

COMPANIES/ORGANIZATIONS COMMENTS

CO122 – Wild Virginia

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April 09, 2017

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Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426
Submitted Via FERC eFiling Feature on the FERC Web Site

Re: Comments on DEIS for the Atlantic Coast Pipeline Proposal, FERC Docket No. CP15-554-000, In Response to Notice of Availability of Draft Environmental Impact Statement for the Atlantic Coast Pipeline, January 6, 2017

Board of Directors:

Dear Mr. Davis:

I am transmitting the comments included in this document on behalf of Wild Virginia, Heartwood, Ernest Q. Reed, Jr., Misty Boos, and David Sligh, in response to the referenced Notice of Availability of the Draft Environmental Impact Statement ("Notice"). The USFS Notice states that: "All comments must be submitted to the FERC, the Lead Federal Agency, within 90 days following the date of publication of the FERC Notice of Availability," in the Federal Register. The FERC Notice was published and dated Monday, January 9 in the Federal Register. 90 days after that date falls on April 9, which is not an official business day, making the deadline for these comments April 10. We therefore request that these comments be considered timely.

Thank you for accepting these comments.

Sincerely,

/s/
Ernest Q. Reed, Jr.

Bette Dzamba
Howard Evergreen
Katie Keller
Jennifer Lewis
Laurie Miller
Ernie Reed
David Sellers
Deirdre Skogen
Elizabeth Williams

CO122-1 We note that the majority of this letter is identical to comment letter CO88. New comments have been coded below; for the remaining comments, see the responses to comment letter CO88.

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Comments on Draft Environmental Impact Statement
for
Atlantic Coast Pipeline
Docket No. CP15-554-000
From Wild Virginia, Heartwood, Ernest Q. Reed, Jr., Misty Boos, and David Sligh

Introduction

The above-named organizations and individuals (collectively “Wild Virginia”), all intervenors on Docket CP15-554-000, strongly object to the approval of the proposed Atlantic Coast Pipeline (“ACP”) by the Federal Energy Regulatory Commission (“FERC” or the “Commission”). Through these comments, we explain the reasons FERC may not legally issue the requested Certificate of Public Convenience and Necessity (“Certificate”), based on both procedural and substantive grounds.

Wild Virginia also objects to the proposed issuance of a Special Use Permit (“SUP”) to Atlantic Coast Pipeline, LLC (“Applicant”) for crossings of National Forest lands, and to related proposals to amend the Land and Resource Management Plans (“plan amendments”) for the Monongahela National Forest (“MNF”) and the George Washington National Forest (“GWNF”). These include proposed project-specific plan amendments for both forests and “plan-level” amendments for the GWNF. The proposals for these administrative actions cannot be upheld based on procedural violations in the current administrative process and because the proposals would cause unacceptable damages and risks to humans and the environment. The environmental review process now underway flagrantly violates the National Environmental Policy Act (“NEPA”); the construction, operation, and maintenance of the pipeline and associated activities (roads, work spaces, etc.) would violate the procedural requirements and resource protection requirements that the United States Forest Service (“FS” or the “Service”) is charged with upholding.

In the following sections, we describe some of the ways that the DEIS is inadequate and fails to meet legal standards. Reports and comments already in the record to inform FERC and the FS illustrate a multitude of other issues ignored or poorly represented in the DEIS. In addition, we describe the ways in which the impacts of the proposed project would be unacceptable and fail to satisfy regulatory environmental protection standards and to serve the public interest.

Wild Virginia is a non-profit organization, incorporated in the Commonwealth of Virginia, with the mission of protecting and conserving the wild and natural values of Virginia’s Natural Forests. Heartwood is a non-profit organization, incorporated in the state of Indiana, with the mission of protecting national forests throughout the central and eastern United States. Wild Virginia, Heartwood Ernest Q. Reed, Jr., Misty Boos, and David Sligh, intervenors.

Incomplete Record to Support Decisions and Adequately Inform the Public

FERC has failed to meet its obligations for review of this project under the National Environmental Policy Act (“NEPA”), by failing to compile and include necessary information in the DEIS. The Draft Environmental Impact Statement (“DEIS”) now under review fails to meet legal standards which govern its content and quality.

FERC has undertaken a process under NEPA to review a proposal by Applicant to construct, operate, and maintain a 42-inch natural gas pipeline through portions of West Virginia and Virginia. In

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pursuance of its duties under NEPA, FERC published a Draft Environmental Impact Statement (“DEIS”) and a notice requesting public comments on the DEIS on December 30, 2016. Federal regulations implementing NEPA command that a DEIS “must fulfill and satisfy *to the fullest extent possible* the requirements established for final statements in section 102(2)(C) of the Act.” 40 C.F.R. § 1502.9(a) (emphasis added). FERC’s DEIS for the ACP fails to meet this mandate in a number of respects, as described below. Of special note, by explicitly deferring requirements for Applicant to supply information needed in the DEIS to the end of this comment period, FERC has clearly violated 40 C.F.R. § 1502.9(a). If FERC deemed it possible in December, 2016 for Applicant to submit necessary materials within the short time the public comment period runs, then it was clearly possible for FERC to take the time needed to get this information and incorporate it into the DEIS before issuing the document. Instead, FERC rushed publication of the DEIS to meet an arbitrary schedule set to serve only Applicant’s interests and in response to pressure from Applicant.

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We doubt that FERC is capable of being an unbiased decision maker. More importantly, we doubt that having already concluded that there will be no impacts if the face of incomplete and inconsistent information, that FERC is capable of taking the “hard look” at the issues that NEPA requires.

The Forest Service has independent authorities and duties for this project proposal (to rule on the SUP application and Plan Amendment proposals), including fulfillment of all NEPA requirements and requirements in the Service’s governing laws. Under NEPA, the Forest Service is acting as a “cooperating agency” in this EIS process. As such, the Forest Service may adopt FERC’s DEIS, as provided at 40 C.F.R. § 1506.3(c), only if that document meets both the substantive and procedural requirements that govern its regulatory decisions. These requirements arise from NEPA and from the agency-specific regulations that govern the Service’s resource protection duties. If the FERC DEIS fails to meet those requirements, as is amply proven by the record, then the Forest Service must undertake its own separate NEPA review. The current FERC DEIS fails as a basis for meeting the Forest Service’s responsibilities under both NEPA and the agency’s own regulations. Therefore, a revised and sufficient DEIS must be prepared, either in cooperation with FERC or through a separate action.

The materials submitted by Applicant to support its request for a SUP and associated Forest Plan amendments to “occupy and use” National Forest System lands fall far short of the regulatory requirements that specify the information and justifications that must be submitted to allow the permit and Plan amendments to be approved. The failure of the DEIS to provide this information, at this stage in the NEPA process, also prevents these agencies from meeting their procedural duties under NEPA and agency requirements. Even if the deficiencies were to be remedied at a later time, the public will have been deprived of its rights to review the necessary information and make effective comments in time for those comments to be fully considered and addressed in the Final Environmental Impact Statement (“FEIS”).

Under law, the applicant bears the burden of supplying sufficient information and analyses to meet all applicable requirements. Likewise, the law places the burden on the federal agencies adopting a DEIS to provide a “detailed” review of the pertinent information and explain the basis for their decisions. Both Applicant and FERC have failed to meet their respective burdens of evidence.

The decision on ACP’s application for a special use permit to “occupy and use” National Forest System lands is governed by federal regulations at 36 C.F.R. § 251.54. Under the regulations, the applicant must submit, “at a minimum,” information detailed at 36 C.F.R. § 251.54(c). In addition, the Forest Service may allow the ACP to occupy or use National Forest lands “only if” these agencies make

CO122-2 See the response to comment CO88-2.

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specific findings in accordance with the Forest Service Manual (“FSM”). The requisite findings, in pertinent parts, are that:

- a. The proposed use is consistent with the mission of the Forest Service to manage National Forest System lands and resources in a manner that will best meet the present and future needs of the American people, taking into account the 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; and
- b. The proposed use cannot reasonably be accommodated on non-Natural Forest System land. . . .

FSM 2703.2(2).

The record does not include information conforming to the minimum requirements set out in 36 C.F.R. § 251.54(c) and is wholly inadequate to justify the findings required by the Forest Service Manual. As demonstrated by the requests for information made by the Forest Service, many of which were not adequately answered before the DEIS’s release and are still not met, and by deficiencies identified and documented in the record by Wild Virginia and other parties, the Applicant has failed or refused to provide the necessary information and analyses. The evidence, in fact, indicates strongly that the threshold requirements for issuing a Special Use Permit cannot be met, as shown in part in the discussion of water quality threats below.

1. By letter dated October 24, 2016, Clyde Thompson, Forest Supervisor, Monongahela National Forest (Docket submittal no. 20161025-5044) requested Applicant to provide “site specific design of stabilization measures in selected high-hazard locations along the proposed ACP Project route.” The Forest Service explained in its letter that the proposed ACP “would cross some very challenging terrain in the central Appalachians” posing “[p]otentially difficult situations,” including “steep slopes, presence of headwater streams, geologic formations with high slippage potential, highly erodible soils, and the presence of high-value natural resources downslope of the high hazard areas.”

The Forest Service substantiated its concerns, noting that “[s]imilar hazards on other smaller pipeline projects in the central Appalachians have led to slope failures, erosion and sedimentation incidents, and damages to aquatic resources.” The possibility that similar problems would occur for this much larger pipeline, according to the Forest Service, “could present a high risk of failures that lead to resource damage.”

The October 2016 letter was not the first time the Forest Service had raised these issues. In fact, the agency has insisted that these potential problems be assessed through extensive and detailed comments and requests for information from its earliest involvement in this process. Those questions have been met by Applicant with “general descriptions and conceptual drawings” of methods proposed to stabilize slopes and control erosion/sedimentation.

The Forest Service makes clear that the requested information for high hazard sites is necessary for it to deem the application for a Special Use Permit complete and ready for further processing and that the information is necessary to “clarify the likelihood that the ACP can be constructed through the George Washington National Forest without undue risk of resource damage.” Given these findings, the analyses in the DEIS cannot be considered adequate to meet the Forest Service requirements under NEPA.

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The deficiencies identified implicate several portions of the requirements the agencies must satisfy. First, one of the minimum requirements contained in the regulations is that the applicant must “provide sufficient evidence to satisfy the authorized officer that the proponent has, or prior to commencement of construction will have, the technical and financial capability to construct, operate, maintain, and terminate the project for which authorization is requested. . . .” Without knowing, in detail, how the hazards identified will affect the pipeline’s construction and maintenance, whether the technical challenges can be surmounted, and, if so, at what cost, the Forest Service cannot deem this minimum requirement to have been met. In expressing the need to “clarify the likelihood that the ACP can be constructed through the George Washington and Monongahela National Forests without undue risk of resource damage,” the Forest Service has questioned whether the pipeline can be built in the National Forest in a safe and protective manner. As discussed below, there is strong evidence that the project cannot be built through individual watersheds without undue risk, because the requirements of the Clean Water Act and state water quality standards will almost certainly be violated.

Second, even if the pipeline can be built in this terrain, the lack of information about the hazards described prevents the Forest Service from making properly-supported findings as to the impacts that would occur. Thus, these agencies do not have a basis of fact on which to rest conclusions about the ways this proposal would affect the uses and values of the National Forest, nor to properly weight the costs and benefits of this proposal, a “no-action alternative,” or any other alternative.

2. The DEIS does not include an adequate analysis of an alternative route for the ACP that would not cross National Forest lands, as federal regulations require and as specified at FSM 2703.2(2)b. The minimum threshold for deciding whether **any** crossing of National Forest lands may be allowed, is a finding that the “proposed use cannot reasonably be accommodated on non-National Forest System land.” By contrast, FERC stated in the DEIS:

Based on our evaluations, we conclude that the major pipeline route alternatives do not offer a significant environmental advantage when compared to the proposed route or would not be economically practical; and therefore, are not preferable to the proposed action. We also conclude that the route variations evaluated do not offer significant environmental advantages when compared to the corresponding segments of the proposed pipeline route; and therefore, are not preferable to the proposed action.

DEIS at 5 - 27.

Forest Service regulations place a substantial burden on those proposing to cross our public lands. FERC seeks to relieve Applicant of that burden but cannot legally do so. The FS may not allow this process to proceed without a valid analysis of one or more alternative routes that avoid **all** National Forest lands. And such an important analysis cannot be supplied for the first time in the FEIS but must be available for public review and comment in a revised DEIS. If **any** alternative to crossing National Forest lands can “reasonably accommodate” the project, then it is nearly certain that such a re-routing in those specific areas will also require significant changes to the route on non-National Forest lands, producing issues that the public cannot possibly anticipate or address in comments to the current DEIS.

Unacceptable Impacts

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Even with the deficiencies in the evidence Applicant has submitted and the inadequacies of FERC's analyses, the record reveals risks that are undoubtedly posed by this project proposal. Three examples are described below:

Water Quality Violations in Headwater Streams -

Headwater streams, the arteries that feed larger waterbodies downstream, are of enormous importance, both as individual resources and as essential components of entire river systems.¹ The proposed route for the ACP would damage dozens of these types of streams and yet these impacts are essentially dismissed by FERC in the DEIS. FERC catalogs some of the threats to streams posed by the proposal, though the list is far from complete:

Impacts on waterbodies could result from construction activities in stream channels and on adjacent banks. Clearing and grading of stream banks, blasting (if required), in-stream trenching, trench dewatering, and backfilling could each result in temporary, local modifications of aquatic habitat involving sedimentation, increased turbidity, and decreased dissolved oxygen concentrations.

DEIS at 4-100. FERC then asserts, without scientific support, that “[i]n almost all cases, these impacts would be limited to the period of in-stream construction, and conditions would return to normal shortly after stream restoration activities are completed.” DEIS at 4-100. While FERC has not defined what “shortly” means in this context, the common meaning of the word does not mean months or years, and yet that is the window of recovery the scientific literature describes. For example, a study by an industry group states that “recovery to pre-construction conditions [after in-stream construction of natural gas pipelines] is generally apparent within a year,”² providing no assurance that habitat and aquatic communities will reach pre-construction conditions “shortly.” Another study stated that “[s]ediment load increases during construction have been reported to directly and/or indirectly affect fish through modification of their habitats (e.g., increased embeddedness of substrates or infilling of pools) but blithely described those impacts as “temporary” because pre-construction condition were restored with 1 to 2 years.³ Again, impairment of these resources for months or even years, as studies demonstrate may occur, is not consistent with FERC's claims of minimal and short-term impacts.

The findings cited above and others show FERC's assertions as to the persistence of damages to aquatic life in streams from pipeline crossings to be invalid. However, based on these incorrect assertions, the DEIS goes on to state that “[l]ong-term impacts on surface waters are anticipated to be minor, under normal circumstances, because ACP . . . would not permanently affect the designated water uses. . . .” DEIS at 4-115. The flawed logic this statement reflects cannot be a basis for FERC's findings that water quality impacts will be acceptable. A conclusion that long-term impacts would be minor does not follow from a finding that designated uses in the streams would not be permanently impaired. Further, though the DEIS gives summary descriptions of Clean Water Act requirements and state water quality standards, its analysis is not based on those requirements.

¹ The paper by Meyer et al. provides a comprehensive discussion and literature review supporting these values: Meyer, Judy L., David L. Strayer, J. Bruce Wallace, Sue L. Eggert, Gene S. Helfman, and Norman E. Leonard, *The Contribution of Headwater Streams to Biodiversity in River Networks*, Journal of the American Water Resources Association, Vol. 43, No. 2, February 2007, pages 86 - 103.

² Interstate Natural Gas Association of America (INGAA), *INGAA, River and Stream Crossings Study, (Phase I), Executive Summary*, at 15.

³ Reid, Scott M., Scott Stoklosar, Serge Metikosh, and Jim Evans, *Effectiveness of Isolated Pipeline Crossing Techniques to Mitigate Sediment Impacts on Brook Trout Stream*, Water Qual. Res. J. Canada, Volume 37, No. 2, 2002, at 473.

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Both West Virginia and Virginia have adopted water quality standards reflecting the requirements of the Clean Water Act.⁴ Both states include the support of aquatic life as “designated uses.” The specific command in Virginia standards requires that water quality be protected to support “the propagation and growth of a balanced, indigenous population of aquatic life, including game fish, which might reasonably be expected to inhabit them.”⁵ Also, both states’ regulations require full support of what are termed “existing uses,” which may not be impaired.⁶ Neither designated nor existing uses may be degraded for years or even months, so FERC’s analysis is misguided, in that it focuses on a level of impacts that is not legally allowed, and its assurances that water quality will be adequately protected are baseless.

This general discussion of impacts by the proposed project on streams is particularly troublesome in relation to sensitive and valuable headwater streams in its path. Just one example of likely dire impacts can be seen for the Warwick Run sub-watershed in Highland County, Virginia, at the point where the pipeline would cross from West Virginia into Virginia. The confluence of natural conditions and the intensity of activities Applicant proposes within this small watershed present a situation in which conformance with water quality standards is virtually impossible.

Warwick Run lies within the Back Creek/Jackson River watershed and drains a mountainous area that is 4,337 acres in size.⁷ The watershed is currently more than 96% forested and is almost entirely within the boundaries of the GWNF. Approximately four miles of the proposed pipeline path would affect the watershed, with more than half that length cutting directly across the area and the rest running along the ridge-top on the eastern border of the drainage. Applicant proposed a corridor that would plunge down the slope of the mountain for a distance of about 7,500 feet, on slopes that are sometimes greater than 40% and which are never less than 25%. In one section, the slope would be 105%.⁸ Due to these slopes, shallow bedrock, limited work areas on steep and narrow ridges, and evidence of “surficial creep,” the Forest Service included three separate portions of the pipeline route within the Warwick Run drainage in its request for site-specific assessments in high-hazard areas.⁹

The right-of-way would cross two tributaries to Warwick Run that are designated trout waters by the state and which harbor rare and vulnerable populations of native brook trout. These tributaries and two others that would be crossed by the pipeline would flow directly into Warwick Run, which is also a brook trout stream. All of the upland construction areas and a 4,000+ foot stretch of access road would drain to Warwick Run and its tributaries as well. Warwick Run lies within an area that has been identified to have high quality, “intact” brook trout populations, one of only 103 areas so-designated out of 1,443 in the entire Chesapeake Bay drainage, and is therefore considered a high priority for preservation EPA’s Chesapeake Bay Program.¹⁰

⁴ W. Va. CSR § 47.2.1. et seq.; 9 VAC 25-260-5. et seq.

⁵ 9 VAC 25-260-10.

⁶ Both states adopt the federal definition of “existing uses” - “those uses actually being attained in or on the water, on or after November 28, 1975, regardless of designated uses.” 40 C.F.R. § 131.3(c).

⁷ Watershed characterization information comes from the U.S. EPA’s *National Hydrography Database Plus*, described at <https://www.epa.gov/waterdata/nhdplus-national-hydrography-dataset-plus>.

⁸ October 24, 2016 Letter, Clyde Thompson, Forest Supervisor, Monongahela National Forest (Docket submittal no. 20161025-5044) described on page 2 above.

⁹ Id.

¹⁰ U.S. EPA, Chesapeake Bay Program, *Brook Trout Outcome Management Strategy, 2015-2025, v. 1*.

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Even if Applicant implemented the most protective erosion and sediment control measures on upland construction areas in the Warwick Run watershed, if the greatest possible care was taken in construction of stream crossings (some of which would likely require blasting of bedrock), and if stream banks and riparian areas were restored to conditions as close as possible to those currently found, severe impairment of these waters is likely, if not certain. Cumulative impacts on stream temperatures, from clearing during construction, from the loss of hemlocks to pest infestations, and from global warming must also be considered. Likewise, the conversion of any significant areas of forest to other vegetation types that would accompany the pipeline will affect runoff and infiltration patterns, which will in turn degrade the streams.

The horror story presented by Applicant's proposal for the Warwick Run watershed is repeated numerous times along the proposed pipeline route. These circumstances make passage through these areas legally, if not technically, impossible. The DEIS/EIS must acknowledge as much. These impacts will clearly rise to the level of "significant" impacts and cannot be mitigated sufficiently to justify approval. The Forest Service will fail in its duty if it allows construction through the Warwick Run watershed and others with similar characteristics.

Significant Impairment of Visual Quality and Recreation -

The DEIS makes no attempt to assess the impacts of this proposed pipeline on the Appalachian Trail in context with other pipelines and other existing or potential impacting activities/existing projects that would damage the AT's character and value. Thus, any conclusions related to the scenic, recreational, or economic impacts on the AT, from crossings or viewing areas, are without great value. This failure violates FERC's duty to perform an adequate cumulative impacts analysis under NEPA.

High Risk of Impairment of Groundwater and Subterranean Resources -

The information in the DEIS about groundwater wells, springs, and karst features is, by design, woefully incomplete. First, the assessment ignores the fact that pollutants from upland areas on the Forest will flow down-gradient and enter the karst systems through losing streams. Second, Applicant and FERC have limited the area in which water wells, springs, and swallets ("karst features") must be identified to a region that is within 500 feet of the pipeline and aboveground facilities. This arbitrary distance limit is shown by the overwhelming weight of scientific consensus to be without any basis and totally inadequate to provide any reliable protection for groundwater or surface waters.

Further, the surveys that have been done and those proposed have not and will not be capable of fully characterizing the risks of "karst features" forming in the future, in part due to the very activities proposed by the Applicant. The entire area of subsurface environment overtop karst bedrock formations, including that layer generally called the epikarst, may be just as vulnerable to contamination and channeling of materials to sinkholes and will contribute more diffuse, but still potentially very harmful flows to groundwater, which can still move to springs and wells in a much shorter time than would generally occur in other areas.

The DEIS completely ignores the disruption of hydrologic flow patterns through the karst and into caves; changes that could be catastrophic for the future viability of water supplies for humans and for springs contributing important flows to streams in the region. "Base flows," those contributions of groundwater that sustain perennial streams even during the worst droughts, may be destroyed or greatly diminished if the operations proposed by Applicant do not properly protect against such impacts and the field investigations and analyses so far completed fall far short of a standard that would supply any reasonable degree of protection. Springs in the Shenandoah Valley also contribute important cold-water contributions to the major streams that sustain populations of trout and other species that would otherwise be absent from the "warm water" streams.

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Both the quality and the flow patterns of subterranean flows through the karst, which may be damaged by this project, are vital to the survival of the many sensitive, and in some cases endangered or threatened animals, in the caves and other subsurface zones. The Forest Service has a special responsibility to protect these species and the overall integrity of these systems and the only way any degree of certainty about possible impacts to the whole range of resources at risk in karst areas is to conduct extensive dye testing, LIDAR imaging, ground surveys, and possibly other measures. Even then, the risks are still significant but could be at least lessened to some extent

CO122-3

Forest Fragmentation

The ACP route bisects 105 separate core forest areas in West Virginia and Virginia where biodiversity is the highest and harm to the interior forest from fragmentation would be the greatest. From the terminus in Harrison County, WV, to Buckingham County, Va., 14,786 acres of core forest would be lost to fragmentation caused by the pipeline corridor, access roads, and edge effects along both. The DEIS concedes that forest fragmentation will be permanent and that it cannot be mitigated, but does not see this as a significant issue.

Yet the DEIS fails to detail the environmental impacts of this fragmentation. For instance, the DEIS admits that there would be “the removal of approximately 6,800 acres of forested vegetation (includes 3,800 acres of permanent impacts)” and “fragmentation of interior forest blocks,” but there are no maps or explanation of the location of the large blocks of interior forest that would be impacted.¹¹

Furthermore, the DEIS fails to fully account for the impacts of the forest fragmentation that will be caused by the construction and operation of the pipeline, in terms of (1) the total amount of forest impacted and (2) the impacts to individual species and to habitat. For example, the effects of fragmentation are more extensive than simply the amount of forest cover impacted. Fragmentation impairs key ecosystem functions by decreasing biomass and altering nutrient cycles. Effects are greatest in the smallest and most isolated fragments, and they magnify with the passage of time.¹² These effects create their own cascade of environmental impacts. For this reason, the portion of the draft EIS addressing forest fragmentation and impacts to wildlife and habitat is inadequate.

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Environmental Impacts to Bat Populations

Although the DEIS concludes that the ACP is likely to adversely affect both the Indiana bat and the northern long-eared bat, requiring formal consultation with USFWS, the lack of information renders the analysis of impacts to these and other bat species in the draft EIS incomplete. There is no discussion of the impacts unique to construction or maintenance. Moreover, the Commission has failed to properly include impacts to these species in its assessment of the cumulative impacts of the proposal.

The interrelationships between bat populations and the karst geological formations and caves where they roost and hibernate is well documented. “Dissolution and erosion of limestone and dolostone in this region have created an extensive karst landscape, creating a network of sinkholes, underground streams, caves, and the like...the prevalent carbonate rocks and karst in this ecoregion are associated with unique fauna within caves, including bats, salamanders, and a wide variety of

¹¹ DEIS, at 4-352.

¹² Haddad, et.al., Habitat Fragmentation and its Lasting Impact on Earth's Ecosystems, American Association for the Advancement of Science, Sci. Adv. 2015;1:e1500052, 20 March 2015.

CO122-3 Section 4.5.6 has been revised to include an updated interior forest fragmentation analysis.

CO122-4 Comments noted. Sections 4.7.1, 4.7.1.11, 4.7.1.12, 4.7.1.13, and 4.7.1.14 have been updated with the most recent survey data, impact analyses, and avoidance, mitigation, and conservation measures.

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invertebrates... cave habitats in the Appalachian region include several federally listed rare and/or endangered species including the Madison cave isopod, Townsend's big-eared bat and Indiana bat.¹³

With respect to biological surveys alone, the draft EIS admits that necessary data have yet to be collected for most of the species at issue. For the endangered gray and Virginia big-eared bats, the DEIS does not contain “3,103 acres of hibernacula surveys in 2017.”¹⁴ For the endangered Indiana bat and the threatened northern long-eared bat, the DEIS fails to include “surveys on 65 acoustic sites, 4 mist net sites, 3,103 acres of hibernacula surveys and 185 acres of roost tree surveys in 2017.”¹⁵

While the DEIS states that “FWS has expressed concern regarding impacts to potentially connected karst system located upstream of bat hibernacula that could cause changes to structure, hydrology, and/or hibernacula microclimate that could make bat hibernacula unsuitable, and/or disrupt hibernating bats, leading to mortality[,]” the DEIS states that the applicants would follow a “Karst Mitigation Plan.”¹⁶ In this same section, the Commission admits that “[d]iscussions regarding the potential impacts on karst and bat hibernacula are ongoing with the Commission, FWS, FS, VDGIF, and WVDNR.”¹⁷ If these discussions are ongoing, it is impossible to know whether or how the eventual karst mitigation plan will reduce impacts to bat species. Without this information, it is clear that the impacts and proposed mitigation have not yet been fully noted or analyzed.

The gaping holes in the draft statement’s bat and habitat assessment are at odds with the National Environmental Policy Act. Under NEPA, federal agencies are obligated to take a “hard look” at the environmental implications of their actions—a look that demands, “[a]t the least, ... a thorough investigation into the environmental impacts of ... [proposed] action[s] and a candid acknowledgment of the risks that those impacts entail.”¹⁸ In order to satisfy these requirements, an agency must “gather” all relevant information and ultimately “provide the data on which it bases its environmental analysis.”¹⁹ Since the DEIS does not include the information required to assess the project’s impacts on these threatened and endangered species, the DEIS is both premature and arbitrary.

Specific Objections to Proposed Plan Amendments

Monongahela NF

The Notice describes potential amendments to the MNF Forest Plan to “temporarily exceed standards identified under management direction for soils and water, specifically forest-wide standards SW06 and SW07, provided that design criteria, mitigation measures, project requirements, and/or monitoring activities agreed upon by the FS are implemented as needed to achieve adequate slope and soil stability.”

SW 06 specifics:

“Severe rutting resulting from management activities shall be confined to less than 5 percent of an activity area.”

¹³ Kastning, Ernst, H., An Expert Report on the Geological Hazards in the Karst Regions of Virginia and West Virginia, Investigations and Analysis Concerning the Proposed Mountain Valley Gas Pipeline, July 3, 2016.

¹⁴ DEIS at 4-200 (Table 4.7.1-1) and 4-203.

¹⁵ DEIS at 4-200 (Table 4.7.1-1) and 4-207.

¹⁶ DEIS at 4-212.

¹⁷ Id.

¹⁸ Nat’l Audubon Soc’y v. Dep’t of the Navy, 422 F.3d 174, 185 (4th Cir. 2005).

¹⁹ N. Plains Res. Council, Inc. v. Surface Transp. Bd., 668 F.3d 1067, 1083, 1085 (9th Cir. 2011)

COMPANIES/ORGANIZATIONS COMMENTS

CO122 – Wild Virginia (cont’d)

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An activity that causes “severe rutting” is, by definition, destructive and presents a risk to water quality. Ruts will provide channels for runoff and enhance the likelihood that erosion will occur. The force of concentrated flows in areas of severe rutting will be more difficult to control and management practices for sediment trapping or filtering will be less effective. Therefore, limiting the occurrence of this condition to a relatively small area, within which stabilization and restoration can be achieved quickly, is absolutely necessary.

Even the existing formulation, based on a percentage of the work area, is inadequate, because the larger the overall site, the larger the severely-rutted area will be. And the larger the severely-rutted area is, the more time and effort will be required to correct the problems at this site and prevent serious environmental damage. Given that much of the terrain in the MNF that would be crossed by the ACP is steep, has sensitive streams, unstable and highly erodible soils, and high rainfall amounts and intensities, allowing larger areas with “severe rutting” would be particularly reckless. If any variance from the general condition in SW 06 is made, the requirement should be more stringent rather than less. It should specify an aerial extent in acres or square feet rather than a percentage of the entire work area. Also, it may well be necessary to require and even more limited size of area in difficult terrain.

SW 07 specifics:

Use of wheeled and/or tracked motorized equipment may be limited on soil types that include the following soil/site area conditions:

- a) Steep Slopes (40 to 50 percent) - Operation on these slopes shall be analyzed on a case-by-case basis to determine the best method of operation while maintaining soil stability and productivity.
- b) Very Steep Slopes (more than 50 percent) - Use is prohibited without recommendations from interdisciplinary team review and line officer approval.
- c) Susceptible to Landslides - Use on slopes greater than 15 percent with soils susceptible to downslope movement when loaded, excavated, or wet is allowed only with mitigation measures during periods of freeze-thaw and for one to multiple days following significant rainfall events. If the risk of landslides during these periods cannot be mitigated, then use is prohibited.
- d) Soils Commonly Wet At Or Near The Surface During A Considerable Part of the Year, or Soils Highly Susceptible To Compaction. Equipment use shall normally be prohibited or mitigated when soils are saturated or when freeze-thaw cycles occur.

This requirement is already conditional (use of certain equipment “may be limited”). All the condition defined in items a. through d. allow the use of the equipment described but only after additional review. The environmental settings described, in which special reviews are required, are all very problematic and present great risks of destructive results from equipment use and severe damage to water quality. There is no justification for eliminating the requirements for additional review contained in a. through d. and, as stated above, an amendment that relaxes these requirements will be reckless.

CO122-5

George Washington National Forest-Proposed Forest Plan Amendments

The Revised Land Management Plan for the George Washington National Forest was approved and finalized in November, 2014. The plan states that “Public collaboration is a key part of the planning process. Our goals...are to ensure that all individuals and groups interested in or affected by the management of the George Washington National Forest have the opportunity to be informed and participate in the revision process; to reach an informed understanding of the varying interest; and to

CO122-5 See the response to comment CO88-10.

Z-2599

COMPANIES/ORGANIZATIONS COMMENTS

CO122 – Wild Virginia (cont'd)

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CO122-5
(cont'd)

consider these interests in developing the revised plan...many opportunities were provided...to get involved in the planning process and to provide comments.”²⁰

There is no mention in the plan of either energy or natural gas infrastructure as being a significant issue. This despite the fact that 1) the announcement of the Request for Proposals by Duke Energy and the announcement of the Southeast Reliability Project (the previous name for the ACP) in May, 2014 predated the release of the plan and 2) neither Dominion nor Duke Energy had chosen to be involved in the planning process, depriving the public, state and federal agencies of the opportunity to fully analyze the relevance, sufficiency or impacts of new energy corridors in the “reasonably foreseeable future.” Dominion and Duke Energy acted arbitrarily and capriciously in waiting until the new plan was released to consider raising the issue, instead of including it in the more appropriate forest plan analysis for the plan itself. This action was an act of deceit that deprived the USFS opportunity to consider it in a timely and effective manner and in context with all other components of the plan.

For this reason, and for the reasons stated below, we request denial of any forest plan amendment increasing the areas or acreage in “Rx 5C-Designated Utility Corridors” by the applicants.

Proposed Amendment 1: This proposal would change the plan designation of 102.3 acres to make these lands “Rx 5C-Designated Utility Corridors.” This change would remove management for dispersed recreation and mosaics of habitat from these areas. We oppose this change and assert that any new utility project should be examined in a site-specific plan review.

Proposed Amendment 2: These soil condition and riparian corridor conditions are appropriate and protective measures. The proposed change, allowing the general conditions to be violated “provided that mitigation measures or project requirement agreed upon by the FS are implemented as needed,” defers decisions and allows variances without adequate guidance to limit the discretion of FS personnel faced with these decisions.

The protections these conditions provide are too important to be swept away for the benefit of this one entity. For example, FW-5 requires that “organic layers, topsoil and root mat” be left in place over at least 85% of the activity area and that revegetation occur within 5 years. The Applicant is supposed to be committed to establishing viable and sustainable plant communities in all disturbed areas and should have that goal met well before 5 years have elapsed. Making sure that sufficient organic matter and suitable soils are kept in place is essential to meet these goals.

FW-15, FW-16, and FW-17 all appropriately regulate activities in and near the channels of ephemeral streams. Case-by-case exceptions may be allowed for F-15 (vehicle travel) and FW-17 (limit on percentage of timber removed), providing sufficient flexibility for operations in these areas while requiring site-specific reviews to avoid serious damage in these areas. FW-16 limits the percentage of “mineral soil” that may be exposed in these zones and is also an appropriate and necessary limitation. These ephemeral streams are important resources and must be protected even when flow is not present. It is well established that aquatic biota can and do survive in ephemeral stream beds and, of course, they may contribute pollution to downstream waters when flowing. The proposed special exceptions should not be granted. Rather, Applicant must be held to the same standards as all other activities in these areas, whether conducted by public or private parties.

²⁰ United States Department of Agriculture, Region 8, Revised Land and Resource Management Plan, George Washington National Forest, November, 2014, 1-9.

COMPANIES/ORGANIZATIONS COMMENTS

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The requirements of 11-019 prevent tree removal in the “core of the riparian corridor,” unless done to meet one or more of the listed purposes. The exception to the prohibition, allowing for tree removal “[f]or approved facility construction/renovation” should easily accommodate the work proposed for this project, if approved. There is no valid reason for removing the protections this provision provides.

Proposed Amendment 3 - The notice states that “[t]he LRMP would be amended to allow the ACP to cross the Appalachian National Scenic Trail in Augusta County, Virginia (reference LRMP Standard 4A-025).” As with other proposed amendments above, this change is unnecessary, because the provisions of 4A-025 already allow “a single crossing of the prescription area by linear utilities and rights-of-way, limiting location of new crossings to areas “where major impacts already exist.” The damages that would be inflicted on the Appalachian Trail and the experience of users due to visual and noise impacts in sight and hearing of the Trail but not directly associated with a crossing are already much too great. Any new activities of this type must be very strictly limited and there is no justification for this amendment.

Proposed Amendment 4: The Notice states that “[t]he LRMP may need to be amended to allow the removal of old growth trees within the construction corridor.” The pipeline route should avoid all old growth stands. Given that the DEIS already acknowledges that forest fragmentation would be a significant negative impact of the ACP that cannot be mitigated, the removal of old growth trees would exacerbate unavoidable impacts that already exist and must not be allowed.

Proposed Amendment 5: This possible amendment, according to the Notice, would be made “to allow major reconstruction of a NFS road within the Rx 2C3 area.” The areas under this prescription include just seven stream segments on some of the highest quality streams in the GWNF, all of which have been designated “eligible recreation rivers” for possible inclusion in the “National Wild and Scenic River System.” Water resources of this magnitude are much too rare to allow major and very invasive construction within them - work that could well destroy the values that, otherwise, might enable their designation for national-level protections. Rather than allowing major reconstruction of roads in these areas, the FS should place a high priority on the removal and rehabilitation of roads.

Proposed Amendment 6: This proposal would allow violation of the existing “Scenic Integrity Objectives” for some unspecified period of time while the wounds created by the Project are allowed to partially heal. The Notice promises that mitigation measures “are expected to improve visual quality over an extended timeframe.” This “extended timeframe” is undefined and, in fact, the FS must acknowledge that even the best mitigation measures will still damage scenic integrity. Neither short-term nor long-term impairment of this important feature of the Forest for industrial construction should be granted approval through the Forest Plan. If any lessening of scenic integrity standards were to be allowed, those exceptions should be very strictly defined and limited and the current construction and mitigation plans the Applicant has proposed and FERC has deemed acceptable in the DEIS are far from sufficient.

CO122-6

As a cooperating agency, the Forest Service may adopt the draft EIS issued by the Commission on December 30, 2016 without recirculating it if, “after an independent review of the statement,” the Forest Service concludes that its comments and suggestions have been satisfied.²¹ Given the dearth of essential information in the draft EIS related to impacts to the MNF and GWNF, we urge the Forest Service not to adopt this draft EIS. Instead, the Forest Service should issue a revised draft EIS for the

²¹ 134 40 C.F.R. 1506.3(c). 49

CO122-6

FS response: Since the draft EIS, Atlantic has provided additional information and analyses as requested by the FS to evaluate the effects of the proposed project. The FS has worked with Atlantic to develop project design features, mitigation measures, and monitoring procedures to ensure that NFS resources are protected. The determination that the EIS is sufficient to meet FS NEPA obligations will be made in the FS ROD for the plan amendments decision. The FS no longer proposes to change any land allocations to the Rx5C- Designated Utility Corridors on the GWNF.

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COMPANIES/ORGANIZATIONS COMMENTS

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SUP, associated plan amendments, and other impacts to the MNF and GWNF, based on complete information and an adequate assessment of the environmental impacts of the Atlantic Coast Pipeline's proposed route through the National Forests, and provide that revised draft EIS for public review and comment.

The Forest Service clearly has the authority and the obligation to revise the National Forest analysis in this draft EIS and to issue a new draft for public comment. Only then will the Forest Service have the information it needs to make a reasoned decision and the public the tools needed to comment in a meaningful way on the impacts on the National Forests and the sufficiency of Atlantic's proposed mitigation measures.

Furthermore, we request that the Forest Service reject all and any forest plan amendments that would change or increase the areas or acreage in "Rx 5C-Designated Utility Corridors" by the applicants. We also request denial of any special-use permit by the applicants that would depend on any changes to the existing forest plan in management area Rx 5-C.

Z-2602

RESEARCH ARTICLE

APPLIED ECOLOGY

Habitat fragmentation and its lasting impact on Earth's ecosystems

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10.1126/sciadv.1500052

We conducted an analysis of global forest cover to reveal that 70% of remaining forest is within 1 km of the forest's edge, subject to the degrading effects of fragmentation. A synthesis of fragmentation experiments spanning multiple biomes and scales, five continents, and 35 years demonstrates that habitat fragmentation reduces biodiversity by 13 to 75% and impairs key ecosystem functions by decreasing biomass and altering nutrient cycles. Effects are greatest in the smallest and most isolated fragments, and they magnify with the passage of time. These findings indicate an urgent need for conservation and restoration measures to improve landscape connectivity, which will reduce extinction rates and help maintain ecosystem services.

INTRODUCTION

Destruction and degradation of natural ecosystems are the primary causes of declines in global biodiversity (1, 2). Habitat destruction typically leads to fragmentation, the division of habitat into smaller and more isolated fragments separated by a matrix of human-transformed land cover. The loss of area, increase in isolation, and greater exposure to human land uses along fragment edges initiate long-term changes to the structure and function of the remaining fragments (3).

Ecologists agree that habitat destruction is detrimental to the maintenance of biodiversity, but they disagree—often strongly—on the extent to which fragmentation itself is to blame (4, 5). Early hypotheses based on the biogeography of oceanic islands (6) provided a theoretical framework to understand fragmentation's effect on extinction in terrestrial landscapes composed of "islands" of natural habitat scattered across a "sea" of human-transformed habitat. Central to the controversy has been a lingering uncertainty about the role of decreased

fragment size and increased isolation relative to the widespread and pervasive effects of habitat loss in explaining declines in biodiversity and the degradation of ecosystems (7). Observational studies of the effects of fragmentation have often magnified the controversy because inference from nonmanipulative studies is limited to correlation and because they have individually often considered only single aspects of fragmentation (for example, edge, isolation, and area) (8). However, together with these correlative observations, experimental studies reveal that fragmentation has multiple simultaneous effects that are interwoven in complex ways and that operate over potentially long time scales (9).

Here, we draw on findings of the world's largest and longest-running fragmentation experiments that span 35 years and disparate biomes on five continents. Their rigorous designs and long-term implementation overcome many limitations of observational studies. In particular, by manipulating and isolating individual aspects of fragmentation while controlling for others, and by doing so on entire ecosystems, they provide a powerful way to disentangle cause and effect in fragmented landscapes. Here, we present experimental evidence of unexpected long-term ecological changes caused by habitat fragmentation.

Highlighting one ecosystem type as an example, we first present a global analysis of the fragmentation of forest ecosystems, quantifying for the first time the global hotspots of intensive historical fragmentation. We then synthesize results from the set of long-term experiments conducted in a wide variety of ecosystems to demonstrate consistent impacts of fragmentation, how those impacts change over time, and how they align with predictions from theory and observation. Finally, we identify key knowledge gaps for the next generation of fragmentation experiments.

GLOBAL ANALYSIS OF THE EXTREME MAGNITUDE AND EXTENT OF FRAGMENTATION

New satellite data sets reveal at high resolution how human activities are transforming global ecosystems. Foremost among these observations are those of forest cover because of the high contrast between forest

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and anthropogenic land cover types. Deforestation, which was already widespread in temperate regions in the mid-18th to 20th centuries and increased in the tropics over the past half century, has resulted in the loss of more than a third of all forest cover worldwide (10, 11). Beyond the direct impacts of forest loss and expanding anthropogenic land cover (for example, agricultural fields and urban areas), remnant forests are likely to suffer from being smaller, more isolated, and with a greater area located near the edge of the forest (12).

We analyzed the world's first high-resolution map of global tree cover (13) to measure the magnitude of forest fragmentation. This analysis revealed that nearly 20% of the world's remaining forest is within 100 m of an edge (Fig. 1, A and B)—in close proximity to agricultural, urban, or other modified environments where impacts on forest ecosystems are most severe (14). More than 70% of the world's forests are within 1 km of a forest edge. Thus, most forests are well within the range where human activities, altered microclimate, and nonforest species may influence and degrade forest ecosystems (15). The largest contiguous expanses of remaining forests are in the humid tropical regions of the Amazon and Congo River Basins (Fig. 1A). Large areas of more disjunct forest also remain in southeastern Asia, New Guinea, and the boreal biomes.

Historical data enable the study of the process of forest fragmentation over time. We reconstructed the historical forest extent and timing of fragmentation in two forested regions of Brazil that provide a stark contrast in land-use dynamics. The Brazilian Amazon is a rapidly changing frontier (10), yet most of its forests remain contiguous and far from an edge despite recent increases in fragmentation (Fig. 1, C and D). In contrast, the Brazilian Atlantic Forest is a largely deforested landscape, cleared for agriculture and logged for timber over the last three centuries (11). This remaining forest is dominated by small fragments, with most fragments smaller than 1000 ha and within 1000 m of a forest edge (Fig. 1, E and F) (16). In the Brazilian Amazon, the proportion of forest farther than 1 km from the forest edge has decreased from 90% (historical) to 75% (today), and in the Brazilian Atlantic, from 90% to less than 9%.

These two forested regions of Brazil define extremes of the fragmentation process and are representative of the extent of fragmentation in forested landscapes worldwide (Fig. 1), as well as many other biomes including temperate grasslands, savannas, and even aquatic systems (17). For example, although a spatial analysis similar to that of forest is not currently possible in grasslands, 37% of the world's grassland eco-regions are classified as "highly fragmented" (18, 19).

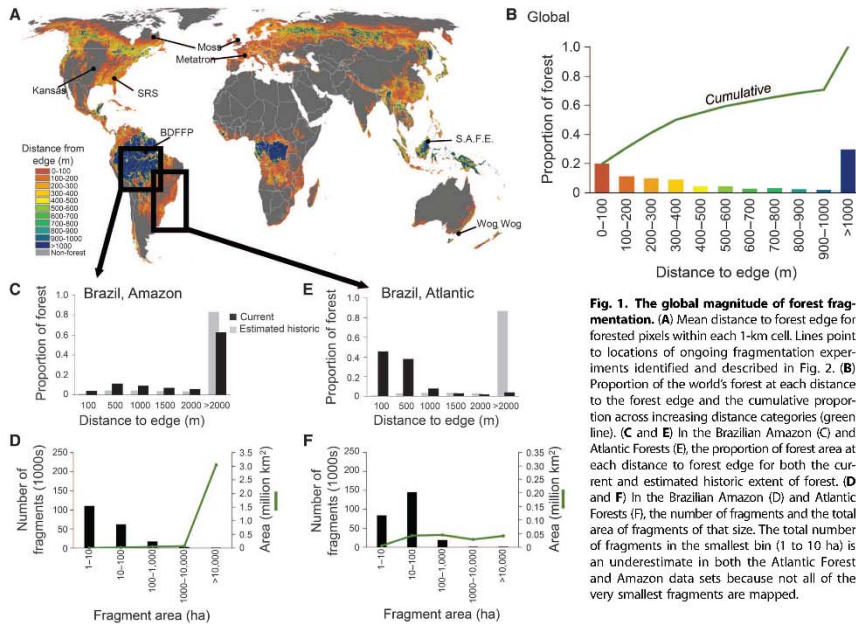


Fig. 1. The global magnitude of forest fragmentation. (A) Mean distance to forest edge for forested pixels within each 1-km cell. Lines point to locations of ongoing fragmentation experiments identified and described in Fig. 2. (B) Proportion of the world's forest at each distance to the forest edge and the cumulative proportion across increasing distance categories (green line). (C and E) In the Brazilian Amazon (C) and Atlantic Forests (E), the proportion of forest area at each distance to forest edge for both the current and estimated historic extent of forest. (D and F) In the Brazilian Amazon (D) and Atlantic Forests (F), the number of fragments and the total area of fragments of that size. The total number of fragments in the smallest bin (1 to 10 ha) is an underestimate in both the Atlantic Forest and Amazon data sets because not all of the very smallest fragments are mapped.

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Robust knowledge of how habitat fragmentation affects biodiversity and ecosystem processes is needed if we are to comprehend adequately the implications of this global environmental change.

THE VALUE OF LONG-TERM FRAGMENTATION EXPERIMENTS

Long-term experiments are a powerful tool for understanding the ecological consequences of fragmentation (38). Whereas observational studies of fragmented landscapes have yielded important insights (9, 39), they typically lack rigorous controls, replication, randomization, or baseline data. Observational studies have limited ability to isolate the effects of fragmentation from concomitant habitat loss and degradation *per se* (4, 7, 22). Remnant fragments are embedded in different types and qualities of surrounding habitat, complicating interpretation because the surrounding habitat also influences biodiversity and ecosystem productivity (23).

The long-term fragmentation experiments we analyze here comprise the entire set of ongoing terrestrial long-term experiments. They

occur in several biomes (Fig. 2 and Supplementary Materials) and were designed to manipulate specific components of fragmentation—habitat size, isolation, and connectivity—while controlling for confounding factors such as the amount of habitat lost across a landscape (Fig. 2). The largest fragments across these experiments match the size of fragments commonly created by anthropogenic activities (Fig. 1 and 2). Distances to the edge of experimental fragments range to 300 m, encompassing edge distances found in more than half of forests worldwide (Fig. 13). In each experiment, different fragmentation treatments with replication were established, starting from continuous, nonfragmented landscapes and controlling for background environmental variation (either by experimental design [blocking] or by measurement of covariates for use in subsequent analyses). Tests were conducted within fragments that varied experimentally in area or edge, within fragments that were experimentally isolated or connected, or within experimental fragments compared to the same area within continuous habitat. All treatments were replicated. Experiments were created by destroying or creating precise amounts of habitat across replicate landscapes, allowing tests of fragmentation effects independent of habitat loss. The robust

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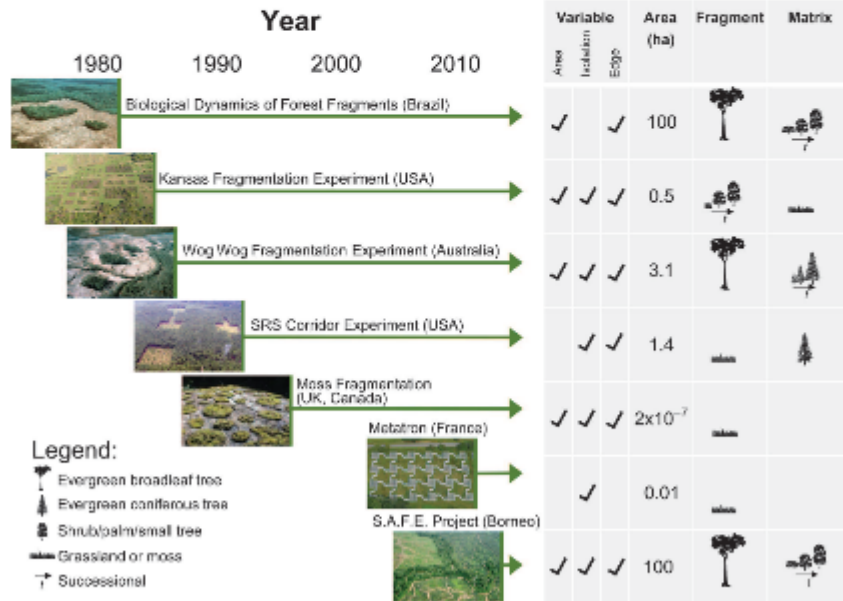


Fig. 2. The world's ongoing fragmentation experiments. All experiments have been running continuously since the time indicated by the start of the associated arrow (with the exception of the moss fragmentation experiment, which represents a series of studies over nearly two decades). The variables under study in each experiment are checked. The area & that of the experiment's largest fragments, listed under "Fragment" and "Matrix" indicate the dominant community and its relative height, with multiple trees representing succession.

COMPANIES/ORGANIZATIONS COMMENTS

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and comparable experimental designs allow for powerful tests of the mechanisms underpinning the ecological impacts of fragmentation, and the long-term nature of causing studies has revealed consistent emergent effects.

These experiments mimic anthropogenic fragmentation; they are whole ecosystem manipulations in which all species and processes experienced the same treatment (29). Emergent responses thus reflect the multiple direct and indirect effects of interacting species and processes. Further, because experimentally fragmented ecosystems are open to fluxes of individuals and resources, fragmentation effects can manifest across multiple levels of ecological organization (Fig. 3). Long-term experiments have the power to detect lagged, and/or chronic impacts.

The first fragmentation experiments, now more than three decades old, were created to test effects of fragment area on both species persistence and patterns of immigration, reflecting concern in conservation biology about the role of fragmentation in reducing population sizes below viable levels (25) (Fig. 2). Subsequent experiments created two decades ago, shifted focus to remedying habitat isolation, reflecting recognition of the potential to mitigate negative effects of fragmentation by recreating habitat—specifically with corridors—to increase connectivity among fragments (26) (Fig. 2). The newest experiments test emerging questions about potentially deleterious synergies between fragmentation and global changes in climate and land use (Fig. 2).

We synthesized results available 31 January 2014 for all studies within these experiments that were conducted in all treatments and replicates, and tested fragmentation effects on dispersal, abundance, extinction, species richness, community composition, and ecosystem functioning. We first calculated effect sizes of fragmentation as log response ratios (Fig. 3). Data from 76 different studies across the five longest running experiments were drawn from published and unpublished sources (table S1). We synthesized results according to three fragmentation treatments: reduced fragment area [the focus of Biological Dynamics of Forest Fragments Project (BDFFP), Wag-Wag, and Kansas; see Fig. 2 for identities of experiments], increased fragment isolation (Susannah River Site (SRS) and Moss), and increased proportion of edge fall experiments). Fragmented treatments were compared directly to non- or less-fragmented habitats that were either larger or connected via structural corridors (table S1).

Strong, consistent, and accumulating effects of habitat fragmentation

Our synthesis revealed strong and consistent responses of organisms and ecosystem processes in fragmentation arising from decreased fragment area, increased isolation, and the creation of habitat edges (Fig. 3).

Community and ecosystem responses emerge from observed responses at the level of populations. Reduced area decreased animal

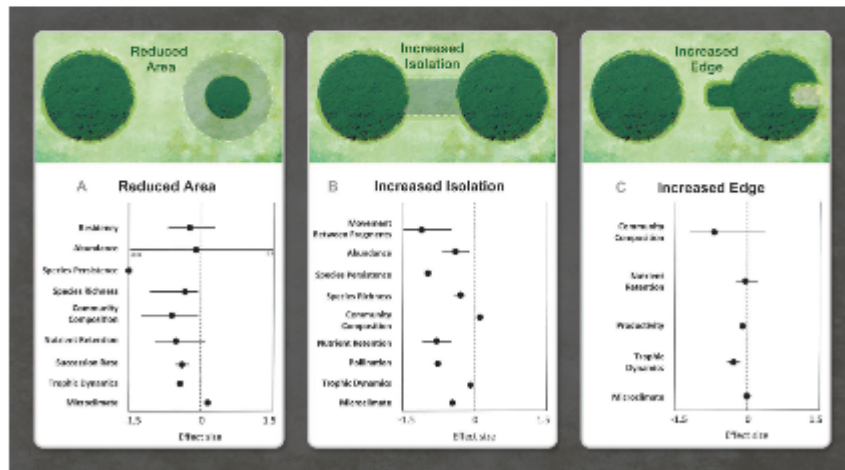


Fig. 3. Fragmentation effects propagate through the whole ecosystem. (A to C) For each fragmentation treatment [reduced area in BDFFP, Wag-Wag, Kansas (A); increased isolation in SRS and Moss (B); and increased edge in all experiments (C)], we summarize major findings for ecological processes at all levels of ecological organization. Each dot represents the mean effect size [summarized as log response

ratio (mean in more fragmented treatment/mean in non- or less fragmented treatment)] for an ecological process. Effect sizes are statistical, such that negative or positive values could represent degrading function. Horizontal bars are the range when a dot is represented by more than one study. Details, including individual effect sizes for each study, are reported in table S1.

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CO122 – Wild Virginia (cont'd)

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residency within fragments, and increased isolation reduced movement among fragments, thus reducing fragment recolonization after local extinction (Fig. 3, A and B). Reduced fragment area and increased fragment isolation generally reduced abundance of birds, mammals, insects, and plants (Fig. 3, A and B). This overall pattern emerged despite complex patterns of increases or declines in abundance of individual species (Fig. 3A) with various proximate causes such as release from competition or predation, shifts in disturbance regimes, or alteration of abiotic factors (14, 27–29). Reduced area, increased isolation, and increased proportion of edge habitat reduced seed predation and herbivory, whereas increased proportion of edge caused higher fledging predation that had the effect of reducing bird fecundity (represented together as trophic dynamics in Fig. 3, A to C). Perhaps because of reduced movement and abundance, the ability of species to persist was lower in smaller and more isolated fragments (Fig. 3, A and B).

As predicted by theory (6, 30, 31), fragmentation strongly reduced species richness of plants and animals across experiments (Fig. 3, A and B), often changing the composition of entire communities (Fig. 3, A to C). In tropical forests, reduced fragment size and increased proportion of edge habitat caused shifts in the physical environment that led to the loss of large and old trees in favor of pioneer trees (Fig. 3, A and C), with subsequent impacts on the community composition of insects (32). In grasslands, fragment size also affected succession rate, such that increased light penetration and altered seed pools in smaller fragments impeded the rate of ecological succession relative to that of larger fragments (33) (Fig. 3A).

Consistently, all aspects of fragmentation—reduced fragment area, increased isolation, and increased edge—had degrading effects on a disparate set of core ecosystem functions. Degraded functions included reduced carbon and nitrogen retention (Fig. 3, A to C), productivity (Fig. 3C), and pollination (Fig. 3B).

In summary, across experiments spanning numerous studies and ecosystems, fragmentation consistently degraded ecosystems, reducing species persistence, species richness, nutrient retention, trophic dynamics, and, in more isolated fragments, movement.

Long-term consequences of fragmentation

To synthesize all time series of species richness and ecosystem functioning gathered across experiments, we measured effects of fragmentation over the course of each study. The effect of fragmentation was calculated over time as the proportional change in fragmented relative to non- or less-fragmented treatments (Fig. 4).

In most cases, the large and consistent effects of fragmentation revealed by the experiments were predicted from theory. However, we were struck by the persistence of degradation to biodiversity and ecosystem processes and by the increase in many of the effects over time (Fig. 4). For example, extreme rainfall events at Wog Wog appeared to delay the decline in plant species richness for 5 years after fragmentation. In the Kansas Experiment, a lag of 12 years occurred before fragmentation effects on plant succession were detected. Our results thus reveal long-term and progressive effects of fragmentation and provide support for three processes proposed by recent studies in spatial ecology: extinction debt, immigration lag, and ecosystem function debt (Fig. 4).

First, we found strong evidence for temporal lags in extinction [that is, “extinction debt” (30)] in fragments. Species richness of plants, arthropods, and birds sampled in the experiments conducted in mature forest fragments and replicated moss landscapes showed decreases of

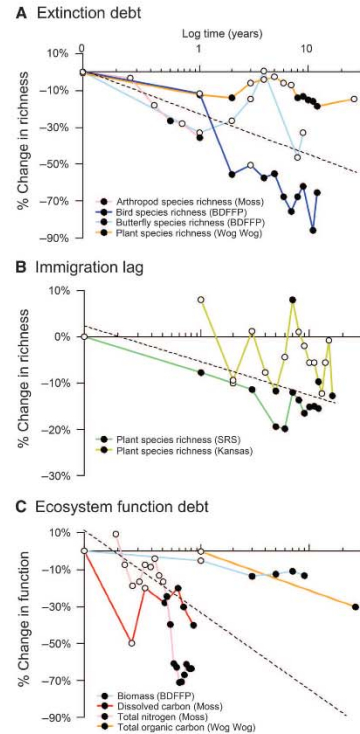


Fig. 4. Delayed effects of fragmentation on ecosystem degradation.

(A) The extinction debt represents a delayed loss of species due to fragmentation. (B) The immigration lag represents differences in species richness caused by smaller fragment area or increased isolation during fragment succession. (C) The ecosystem function debt represents delayed changes in ecosystem function due to reduced fragment size or increased isolation. Percent loss is calculated as proportional change in fragmented treatments [for example, (no. of species in fragment – no. of species in control)/(no. of species in control) × 100]. Fragments and controls were either the same area before and after fragmentation, fragments compared to unfragmented controls, or small compared to large fragments. Filled symbols indicate times when fragmentation effects became significant, as determined by the original studies (see table S2). Mean slopes (dashed lines) were estimated using linear mixed (random slopes) models. Mean slope estimates (mean and SE) were as follows: (A) –0.22935 (0.07529); (B) –0.06519 (0.03495); (C) –0.38568 (0.16010).

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20 to 75% after fragmentation (Fig. 4A). Some declines were evident almost immediately after fragmentation, whereas others increased in magnitude over the experiment's duration. Across experiments, average loss was >20% after 1 year, >50% after 10 years, and is still increasing in the longest time series measured (more than two decades). The rate of change appears to be slower in larger fragments [in BDFFP, 50% decline in bird species after 5 years in 1-ha fragments, but after 12 years in 100-ha fragments; in Moss, 40% decline in arthropod species richness of small fragments and 26% reduction in large fragments after 1 year (34, 35)]. As predicted by theory (36), the extinction debt appears to take longer to pay in larger fragments.

Second, we observed that reduced richness was coincident with an "immigration lag" (37), whereby small or isolated fragments are slower to accumulate species during community assembly (33, 38) (Fig. 4B). Immigration lags were observed in experiments conducted in successional systems that were initiated by creating new habitat fragments, rather than by fragmenting existing habitats. After more than a decade, immigration lags resulted in 5% fewer species after 1 year, and 15% fewer species after 10 years in small or isolated fragments compared to large or connected fragments (Fig. 4B).

Third, we observed an ecosystem function debt caused by fragmentation (39) in forest and moss fragments (Fig. 4C). An ecosystem function debt is manifest both as delayed changes in nutrient cycling and as changes to plant and consumer biomass. Loss of function amounted to 30% after 1 year, rising to 80% after a decade in small and isolated fragments when compared to larger and more connected fragments (Fig. 4C). Functional debts can result from biodiversity loss, as when loss of nutrients and reduction in decomposition are caused by simplification of food webs. Alternatively, the impact is exhibited through pathways whereby fragmentation changes biotic (for example, tree density in successional systems) or abiotic conditions (for example, light regimes or humidity) in ways that alter and potentially impair ecosystem function [for example, biomass collapse in fragments; Figs. 3 and 4; altered nitrogen and carbon soil dynamics (40)].

A new understanding of the effects of fragmentation

By testing existing theory, experiments play a pivotal role in advancing ideas and developing new theory. We draw on experimental evidence to highlight two ways that the understanding of fragmentation has been enriched by the interplay between long-term experiments and development of theory.

First, island biogeography (6) was among the earliest theories to predict extinction and immigration rates and patterns of species richness in isolated biotas, which were later used to predict the effects of fragmentation on these variables. Experiments in continental settings tested the theory and gave rise to fresh perspectives. For example, islands are surrounded by sea, a thoroughly inimical matrix for island-dwelling species. Habitat islands, or fragments, are surrounded by a matrix that may not be so unsuitable for some species. In terms of all of the ecological variables studied in our long-term experiments, our results support the conclusion that ecological dynamics in human-modified fragments are a stark contrast to the dynamics in intact habitats that remain. Observational studies that have devoted more detailed consideration to the countryside within which fragments are embedded explain the diversity of ecological responses in remaining fragments (41). At the same time as experiments supported the core predictions of classical theories about effects of fragment size and isolation (Figs. 3 and 4), they spurred and tested new theories such as metacommunity theory (42) to account

for variation in connectivity and habitat quality within and between fragments (33, 43–45), spatial dynamics (14, 46), and spatially varying interspecific interactions (47).

Second, experiments have demonstrated that the effects of fragmentation are mediated by variation in traits across species. More realistic predictions of community responses to fragmentation emerged after explicit consideration of species traits such as rarity and trophic levels (48, 49), dispersal mode (50–52), reproductive mode and life span (29, 53), diet (54), and movement behavior (55, 56). Increasingly, the simple theoretical prediction that fragmentation reduces species richness is being modified to account for species identity through models that focus on how species vary in their traits (4, 21, 36, 48, 57, 58). Consideration of traits may help to interpret variation around the overarching pattern that fragmentation consistently reduces species richness across many species and biomes (Figs. 3 and 4).

A NEW GENERATION OF FRAGMENTATION EXPERIMENTS

New foci are emerging for studying ecosystem fragmentation, including (i) synergies between fragmentation and global changes, (ii) eco-evolutionary responses of species to fragmentation, and (iii) ecological responses to fragmentation in production landscapes—that is, ecosystems whose services are under extreme appropriation by humans (59).

First, conclusions from experiments thus far are likely to have been conservative because impacts from other environmental changes have been mostly excluded. Most forms of global change known to reduce population sizes and biodiversity will be exacerbated by fragmentation (58, 60), including climate change (61), invasive species (62, 63), hunting (64), pollution [including light, noise, and chemicals (65)], and altered disturbance regimes (66).

More complex experiments with unparalleled control and capacity to simultaneously manipulate fragmentation and other global changes are now under way (53). The Metatron, created in 2011 in southern France (67), enables ecologists to assess effects of variation in temperature and other abiotic factors in addition to habitat isolation. The SAFE Project is being created in the rainforest of Borneo (68) and will embed a fragmentation experiment within a production agricultural plantation in which poaching will occur. Other synergies should be investigated experimentally, including the interaction between fragmentation and hunting, fire, infectious disease outbreaks, or nitrogen deposition. Within these experiments, fragmentation and loss of habitat can then be varied independently.

Second, current experiments have stopped short of examining how fragmentation drives evolution through genetic bottlenecks, ecological traps, changing patterns of selection, inbreeding, drift, and gene flow (69–72). Extensive fragmentation has occurred over many years, and in some regions over millennia (11). Changes caused by fragmentation undoubtedly lead to altered patterns of selection and trait evolution. Evolutionary responses to fragmentation have already been suggested (73, 74), and it is likely that such changes will, in turn, feed back to influence population persistence and ecosystem resilience in fragmented landscapes. Linking long-term experiments with the tools of landscape genetics (75) may provide powerful insights into the evolutionary dynamics of species inhabiting fragmented landscapes.

Third, new experiments should address the management of natural habitats in production landscapes by monitoring vegetation, networks of interacting species, and ecosystem services at ecologically relevant

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spatial and temporal scales (76–78). Some ecosystem services have global consequences, for example, local carbon sequestration affects global atmospheric CO₂. However, in many cases the benefits obtained by people depend on their proximity to habitat fragments (79). For example, crop pollination and biological pest control from natural areas adjacent to farms are made available by the very process of habitat fragmentation, bringing people and agriculture closer to those services. Yet, further fragmentation reduces access to many services and ultimately may push landscapes past tipping points, beyond which essential ecosystem services are not merely diminished but lost completely (80). This complex relationship creates a double-edged sword, for which locally optimal levels and arrangements of habitat must be sought. New fragmentation experiments should consider how multiple fragments in a landscape interact, creating an ecological network in which the collective benefit of ecosystem services may be greater than the sum of services provided by individual fragments (81, 82). Experimental inferences may then be tested beyond their spatiotemporal domains and, if successful, extrapolated across scales. Such research will be aided by satellite monitoring of ecosystems and human land use across the globe. The most powerful research programs will integrate experiments, observational studies, air- and space-borne imaging, and modeling.

CONCLUSIONS

Fragmentation experiments—some of the largest and longest-running experiments in ecology—provide clear evidence of strong and typically degrading impacts of habitat fragmentation on biodiversity and ecological processes. The findings of these experiments extend to a large fraction of the terrestrial surface of the Earth. Much of the Earth's remaining forest fragments are less than 10 ha in area, and half of the world's forest is within 500 m of the forest edge—areas and distances matched to existing long-term experiments (Figs. 1 and 2) from which consistent effects of fragmentation have emerged (Figs. 3 and 4).

Reduced fragment area, increased isolation, and increased edge initiate changes that percolate through ecosystems (Fig. 3). Fragmentation has the capacity to generate persistent, deleterious, and often unpredicted outcomes, including surprising surges in abundance of some species and the pattern that long temporal scales are required to discern many strong system responses. In light of these conclusions and ongoing debates, we suggest that fragmentation's consistency, pervasiveness, and long-term degrading effect on biodiversity and ecosystem function have not been fully appreciated (9).

Without gains in yield and efficiency of agricultural systems (83), the expansion of human populations will inevitably continue to reduce and fragment natural areas. The area of Earth's land surface devoted to cropland already occupies 1.53 billion hectares (83) and may expand 18% by the middle of this century (84), and the area committed to urban centers is predicted to triple to 0.18 billion hectares by 2030 (85). The capacity of the surviving forests and other natural habitats to sustain biodiversity and ecosystem services will hinge upon the total amount and quality of habitat left in fragments, their degree of connectivity, and how they are affected by other human-induced perturbations such as climate change and invasive species. Long-term experiments will be even more needed to appreciate, explain, and predict long-term effects. New efforts should work in concert, coordinating a network of experiments across ecosystems and spatial extents.

The effects of current fragmentation will continue to emerge for decades. Extinction debts are likely to come due, although the counteracting immigration debts may never fully be paid. Indeed, the experiments here reveal ongoing losses of biodiversity and ecosystem functioning two decades or longer after fragmentation occurred. Understanding the relationship between transient and long-term dynamics is a substantial challenge that ecologists must tackle, and fragmentation experiments will be central for relating observation to theory.

Experimental results to date show that the effects of fragmentation are strong and markedly consistent across a diverse array of terrestrial systems on five continents. Increasingly, these effects will march in concert with other global changes. New experiments should be coupled with emerging technologies, landscape genetics, and detailed imagery of our planet, and should be coordinated with current ecological theory to understand more deeply the coupled dynamics of ecological and social systems. These insights will be increasingly critical for those responsible for managing and prioritizing areas for preservation and ecological restoration in fragmented landscapes.

SUPPLEMENTARY MATERIALS

Supplementary material for this article is available at <http://advances.sciencemag.org/cgi/content/full/1/2/e1500052/DC1>

Materials and Methods

Fig. S1. Map of the BOFFP experiment and location within Brazil.

Fig. S2. Map of the Kansas fragmentation experiment.

Fig. S3. Map of the Wog Wog experiment and location within Australia.

Fig. S4. Map of the SRS experiment showing locations of the eight blocks in the second SRS Corridor Experiment within the SRS, South Carolina, USA.

Fig. S5. Design of the Moss experiment.

Fig. S6. Design of the Metazon experiment with 48 enclosed fragments and adjoining enclosed corridors.

Fig. S7. Map of the SAFE experiment and location within Borneo [after Ewers *et al.* (68)].

Table S1. Metadata for Fig. 3 in the main text.

Table S2. Metadata for Fig. 4 in the main text.

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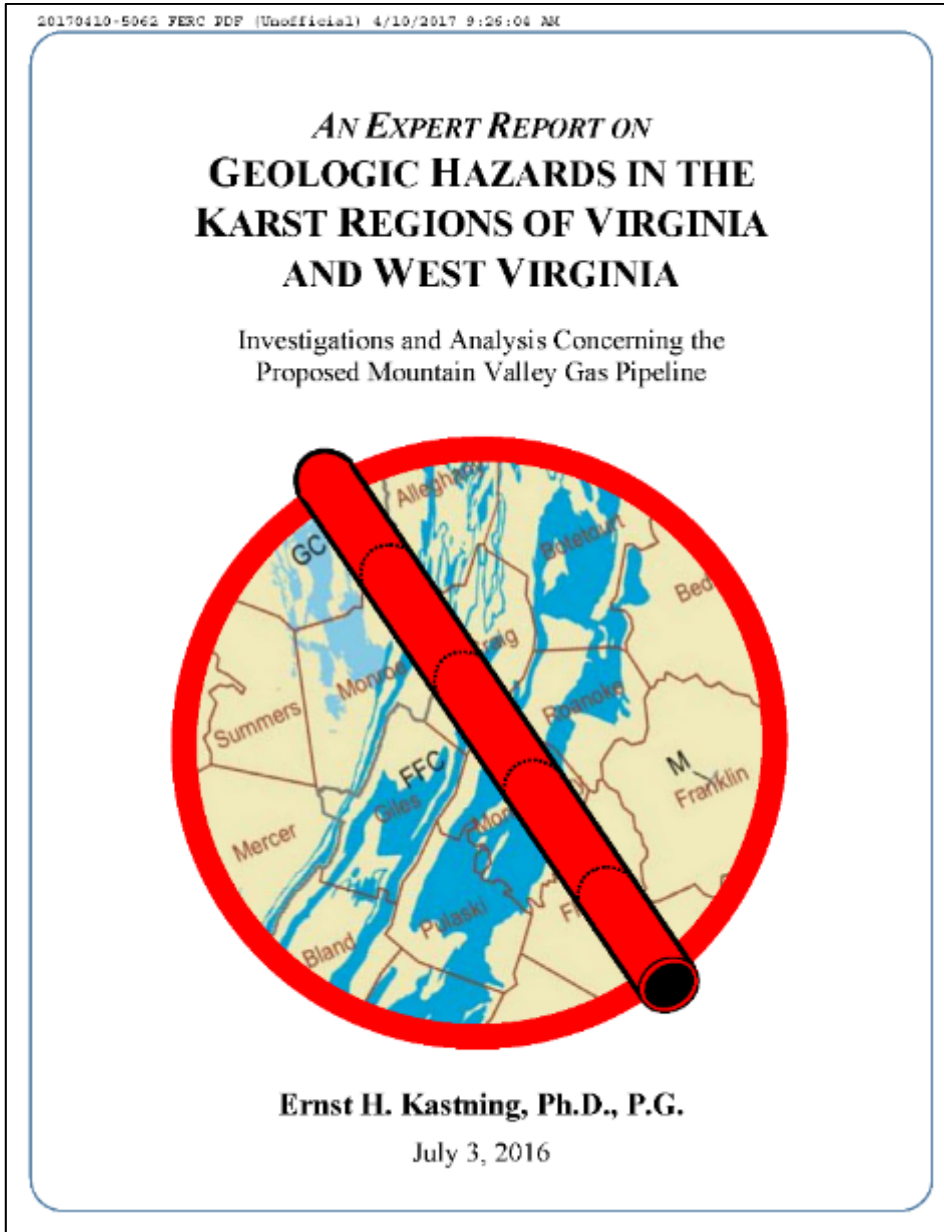
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COMPANIES/ORGANIZATIONS COMMENTS

CO122 – Wild Virginia (cont'd)

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AN EXPERT REPORT ON
**GEOLOGIC HAZARDS IN THE KARST REGIONS
OF VIRGINIA AND WEST VIRGINIA**

Investigations and Analysis Concerning the
Proposed Mountain Valley Gas Pipeline

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Geological Hazards of Mountain Valley Pipeline

Ernst H. Kastning

Executive Summary

The proposed corridor of the Mountain Valley Pipeline (MVP) passes through a significant area of karst as it crosses the mountainous Valley and Ridge Province (the Appalachian Fold Belt) in Summers and Monroe counties, West Virginia and Giles, Craig, Montgomery, and Roanoke counties in Virginia. Karst is a landscape that is formed by the dissolving of bedrock. Severe karst can create hazards for structures that are built on or across it. The environment, both on the surface and in the subsurface, is more easily degraded in karst than in most other terrains. Karst poses severe constraints on engineering, construction, and maintenance of large-scale structures built upon it or across it. Moreover, the karst in this mountainous region is much different than that in other areas. Siting a pipeline through the Appalachian karst poses significantly greater hazards than in karst areas where the terrain has lower topographic relief.

Karst is a critical factor in siting and management of a high-pressure gas pipeline such as the one proposed. However, other potential hazards such as land instability, weak soils, and potential seismicity are also highly significant in this region. When two or more of these elements act together, the resulting environmental threat from the pipeline is compounded and exacerbated.

The conclusion of this report is that the karst and associated hazards constitute a serious incompatibility with the proposed pipeline. The effect of these threats on the emplacement and maintenance of the line, as well as the potential hazards of the line on the natural environment, renders this region as a 'no-build' zone for the project.

Report Contents

The first two sections of this report are included as a summary of karst and its occurrence in the central Appalachian region. The first section provides a brief overview of the nature of karst and how it works as a system, including sinkholes, caves, integrated groundwater flow networks, and the inseparable relation between surface water and groundwater. The second section describes attributes of karst specific to the region of concern, namely the geologic fold belt constituting the central Valley and Ridge Province of Virginia and West Virginia.

Environmental issues and concerns relative to the proposed pipeline are identified and discussed in detail in the third section. Groundwater contamination is a concern related to construction of the pipeline as well as to its operation. Sinkhole collapse may occur where groundwater patterns are altered and in fill used in burying the pipe (the process of suffosion). Erosion of denuded land is likely, and steep slopes underlain by weak soils may become unstable and lead to soil creep and landslides. The threat of this hazard is exacerbated within the Giles County Seismic Zone, an area of enhanced seismic risk that is traversed by the propose pipeline. Allogenic water (flowing on impermeable rocks in the uplands before it reaches soluble rock below) as well as relatively pure water originating from ridge crests may be compromised in quantity and quality by the presence of the pipeline before it reaches the karst in the lowlands.

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A long corridor, cutting a swath through these sensitive terrains may create extensive zones of land instability, collapse, flooding, siltation, and disruption of natural flow paths of surface and ground water. Caves, some of which have been designated as significant by public agencies and speleological organizations, may be intersected, thus compromising hydrologic and ecologic systems. The most dramatic negative results would occur where two or more hazards act in unison or result in a cascading series of events.

Geologic Hazards

The Mountain Valley Pipeline application is deficient and inadequate because it fails to address significant environmental hazards that would be created by the pipeline, if constructed as proposed. It fails to address geologic hazards that occur within areas in or near the proposed corridor and their potential impacts on the pipeline itself. Geologic hazards that are not adequately addressed by the application include:

- *Groundwater Contamination:* Karst terrains are uniquely vulnerable to augmented groundwater contamination owing to the nature of the groundwater aquifers that form in such areas. Thousands of people living in these potentially impacted areas depend on groundwater to supply their homes. The risk of severe groundwater contamination is increased during construction and may occur should a pipeline rupture in this karst terrain.
- *Vulnerability of Groundwater Recharge:* Allogenic recharge areas (where surface water from steep, upland mountain slopes enters karst aquifers at the base of those slopes) are especially vulnerable to disruption owing to hydrologic alterations that would be caused by the construction of the pipeline.
- *Enhanced Potentials for Surface Collapse:* Construction of the pipeline in mountainous terrain would likely alter hydrologic flows by channelizing subsurface waters. Should the pipeline trench intersect with below-ground karst features, results would include enhanced potential for collapse in the karst.
- *Accelerated Erosion:* Pipeline construction on steep slopes will remove native vegetation, cut into steep slopes, alter soils via compaction, remove surface soil over the pipeline trench and access roads, and will thus create potential for accelerated erosion.
- *Slope Instability:* Unconsolidated geologic material present throughout the area on steep slopes should not be considered as stable. Movement of such materials, especially if stimulated by excess rainfall or by seismic activity, can be expected to threaten the integrity of the proposed pipeline. Over half of the preferred route from Monroe to Roanoke counties has slopes that are 20 percent grade or greater. Almost 20 percent of the slopes along this route are 35 percent grade or greater.
- *Weak Soils:* Even in the absence of such extreme weather or seismic events, soils on steep slopes can be subject to the slow and persistent downslope movement known as "soil creep". This would threaten the integrity of underground structures such as pipelines,

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especially where those structures run parallel to a slope. Soils on steep slopes should not be considered as stable. Several soil groups are high in plasticity and shrink-swell characteristic, resulting in poor drainage and low bearing strength that can induce downslope movement.

- *Seismic Risks:* The proposed route of the pipeline passes through an area with a history of severe seismic activity and enhanced seismic risk as determined by recent geophysical studies. A major seismic event would clearly threaten the integrity of the pipeline. However, even moderate seismic activity, in combination with other conditions, such as karst, severe slopes, and weak soils, pose elevated risks. By extension, in karst areas, the quality of groundwater may be threatened as well.

The above hazards occur as a direct result of the terrain typical to the region being traversed by the proposed pipeline corridor. Multiple geologic hazards are inherent to karst in mountainous regions such as that of concern here. Because of their potential to interact synergistically, they cannot be mitigated by engineering practice. For these reasons, large karst systems must be avoided during pipeline construction.

Examples of Geologic Hazards and Potential Interactions

Much of the pipeline corridor would encounter karst as it passes through the area that is the focus of this report. There are many specific locations where karst features are within or perilously close to the corridor. Four specific examples have been selected as important in order to illustrate cumulative environmental hazards that cannot be mitigated through engineering and construction practice:

- **Milepost 181-195 segment, in Monroe County:** The proposed pipeline crosses numerous interacting karst features, including springs providing allogenic recharge, sinkholes, caves, and a sinking stream. Within this segment, the corridor ascends the northern flank of Peters Mountain where it encounters steep slopes and unstable soils in an area of enhanced seismic risk and where numerous springs discharge waters that are essential to residences, community water supplies, and a commercial bottling facility.
- **Milepost 208-210 segment in Giles County:** Dye traces have documented multi-mile groundwater transport through karst aquifers and with extensive caves. The pipeline is proposed to cross Sinking Creek at a point where its waters have begun to descend into subsurface channels, within an area that is well populated, with numerous homes that depend on karst aquifers for household waters. The pipeline is proposed to enter this area after descending a long and steep mountain slope with potentially unstable soils within the Giles County Seismic Zone of enhanced risk from earthquakes.
- **Milepost 213-214 segment in Giles County:** The pipeline is proposed to cross a cave that is approximately 3000 feet in length, contains water, is inhabited by significant biota, has been designated as a cave conservation site, and is near the surface with little overlying bedrock. Furthermore, the proposed corridor crosses over the cave and runs along a slope

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within potentially unstable soils. This would threaten the integrity of the pipeline if soil slippage were to occur. The site is within the Giles County Seismic Zone.

- **Milepost 220-226 segment in Montgomery County:** The proposed corridor crosses an area known as the “Mt. Tabor Karst Sinkhole Plain” - perhaps the most intensive karst terrain along the entire route, and associated conservation areas. Several dye tracings have documented the interconnected nature of karst areas and caves within this area. Along this segment, the corridor is proposed to pass through two cave conservation areas, a natural area preserve, and a major segment of the karst plain where scores of large, compound sinkholes are present at the surface. As a result, MVP has proposed an alternate corridor for study in this area. However, a greater length of alternate proposed corridor passes through cave conservation areas than would the original proposed corridor. Both proposed corridors pass through the watershed of areas containing sinkholes that have been shown by dye traces to provide discharge into the primary spring of the Mill Creek Springs Natural Area Preserve that discharges into Mill Creek, a tributary of the North Fork of the Roanoke River. This is a short distance upstream from where it serves as habitat for a federally protected fish, the logperch. Furthermore, both proposed corridors pass through steep slopes that would threaten the integrity of the pipeline within a significant cave conservation area. This area is also populated, with numerous homes that draw household waters from karst aquifers and have no access to alternative water supplies.

The above examples were specifically selected for this report to illustrate potential environmental problems along the corridor. There are many other examples of interacting geologic hazards over the entire length of the corridor within karst. This is typical of the entire region.

Conclusions

There are serious problems imposed by geologic and hydrogeologic constraints along the route of the Mountain Valley Pipeline. They fall into two basic categories: (1) the impact of the geologic setting on constructing and safely maintaining the pipeline and (2) the environmental impacts of the pipeline on the land that it would pass through.

As discussed in this report, the predominant geologic aspects are:

- Karst
- Hydrogeology
- Slope Stability
- Soil
- Seismicity

Although each of these five topics has serious specific considerations that have not been addressed by the applicant, the greatest concern is that all five topics are interrelated and are not mutually exclusive. These geologic attributes and the geologic risks are typical to the region and operate as a **system**. Therefore, they should not be merely evaluated on an individual basis.

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Siting a pipeline through the Appalachian karst poses significantly greater hazards than in areas where the terrain has much lower topographic relief, and lacks similar geologic hazards. Steep slopes promote a profound influence of the pipeline on soil stability, erosion, and groundwater.

The analysis of this report unequivocally demonstrates that the Mountain Valley Pipeline cannot be safely built through the areas of Monroe, Giles, Montgomery, and Roanoke Counties that are characterized by karst terrain and steep slopes. Doing so would significantly threaten the structural integrity of the pipeline, and the ecological integrity of the surrounding environment. Many of the potential hazards are immitigable; they cannot be adequately circumvented with engineering or construction practices. The same is true should a catastrophic event occur, such as a breach of the pipeline.

Author of This Report

The author, Ernst H. Kastning, PhD, PG, has studied karst for over 50 years throughout the United States and abroad, and he has authored numerous publications on the subject. His primary expertise is karst along the entire Appalachian region extending from Alabama to New England. His résumé is appended to this report.

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Geological Hazards of Mountain Valley Pipeline

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Geological Hazards of Mountain Valley Pipeline

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Introduction

This report summarizes significant environmental impacts and risks associated with the siting the proposed Mountain Valley Pipeline (MVP) through karst terrain of Giles, Montgomery, Craig, and Roanoke counties in Virginia, Monroe County in West Virginia, and a segment of Summers County that is adjacent to Monroe County in West Virginia. The report is based on an analysis of the proposed route and information submitted to date by MVP and the following agencies: U.S. National Forest Service, Virginia Department of Conservation and Recreation, and Virginia Department of Environmental Quality. Moreover, numerous other documents have been submitted to the Federal Energy Regulatory Commission (FERC) since the announcement of the pipeline proposal. These have been authored by intervenors, local experts, and concerned citizens who have spent countless hours researching, evaluating, and commenting on potential issues brought to light by this project. These contributions and documents have been reviewed and considered in compiling this report.

The scope of this report is to assess impacts of the proposed pipeline from three perspectives: (1) geologic constraints imposed on construction and operation of the pipeline, (2) potential hazards that are posed by the geologic setting on the pipeline if it is built, and (3) potential effects of the pipeline on the natural environment during its construction and operation, especially as those potential effects can be exacerbated by geohazards.

A large part of the MVP would traverse the Appalachian Plateau and Valley and Ridge physiographic provinces. These include some of the most prolific regions of karst in the United States (Davies, 1970; Herak and Stringfield, 1972; Davies and others, 1984; Kastning, 1986; Tobin and Weary, 2004; Palmer, 2007; Weary, 2008; Palmer and Palmer, 2009). The very nature of karst in this mountainous region is much different than that in other areas. Siting a pipeline through the Appalachian karst poses significantly greater hazards than in areas where the terrain has much lower topographic relief. The specifics of these problems are discussed in detail in Sections 2 and 3 of this report.

During the various stages of FERC decision making, it is imperative that geology be a major consideration for the segment of the pipeline that crosses the mountains and valleys of the Appalachian region. The very name "Mountain Valley Pipeline" suggests that this region of major topographic relief is a significant component for the route.

The karst of the counties of West Virginia and Virginia through which the route passes has been mapped at various scales using data developed from field surveys of karst features that are visible from the surface (Miller and Hubbard, 1986; Hubbard, 1988; Kastning and Kastning, 1995). Derivative maps showing the extent of karst-prone rock in these counties in relation to the proposed route of the pipeline are in Appendix B of this report.

Geologic systems, karst included, do not stand alone - they interact. With this in mind, the concerns about karst must be evaluated in context with other geologic processes that interplay. In this report, the effects of hydrogeology (both surface and ground water), slope stability, soils, and seismicity (earthquake potential) are included where they act in unison with karst processes in ways that can, and often do, compound environmental hazards.

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As it concerns karst and other geohazards, this report is organized into four sections in order to synthesize the accumulated knowledge of this landscape in the affected region and the considerable information that has been submitted to FERC to date:

An overview of karst. This section includes the definition of karst, principle aspects of karst processes, and a summary of environmental factors and sensitivity typical in karstic landscapes.

Karst in the central Appalachian region of Virginia and West Virginia. The emphasis of this section is on karst in the six-county area through which the proposed pipeline route extends.

Environmental concerns related to the Mountain Valley Pipeline. This section specifies issues that must be addressed during the deliberative process by FERC.

Compounded hazards related to karst, slope stability, soils, and earthquakes. This section emphasizes how geologic factors act in unison or in sequence, compounding hazards along the route, causing higher levels of impact and concern.

Important Notes to the Reader

The first two sections are for the benefit of those readers who may wish to review the meaning of karst and the hydrogeomorphic processes associated with karstic landscapes and processes (especially related to those found in the region of the proposed pipeline). Those who have a good fundamental understanding of karst and its occurrence in the Appalachian Region may wish to proceed to Sections 3 and 4 that directly address potential problems along the MVP corridor.

References are cited in this report in one of two ways. Published literature is cited by author(s) and date and is keyed to a reference list at the end of the report. Relevant unpublished reports, including submittals to FERC, are identified where applicable.

To facilitate a quick perusal or locating key points, some phrases and sentences have been emphasized in **bold font**. This is primarily the case in Sections 3 and 4 that directly address potential hazards along the pipeline corridor.

This study was initiated at the request of individuals and organizations that are local stakeholders in the FERC review process, and would be adversely affected by the eventual outcomes. They include numerous residents, scientists, and citizen groups. Many of the individuals are registered intervenors in this process and have previously contributed findings, data, and interpretations to FERC. A significant amount of this information has been reviewed and compiled in this report. Those sources are acknowledged in the text.

The Tables and Figures cited in this report are located in Appendix B. This is because some of them are referred to often and in different places in the report.

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Interactive Maps

It may be very useful for the reader to access and use two interactive map sites that have been created online for those involved with the Mountain Valley Pipeline issue. In both cases one is able to select among types of base maps and layers of data and zoom in or out in order to view levels of detail.

The Mountain Valley Pipeline Exploratory GIS Map is focused on geological hazards in the counties along the entire MVP route, with a focus on Virginia. This tool was created by Drs. Stockton Maxwell and Andrew Foy of the GIS Center, Department of Geospatial Science at Radford University. This map is located online at:

<http://www.arcgis.com/apps/MapTools/index.html?appid=bec1646d43ad4f7bfd4953b5d722cc7>

Another interactive map, primarily focusing on the affected counties of West Virginia, was created by the **Indian Creek Watershed Association (ICWA)**. It is located online at:

<http://indiancreekwatershedassociation.org/icwa-interactive-environmental-map>

Both sites are being revised and updated as necessary by their compilers. It is recommended that the interested reader access these maps while reviewing this report or in future assessments and deliberations regarding potential environmental issues related to the pipeline.

The Author

Ernst H. Kastning, PhD, PG, has studied caves and karst for over 50 years throughout this country and abroad. His primary expertise is karst along the entire Appalachian region extending from Alabama to New England. Over the 31 years when he has lived and worked in Radford, Virginia, he has studied karst processes and environmental problems in counties of the greater New River Valley region and adjacent counties throughout Virginia and West Virginia. His publications on karst number over 100 and many directly address karst processes and environmental impacts in the area affected by the proposed Mountain Valley Pipeline. The author's brief résumé is appended to this report. His most pertinent publications relating to the karst region of this study are cited where appropriate and listed in the References Cited at the end of this report.

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Geological Hazards of Mountain Valley Pipeline

Ernst H. Kastning

Section 1

Overview of Karst

A Working Definition of Karst

Once an obscure term, the word 'karst' is being used more and more by the public and the press, particularly in regions where it is prevalent or in situations where issues involving karst come to the fore, such as in the case of the Mountain Valley Pipeline. The concept of karst is not always an easy one to convey. A number of geological dictionaries and lexicons have defined the term. Moreover, there have been several specialized glossaries of karst that provide definitions of the myriad of features and the terminology that collectively define karst (e.g., Monroe, 1970; Lowe and Waltham, 1995; Field, 2002; Poucher and Copeland, 2006; Palmer, 2007). An essential first step in discussing karst is to agree on its meaning.

A very simple, concise, one-sentence definition that generally suffices is:

Karst is a landscape that is principally formed by the dissolving of bedrock.

For clarity, it is useful to add that karst is characterized by sinkholes, caves, dry valleys (with little or no surficial drainage), sinking streams, springs and seeps, solution valleys, and various forms that are sculpted on the bedrock surface (collectively known as *karren*). Hydrologically, groundwater in karst terrains flows efficiently through openings in the bedrock that have been enlarged by the dissolution process. Surface water is rapidly conveyed underground at zones of *recharge* (typically where water enters sinkholes, soil, and vertical fractures in the bedrock) and then passes through a network of conduits (fractures, partings between beds of rock, and caves). The water eventually emerges at the surface in zones of *discharge* (springs, seeps, and wells). Karst forms in rocks that are soluble to various degrees when in contact with slightly acidic natural water. Commonly, the rocks that are most easily dissolved – to form karst terrain - are carbonate units, such as limestone and dolostone (sedimentary), marble (metamorphic), and sulfate units such as gypsum (sedimentary). Nearly all rocks may be dissolved to some degree. Only minor dissolutional features develop in materials with very low solubility in water, for example, granite, gneiss, sandstone and other silicate rocks. In most cases, these features are insignificant in terms of hydrologic and environmental impact. Most significant areas of karst in the United States are found within outcrops of limestone, dolostone, marble, and gypsum. Limestone and dolostone are the principal karst formers in the area under consideration in this report.

With respect to the history of geology, the study of karst (speleology) is a relatively new and blossoming science that draws largely on the principles of geology, hydrology, and physical geography. A thorough professional understanding of the processes that occur both at the surface and in the underground, and an appreciation for the integrated hydrologic system, necessitates a familiarity with the technical aspects of karst. Today the study of karst is multidisciplinary and quantitative, involving the principles of physics, chemistry, and mathematics. The importance of karst overlaps the biological and anthropological sciences as well. The level and scope of modern

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karst studies are demonstrated by a proliferation of comprehensive monographs on the subject (notably those of Sweeting, 1973; Ford and Cullingford, 1976; Bögli, 1978; Jennings, 1985; Dreybrodt, 1988; White, 1988; Drew, 1995; Gillieson, 1996; Klimchouk and others, 2000; Gunn, 2004; Palmer, 2007; Ford and Williams, 2007; and White and Culver, 2011). Because the nature and processes of karst are complex, it is highly suggested that persons working with karst consult one or more of these specialized volumes. Additionally, the number of articles in scientific journals and proceedings volumes, and graduate theses on karst has expanded at a phenomenal rate in recent decades.

Requisites for the Development of Karst

Karst describes a three-dimensional landscape with characteristics that are the result of several contributing factors: (a) soluble rock (*e.g.*, most commonly limestone or dolostone), (b) structural controls that have modified the rock (*e.g.*, regional uplift or subsidence, folds, faults, and fractures), (c) chemically aggressive (acidic) circulating water that dissolves the bedrock, (d) porosity and permeability (hydraulic conductivity) that provide openings that allow groundwater to flow and dissolved material to be flushed through the system, (e) places of recharge where water can enter a karstic aquifer (*e.g.*, sinkholes, swallets, sinking streams) and places of discharge where water re-emerges at the surface (springs, seeps), (f) hydraulic gradients that create the potential for water to flow from high elevations through karst features to low elevations, and (g) sufficient time for karst to develop (typically thousands of years). Usually, but not always, there are both visual (surficial) features (*e.g.*, sinkholes, sinking streams, springs) and hidden (subsurficial) features (*e.g.*, caves and other enlarged conduits) in an area of karst. Depending upon local conditions and the size of drainage areas, the scale of karst landforms can range from quite small (*e.g.*, grooves in exposed rock outcrops and other karren) to quite large (*e.g.*, extensive cave systems, sizable sinkholes and clusters of compound sinkholes, and valleys formed by dissolution).

The composition of the rock, along with its porosity, permeability, and thickness of bedding will all affect the rock's susceptibility to be modified by contact with mildly acidic surface or groundwater. These effects will be more pronounced in areas that have significant humidity and precipitation, where topographic relief is high, and where rocks are at or near the Earth's surface. These conditions are prevalent in the Appalachian region and have contributed to the well-developed karst found there.

Recognizing Karst Features on the Surface

Karstic features on the surface can range from the extremely obvious (*e.g.*, large sinkholes, sinking streams, and/or springs), often overlooked features (*e.g.*, small sinkholes or dry valleys), subtle features (*e.g.*, swales), and very small features (*e.g.*, solutional sculpting of rock surfaces such as karren features).

Karst landforms of any size on the surface can sometimes be hidden from the casual observer. Large, dry valleys and solution valleys can inadvertently go unrecognized as karst – proverbially a “one can't see the forest for the trees” symptom. Although they may be obvious on a topographic

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map or from aerial photographs, especially for those persons familiar with karst, the normal valley shape sometimes disguises the true nature of a solution valley.

In tall, thick forests, tree-coverage may hide even large sinkholes (closed depressions) from being detected with aerial photography or at times while travelling on the surface. Other karstic features are too small to be discovered by aerial photography or illustrated on a topographic map, especially on standard 7.5-minute quadrangles constructed with typical contour intervals of twenty or more feet. In some cases, even smaller contour intervals may not indicate closed depressions. Site visits are mandatory to research a potentially karstic area; one cannot rely solely on sinkholes depicted on a topographic map or mapped with aerial photograph. This is an especially important point for environmental assessments where karst is a factor of risk (Hubbard, 1991). Performing ground truth is the only proven way to detect the presence and abundance of small sinkholes. In the area of concern along the MVP, the proposed corridor crosses numerous places in karst terrain where subtle sinkholes may be the only ones present. Even very small sinkholes are important indicators of karst development, especially where subsurface features (such as caves and other openings) occur. In general, the presence of sinkholes of any size in a soluble rock terrain is an indicator of a subsurface hydrologic karst environment (a network of enlarged openings that have or still do conduct groundwater).

Karstic terrains often have very thin layers of soil overlying them because the soil may be piped away almost as fast as it develops. But this is not always what occurs. For example, where nearby steeply sloping hills drain onto karstic terrain, thick deposits of clay (or other alluvium and/or colluvium) may mantle the karstic landforms, especially in areas with relatively few small fractures in the bedrock. The only discernable evidence of karst may be wet-weather springs or swales (slightly sagging areas, too shallow for most people to refer to them as sinkholes). These slight depressions are sometimes detectable after a heavy rain when water ponds in them briefly or in early spring when the vegetation starts to grow in the swales earlier than on the surrounding area. As the soil is removed from below the vegetative root mat, these areas sag and may eventually collapse into the piping cavities below. Sometimes these collapses occur when farm animals suddenly drop from view while grazing on the greener pastures! Even farm vehicles have been known to suddenly break through a thin soil mat and fall into the cavity beneath.

Sinkholes formed by the physical process of piping (an engineering term; geologists generally name the process 'suffosion') are associated with the soil and regolith zone that overlies bedrock. Even though sinkholes may have formed in soft, loose, insoluble materials, they are still considered features of karst. The reason for this is that during the slow process of piping, tiny particles in these horizons tend to move downward into true karstic openings in the underlying bedrock (namely fractures) and be carried away as part of the groundwater flow. Over time cavities grow in the regolith and soil, including upward growth (termed *stoping*), until their thin roofs collapse, forming the sinkholes.

Suffosion (piping) collapses are very common in the karst regions of the Appalachians. It is usually wrong to consider this kind of subsidence to be an insignificant indicator of karst. On the contrary, most of these sinkholes would not have formed if there were no openings in the bedrock beneath to carry off particles.

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Wet-weather springs may flow when wetter-than-usual conditions cause a temporarily high water table. A wet-weather spring may represent a former spring that flowed when local base level was at a higher elevation.

Seeps and small gravity springs exist where groundwater flow, generally just below the water table, intersects the natural ground surface. These areas of discharge also occur in outcropping rocks, where water that has been perched on an impermeable bed discharges at the surface where the beds are exposed. Seeps will sometimes develop where quarries, roads, railroad cuts, and other excavations (*e.g.*, for pipelines) cut through a hillside and into the bedrock. Discharge may be significant and result in major springs in some cases where major flow paths are intersected (such as caves having large streams).

All of the above characteristics are found in abundance in the karst landscapes of the Appalachian Valley and Ridge region. It would be very difficult to find a path or corridor for any use (roads, power lines, gas transmission lines) through this fold belt that would totally avoid karst. However, some areas within this region have more intensive karst than others.

Sinkholes as a Measure of Karst

The strongest surficial evidence for the presence of an efficient and well-integrated subsurface drainage network is where sinkholes have formed at discrete points of recharge. Sinkholes form in response to surficial waters draining through the ground via the easiest pathway toward the local base level. Water does not travel into and through a sinkhole because the sinkhole has pre-existed – rather, as water travels through established zones of weakness (*e.g.*, fractures, faults, or bedding-plane partings), it gradually dissolves the bedrock and carries the solute away to points of discharge on the surface. Thus, sinkholes are formed contemporaneously with active recharge (Kastning and Kastning, 2001). Tiny soil and rock fragments are also piped away, augmenting the development of sinkholes in the process. Thus, dissolutionally enlarged openings (owing to chemical weathering) and mass wasting of soil cover and break up of bedrock (owing to physical weathering) both contribute to form hollowed-out closed topographic depressions that we call sinkholes (and are internationally known as dolines). Sinkholes can be of any size, as large or small as local geologic or other natural conditions and time permit. The shapes of sinkholes or clusters of sinkholes may provide clues to their origins, if they are mapped thoroughly and analyzed carefully (Kastning, 1989b; Kastning and Kastning, 2003). Sinkholes and other surficial karst features are often highly useful in interpreting geologic structure in the subsurface (Kastning and Kastning, 1981). Structural control is crucial in the establishment of hydrologic continuity among surficial features, such as sinkholes and other recharge zones, subsurface drainage such as caves and other conduits, and discharge zones such as springs or seeps (Kastning, 1999).

Sinkholes are used as measures of karst in many site evaluations. The observed presence of closed depressions in soluble-rock terrain is correctly interpreted as evidence for karstic groundwater flow in the subsurface. These represent places of discrete recharge where water enters the ground at specific points. Conversely, the absence of closed depressions on the surface is too often interpreted as an indicator of poor or no development of karst in the subsurface. The latter view is an erroneous assumption in many karst regions, especially in areas of diffuse recharge where

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water derived from precipitation percolates uniformly into the ground over an area, perhaps through an overlying insoluble bed (*e.g.*, sandstone) or through a thick mantle of soil and regolith. This can result in a surficial landscape with few if any noticeable sinkholes. Because of that erroneous assumption, small, shallow, and otherwise subtle sinkholes are often omitted from environmental studies and assessment. Even if subtle sinkholes are very numerous (and therefore important indicators of karst), not recognizing them or overlooking them can greatly alter conclusions about the presence and extent of karst in an area or at proposed construction sites.

There are many documented regions of karst where extensively explored and mapped caves lie beneath a surface devoid of sinkholes. **In areas underlain by soluble rock, the absence of sinkholes on the surface cannot be categorically interpreted as the absence of karst.**

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Section 2

Karst in the Central Appalachian Region

Introduction

Large, complex karst systems are found extensively in the Valley and Ridge provinces of the Appalachian Plateau and throughout the boundary area straddling Virginia and West Virginia (Davies, 1970; Herak and Stringfield, 1972; Kastning, 1986). The primary belt of karst (*i.e.* the widest outcrops of soluble rock) extends from Mineral, Hampshire, Morgan, Berkeley, and Jefferson counties in northeastern West Virginia, southwestwardly through a double tier of counties along the western margin of Virginia, along its boundaries with West Virginia and Kentucky, to Lee County at the southwestern tip of Virginia at the Tennessee state line. Several narrow strips of karstic rocks in West Virginia parallel the primary belt. These extend from Monongalia and Preston counties in the northern part of the state to the widest of these belts in Pocahontas, Greenbrier, and Monroe counties in the southeast. Altogether, this expansive karst region lies within twenty-five counties in Virginia and eighteen counties in West Virginia, for a total of forty-three counties (Kastning, 1995b; Kastning and Kastning, 1995).

Caves are the best known karst features of this region. Tabulations of the Virginia and West Virginia Speleological surveys (VSS and WVSS, respectively) show that each state has over 4000 documented caves, nearly all of which lie within the area described above. This results in one of the highest densities of cave distribution in the United States. Most of the caves have been described in published compilations (Davies, 1958; Douglas, 1964; Holsinger, 1975). Additional descriptive accounts have appeared in various issues of the *West Virginia Speleological Survey Bulletin*, in guidebooks to previous NSS Conventions and the Eighth International Congress of Speleology (Schleicher, 1970; Virginia Region of the National Speleological Society, 1971; Hempel, 1975; Garton, 1976; Werner, 1981; and Medville and others, 1983), and in newsletters (most notably, *Virginia Cellars* of the VSS and the *West Virginia Caver*). Caves in Virginia that are important geologically, are fragile, contain unique organisms, or are environmentally sensitive have been officially designated as 'significant' by the VSS and the Virginia Cave Board, a collegial body of the Department of Conservation and Recreation (Holsinger, 1985). The George Washington and Jefferson National Forest includes a number of significant caves (Kastning and Kastning, 1992b). Thus the cave regions of the Virginias are well known and continue to challenge explorers, geologists, and hydrologists who are probing the physical and chemical processes of cave development and the hydrogeologic aspects of karst aquifers.

The geomorphic process of cave development is inherently complex, but essential for understanding the threat caves pose to the integrity of large high-pressure pipelines, and assessing the safety hazards of the pipeline with respect to communities along the route. This is especially true in the Appalachian fold belt (White and White, 1983; Orndorff, 1995). A comprehensive understanding of the origin of single caves, cave systems, or caves distributed over a large region, requires that all responsible factors are considered. Most important are (1) the lithology, solubility, porosity, and permeability of the host rock, (2) the chemistry of the groundwater and rates of

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dissolution, (3) the structural setting, (4) the existing topography and evolutionary history of the regional landscape, (5) paleoclimates, and (6) the hydrodynamics of groundwater during speleogenesis (cave and karst formation). Factors and processes important to development of caves and karst in Virginia and West Virginia are outlined in the following sections, with an emphasis on the central Appalachian region.

Karst within the region of this report is discussed in detail in Sections 3 and 4. Maps showing the distribution of soluble rock in this region (likely to have karst) can be found in Appendix B (Figures 1, 2, and 3).

Lithologic Factors

Karsted carbonate rocks that host caves in the central Appalachian region are principally dense, crystalline limestone and dolostone, that occur within three zones that parallel the Appalachian structural trend (Hubbard, 1988; McCue and others, 1939). All of these rocks were deposited during the Paleozoic Era (570 to 245 million years ago). For lithologic descriptions of formations in Virginia and geologic maps of their distribution *see* Butts (1933, 1940), Rader and Evans (1993) and Virginia Division of Mineral Resources (1993). Stratigraphic correlations in Virginia are given in Rader (1982). Detailed descriptions of carbonate rocks in West Virginia and maps showing their distribution are found in McCue and others (1939) and various county reports published by the West Virginia Geological Survey from 1910 to 1940.

Karsted carbonate rocks in the two states occur in three zones as described here. First, the oldest beds, Cambrian and Cambrian-Ordovician in age (570 to 438 million years ago), occur along broad lowlands within the Great Valley, including the Shenandoah Valley of northern Virginia and the eastern panhandle of West Virginia and the southwestern extension of the valley through Virginia. Within the Mountain Valley Pipeline region, these rocks crop out in 46 counties (28 in Virginia and 18 in West Virginia; Kastning and Kastning, 1995). Karst in these rocks is generally mature in its development and the surficial terrain is characterized by sinkholes and lack of perennial drainage in small stream channels. Sinkholes are typically clustered where bedrock of high solubility is exposed or near the surface. In some of the broad valleys, beds of limestone have relatively low dip (0-15 degrees) and sinkholes are thus distributed over wide areas. In northern Virginia, caves of the Shenandoah Valley are small to moderate in length (only a few exceed one mile in length) and typically occupy particular beds of favorable solubility, commonly a single bed. **However, in the southwestern Virginia part of this zone, long caves are more common, with over thirty exceeding one mile in length. Additionally, the number of known caves per county is higher in southwestern Virginia than in the northern part of this zone.**

The second zone of carbonate rocks lies to the west, in the westernmost counties in Virginia and in several counties in West Virginia. These units are middle to late Paleozoic in age, specifically from the Silurian to Devonian periods (438 to 360 million years ago). This zone, which is generally narrower than that of the older carbonates to the east, is comprised of several narrow exposures of limestone and dolostone (Kastning and Kastning, 1995). **These bands run through many counties in West Virginia, including Monroe County. They also traverse parts of Giles and Craig counties in Virginia.** Rocks of this zone have been intensely folded and faulted and

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steeply dipping beds are common. As in the zone of older rocks to the east, caves in the Silurian-Devonian units are generally confined within particular strata. Caves in these rocks are generally small to moderate in extent when compared with those in the karstic rocks to the east.

In the third zone, further to the west in the Appalachian Plateau of West Virginia, carbonate rocks are younger and are generally Mississippian in age (360 to 320 million years ago). The bedrock in the southern part of this zone is typically subhorizontal, with dips of a few degrees up to 15 degrees. **This explains the relatively broad exposures of carbonates of the Greenbrier Group in Pocahontas, Greenbrier, and Monroe counties of West Virginia. Rocks of this zone are host to the longest caves in the region and some of the longest in the United States. Moreover, the number of long caves per county is considerably higher in these rocks than in units of the other two zones** (Kastning and Kastning, 1995). This is particularly true for Monroe and Greenbrier counties in the central Appalachians.

Structural Control of Caves and Karst

The geologic structure of the cave regions of Virginia and West Virginia is complex. The entire area was subjected to large-scale tectonic stresses accompanying continental collision between the North American and African plates during the middle and late periods of the Paleozoic Era. Compressive forces acting in a northwestern-southeastern direction significantly shortened the crust in the Appalachian region, creating fold belts, extensive thrust faults, and fracture systems that characterize the structure. As a result, the regional strike of sedimentary beds is north-northeast, parallel to the trends of ridges and valleys. Dips are typically steep and at some localities beds may be vertical or overturned.

The Valley and Ridge Province is underlain by numerous parallel folds, many of which terminate to the northeast or southeast as plunging anticlines and synclines. Differential erosion during the late Tertiary and Quaternary periods (last 20 to 30 million years) has produced low valleys bounded by parallel mountain ridges. Under the humid-temperate and periglacial climates prevailing in this region during the late Cenozoic Era, dense, crystalline **limestone and dolostone beds have been significantly lowered through both dissolution and physical erosion, forming the floors of many of the broad valleys.** In contrast, dense, massive, well indurated (particles cemented with silica) sandstone units have resisted erosion and most ridge crests are underlain by these siliceous, relatively insoluble units. Beds of shale are typically exposed along the middle and lower walls of valleys. It is not uncommon for the topography to be inverted with respect to the structure, such as ridges being cored by synclines and valleys developed on anticlines. The valley of Sinking Creek, extending northeast through Giles County from Newport is a noteworthy example of the latter. **The relationship of karst features, such as sinkholes and caves, to exposures of soluble rock and regional bedrock structure (folds and strike-and-dip of bedrock) is easily seen by comparing maps.** For example, these correlations are very evident in Giles County when comparing the maps of Miller and Hubbard (1986) and Schultz and others (1986).

Caves are strongly positioned in conjunction with local structure. Most are located along the lower flanks of folds and beneath the lower slopes of valley sides. Caves are also prevalent

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beneath the valley lowlands. Again, this is exemplified in Monroe County, West Virginia, and in Giles and Montgomery counties, Virginia. A fine example is the extensive sinkhole karst of the Mt. Tabor area, northeast of Blacksburg (see Sections 3 and 4 of this report). Also, a comparison of the locations and distributions of caves and sinkholes (Miller and Hubbard, 1986) with the lithology and structure of bedrock within in Giles County (Schultz and others, 1986) shows that karst features are strongly clustered and aligned in concordance with the geologic setting.

Most long passages in caves of the Valley and Ridge Province are oriented along strike and are generally close to horizontal along their lengths. This is characteristic of conduits formed within the shallow-phreatic groundwater zone (Davies, 1960; Ford and Williams, 2007; Palmer, 1975, 1987, 1991; White, 1988). Many of these caves also have dip-oriented conduits and side passages of canyon-like cross sections that serve as tributaries to the strike-oriented master conduits. In most cases, dip-oriented passages convey infiltration from the surface, primarily through sinkholes and fractures, down steep gradients, to master conduits that ultimately carry water along strike to springs.

Faults also are a relevant component of geologic structure. The role of faults in controlling karst development is complex and defies generalization (Kastning, 1977, 1984). In some cases, faults provide zones of high permeability for groundwater flow and dissolutional enlargements of conduits. Under other circumstances, rocks of different lithologies and solubilities are in contact across the fault planes, hindering karstification on the side of the fault where the rocks are less soluble. However, in yet other cases faults have exerted very little influence on caves or surficial karst features. Thrust faults tend to have the greatest effect on karst processes, in many cases simply because they are laterally extensive and the displacements are large, juxtaposing rock units of differing lithologies. Caves may develop adjacent to a thrust surface or along fractures and brecciated material within the fault zone. New River Cave in Giles County, Virginia is a well-known and documented example of control by thrust faulting (Krinitzsky, 1947; Kastning, 1977). **Thrust faults have locally influenced development of passages in caves of the Appalachian Plateau, particularly in the Greenbrier limestones in West Virginia. It is imperative in hydrogeologic assessments that the exact role of faulting during speleogenesis be determined through detailed study at each specific site where faults exist.**

As in all karst regions, joints exert considerable structural control on development of caves and surficial karst features, such as sinkholes. Joints are avenues for the circulation of chemically aggressive groundwater. It follows that joint openings are enlarged as the bedrock on the sides of joints are dissolved. Some joints are initially more open than others and may in a self-ramifying manner enlarge at greater rates than other, less-open fractures nearby.

The degree of openness of fractures and differences in hydraulic gradients along particular conduits typically leads to a dendritic, subsurficial drainage network (Palmer, 1991, 2007). Most of the larger caves in the Appalachian region consist of a contributory network wherein water infiltrating from the surface is concentrated within the karst aquifer through tributary passages that carry discharge to master conduits of flow that in turn convey water to discharge points namely springs.

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All of the bedrock in the fold belt is heavily jointed, providing considerable avenues for the circulation of groundwater. Joints commonly occur as sets in the Appalachian region, whereby the strikes of joints cluster within directional intervals. The dominant sets of joints are consistent with the structural fabric of the Appalachians. Most joints are generally parallel to the strike of the bedrock and thereby are also parallel to fold axes and the strike of thrust faults. Usually there are other joints sets that are perpendicular to the primary ones or formed as conjugate pairs, but the extents and densities of these joints are generally less than those of the primary set. Joint sets are most apparent in caves that are maze-like, wherein parallel passages of two or more orientations intersect one another (Palmer, 1975).

Structure has played a significant role in the origin of long caves in Monroe County of West Virginia. Several caves exceed five miles in length. The exposure of carbonate units of the Greenbrier Limestone at the surface is broad owing to relatively little deformation of rocks in comparison to the Valley and Ridge Province to the east. Folds are broad and their limbs have shallow dips. Faulting is relatively minor and thrust sheets, although numerous in some caves, are short and of small displacement.

As mentioned previously, sinkholes and other surficial karst forms are commonly positioned along structural trends, such as along strike within bands of exposed carbonate units and along faults and joints. **Sinkholes are often aligned along narrow outcrops of steeply dipping beds.** Excellent examples of sinkholes aligned along joints in shallow dipping rocks occur in the Elbrook and Conococheague formations in Pulaski County, Virginia, just west of the New River (Kastning, 1988, 1989a). **The Monitor Lineament in Monroe County is easily spotted as a remarkable straight line in aerial imagery. It is a six-mile-long string of sinkholes, likely caused by water flowing along an ancient fracture and slowly dissolving the limestone, resulting in subsidence and collapse** (Lessing and others, 1979; Lessing, 1981; Indian Creek Watershed Association, 2012). **Many sinkholes in the Mt. Tabor Karst Sinkhole Plain of Montgomery County, Virginia are clearly aligned, attesting to the likelihood of extensive groundwater flow paths along conduits in the underlying bedrock.** The latter two examples characterize conditions of concern regarding karst and the proposed pipe line (*see* Section 4 for further clarification).

Hydrogeologic Conditions

Many caves in the Appalachian region of the Virginias formed as part of a mature, well-integrated karstic drainage system. The longer caves consist of tributary passages converging on master conduits and draining to one or just a few outlets (springs). Many caves, originally formed under shallow phreatic conditions, contain active streams today. In some caves water courses follow the pre-existing paleo-drainage; however, in other situations, the present direction of flow may be contrary to former directions. Changes in flow following speleogenesis can be largely explained by subterranean stream piracy, whereby surficial streams suddenly find routes underground (Palmer, 1972). **Sinking creeks are common in the Appalachian karst regions of West Virginia and Virginia. A classic example is Sinking Creek in Giles County. (This would be crossed by the proposed Mountain Valley Pipeline near mile post 210 and is discussed in detail in Sections 3 and 4 of this report.) Saunders and others (1981) studied the**

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hydrogeology of Sinking Creek, performing dye-tracing studies (including some of the longest in the state).

In the Appalachian fold belt, surface waters flow from mountain slopes toward base-level streams in valleys, forming regionally extensive, trellis drainage networks. Meteoric (storm) water flows steeply downhill from uplands underlain by relatively impermeable sandstone and shale. Water, that encounters carbonate rock exposed low on the slopes or in the broad lowlands in the valleys, commonly sinks and enters a karstic aquifer. Infiltration is often into a sinkhole where the entire flow of a stream is captured. (Such a discrete point of recharge is often termed a 'swallet.')

Excellent examples of this process are found along the lower parts of the northwestern flank of Walker Mountain in Bland County. This site, one of the designated significant karst areas in Virginia, is known as the Skydusky Hollow Karst and contains several of the longest and deepest caves in the state, including the Newberry-Banes Cave System, and Paul Penleys, Spring Hollow, Banes Spring, and Buddy Penleys caves (Holsinger, 1985). A similar situation exists below the southeastern flank of Pearis Mountain in Giles County (*see* map of Miller and Hubbard, 1986). This is known as the Wilburn Valley Karst and includes Starnes, Wilburn Valley, Yer, and other notable caves. This system consists of multiple levels, passages of small cross-section, and numerous pits. This karst area continues to be actively explored and mapped.

There have been some significantly long dye traces in Giles County in addition to those of Saunders and other (1981) mentioned above. One of the longest dye traces within the karst region of Virginia (several miles in length) was performed within the Sugar Run drainage area southwest of Wilburn Valley (Savko, 2001, under the direction of this writer). In this case, flow through one of Virginia's longest caves travels from the headwaters of Sugar Run, following strike around the nose of a plunging anticline (as mapped by Schultz and others, 1986) to emerge at Wabash Springs, one of the highest-discharge springs in the state. **Researchers with the Virginia Karst Project of the Department of Conservation and Recreation placed dyes into some large caves in the headwaters of Clover Hollow. Some of the dye emerged over four miles distant, in the cave streams of Tawneys and Smoke Hole caves. These two caves are adjacent to Sinking Creek (in close proximity to mile post 210 of the proposed Mountain Valley Pipeline).**

The area where the MVP route crosses Sinking Creek (mileposts 210) is one the most significant examples of potential hazards associated with the project. Details of these problems are presented in Sections 3 and 4.

Groundwater of the Mt. Tabor Karst Sinkhole Plain has also been extensively traced with dyes in recent years, including studies by Hayman (1972) and more recently the Virginia Karst Project of the Virginia Department of Conservation and Recreation (Fagan and Orndorff, 2008). These studies reveal a relatively broad and low-lying karst plain exhibiting a well-developed and mature karstic groundwater network. For maps and descriptions, please refer to submissions to FERC by Registered Intervenor Tim Ligon (6 May 2016, submittal 20160506-5059), Louisa Gay (6 Jan 2016, submittal 20160201-5201 FERC) and S. René Hypes of the Virginia Department of Conservation and Recreation (17 March 2016, submittal 20160317-5126).

The area where the Mountain Valley Pipeline route crosses the Mt. Tabor Karst Sinkhole Plain (mileposts 220 to 226) is another significant example of potential hazards associated with the

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project. Details of the problems associated with the Mt. Tabor Karst Sinkhole Plain are presented in Section 4.

Numerous dye-tracing studies to date, including some of phenomenal length, attest to the development of mature and well-integrated karstic aquifers in the counties of interest in this report, especially Giles, Montgomery, and Monroe counties. If additional dye-trace studies were to be performed in the karst of these counties, the findings would certainly further strengthen the known extent of aquifers.

Considering the extent of the soluble rock exposed at the surface in this region, a major conclusion is that much of the surficial karst (sinkholes, etc.) is tied to underlying extensive networks of groundwater flow (see maps of soluble rock in Appendix B of this report, Figures 1, 2, and 3) and map of Kastning and Kastning, 1995). Much of the karst of these counties includes large integrated systems and must be treated as such with respect to potential impact of construction and surface modification by the pipeline project.

Chronology and Sequence of Cave and Karst Development

Groundwater flow that is responsible for the dissolutional excavation of caves in carbonate rocks is guided by the lithostratigraphy (attributes of the host rock such as mineralogic composition, layering, and thickness of beds) and structure of the bedrock as described above. Hydrodynamic factors that force water through fractures and along bedding planes include the degree of porosity and permeability initially inherent in the rock and the secondary changes in these produced during the speleogenetic process. One very important factor is the hydraulic gradient, a measure that drives water through openings and which is derived from a difference in elevation. In general, steep gradients increase the rate of water flow and of dissolution. However, hydraulic gradients are intimately tied to the local relief in topography. The greater the differences in elevations on the surface between zones of recharge of water into an aquifer and zones of discharge of water from the aquifer, the greater the hydraulic gradients in developing conduits. The greatest development of caves occurs just below the potentiometric surface (water table). However, as the ground surface of the Earth is worn down through erosion, the water table drops and, hence, so does the zone of cave development (Palmer, 1987, 1991; White, 1988; Ford and Williams, 2007). As a result, the oldest caves are generally those well above local base level and the youngest are lower and closer to base level.

It is difficult to assess the age of caves, when they began to form, or the rates at which they are excavated by the circulation of water. However, some recent techniques have provided reasonable estimates. Various studies suggest that caves take nearly a million years to form in the greater Appalachian fold belt. Once those results are estimated it is also possible to calculate the rate that the surficial landscape is lowered by erosion.

When water tables drop in response to the lowering of the landscape, caves become air filled. However, most long caves in the Appalachian region have streams in them. This water is making its way from the surface to the present water table or to springs.

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Both existing steep hydraulic gradients and active streams within caves are important aspects in assessing potential problems associated with siting a pipeline corridor through the karst of this region. Only sufficient dye-trace studies can properly delineate flow paths of groundwater within or near the proposed pipeline corridor where it crosses carbonate rock.

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Section 3

Mountain Valley Pipeline Environmental Concerns

Introduction

To begin, there are three basic tenets when reviewing environmental concerns related to the Mountain Valley Pipeline:

- (1) As previously stated, *karst landscapes are among the most sensitive to environmental degradation. Moreover, these terrains can pose some of the most severe constraints on construction and development.* This is well demonstrated in the vast literature on applied problems in karst. Often karst is considered a ‘no-build’ zone for major construction projects.
- (2) Also as previously stated, **the presence of karst features within mountainous landscapes, such as that proposed for MVP, poses challenges and creates hazards that are not present where karst features occur in non-mountainous terrain.** Topography of high relief adds considerably to environmental problems in karst.
- (3) *Areas of karst along the proposed route of the Mountain Valley Pipeline pose some of the most severe challenges and concerns for the MVP project.* The intensity of karst as a hazard has been largely understated in the Resource Reports of the MVP application and in the Hazards Assessment by Draper Aden Associates, February 16, 2016, submittal 20160226-5404 (31274307).

Potential hazards related to karst are exacerbated when they combine with other hazards, especially soils with low physical integrity, slope stability, and potential for seismic events. MVP documents do not address the sequential or cumulative effects of these hazards. Because this is a highly important aspect of the siting process, these synergetic effects are discussed in detail in Section 4 of this report.

No gas pipeline as large as 42 inches in diameter has been constructed across the Appalachian fold belt. Existing large pipelines run over land to the west and east of these mountains, but not across them. The geologic hazards that are summarized in this report are likely partially responsible for the lack of existing large pipelines across the Appalachian ridges.

Environmental Hazards in the Appalachian Karst

It is important to delineate various environmental problems associated with karst in the Appalachian region. Karst poses environmental concern regardless of where it occurs, whether in

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this mountainous region or areas of lower topographic relief (Dougherty, 1983). These are discussed below.

The proposed route of the MVP passes through karst in several places. Karst terrain is a significant environmental feature throughout a segment of the project extending from milepost 172 through 234, in Monroe, Giles, Craig, Montgomery and Roanoke counties (*see* for example, Submittal 20151125-5156 to FERC Docket CP16-10, C.E. Zipper and others, "Motion to Intervene and Protest," November 2015). By example, four specific areas in West Virginia and Virginia are of particular concern and are addressed in this section. They are, from northwest to southeast: (1) exposed karst from Little Mountain to Peters Mountain in Monroe County, (2) Sinking Creek at the intersection of Routes 604 (Zells Mill Road) and 700 (Mountain Lake Road) in Giles County, (3) the area of karst at Canoe Cave on Sinking Creek Mountain in Giles County, and (4) the Mt. Tabor Karst Sinkhole Plain, northeast of Blacksburg in Montgomery County. Significant geologic, hydrologic, and environmental problems associated with these are summarized in this section.

Carbonate-rock terrains pose environmental hazards that are unique with respect to the wide spectrum of bedrock types, and karstic landscapes are particularly sensitive to environmental degradation (LeGrand, 1973; White, 1988). Stresses induced by human activity in karstic terrain result in environmental problems that are much more acute than those that would occur in terrains underlain by either crystalline (metamorphic or igneous) or clastic (other sedimentary) rock. Problems such as groundwater supply and quality and land instability abound in the Appalachian region, as they do in most populated karst regions worldwide, especially those in areas of high topographic relief. **The New River Valley Region, which is largely coincident with the area addressed in this report, has historically been one of the most sensitive karst regions within the Valley and Ridge Region (Kastning, 1989a, 1990; Kastning and Kastning, 1998).**

Groundwater Contamination

Sinkholes, abundant features in the karst of the Virginias (Hubbard, 1984), serve as funnels through which surface water readily enters ground and the aquifer. These are viewed as points of discrete recharge. However, even where sinkholes are less evident or non-existent, water can readily drain into subsurface aquifers. In these circumstance it uniformly infiltrates into surficial materials (soil and underlying regolith) and then comes in contact with the underlying soluble rock. This is termed diffuse recharge. Upon contact with the bedrock, water continues to move downward along fractures. Once underground, water freely courses through enlarged conduits, including caves, and eventually emerges at springs and seeps or is pumped to the surface by domestic or other wells. **A karstic groundwater system is a well-connected 'geologic plumbing' network, and groundwater travels through it at rates similar to water traveling in constructed pipes. There is little or no filtration of this water and contaminants may quickly enter existing water supplies.**

The zone between the surface and the bedrock is known as the **epikarst**. This includes the soil, regolith, and the sculpted upper surface of the bedrock. Epikarst is a highly important zone with respect to environmental problems. Pipelines traversing areas underlain by soluble rock (karst terrain) will be largely constructed within the epikarst. In some cases, where the soil and regolith

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are thin, trenching during construction may also include excavation of the bedrock. **Excavation of bedrock in karst, for example during trenching or quarrying, can be disruptive to groundwater flow and affect both quantity and quality of water** (Kastning, 2008). Soil and regolith above the bedrock is very thin in most places where the proposed MVP corridor crosses karst (*see* submittal 20151130-5432, November 30, 2015, Preserve Giles County, Section 6, especially p. 95, 97-98 via document pagination).

If there is one single environmental issue that stands out in the karst of the Appalachians, it would have to be the sensitivity of the karstic aquifers to groundwater contamination (Kastning, 1988, 1989a, 1990; Kastning and Kastning, 1991; White, 1988). This problem is universal among all karst regions in the United States that underlie areas of economic growth (Aley, 1972; Aley and others, 1972; LeGrand, 1973). Much of the karstic terrain of the Virginias lies in rural regions where environmental impacts are generally limited to those imposed by agricultural practices and highways (Davies, 1970). In some cases, karst lies within the confines of public land (parks, forests, and the like). On the negative side, the region's karstic groundwater problems are increasing with the advent of (1) expanding urbanization, (2) increased usage of environmentally damaging artificial chemicals, (3) shortage of repositories for hazardous wastes (both household and industrial), and (4) ineffective public education concerning waste disposal and the sensitivity of the karstic groundwater system. Urbanization is rapidly encroaching in the region and economic development is resulting in potentially severe karst-related environmental problems. For example, corridors for highways, high-voltage power transmission lines, and gas pipelines have emerged as threats to karst (Werner, 1983; Kastning, 1995a, 1996).

For some time, sinkholes in rural areas were highly susceptible to illegal dumping by landowners or by passersby (Hubbard, 1989; Slipher and Erchul, 1989; Kastning and Kastning, 1992a, 1993). Fortunately, this source of contamination has largely abated as the result of legislation and education. However, sinkholes continue to be infilled with brush and construction debris (generally excavated materials from elsewhere). Some of this has come from construction of corridors such as highways and transmission lines.

Efforts to bring attention to the **sinkhole contamination problem** have been moderately successful (Kastning and Kastning, 1991, 1993, 1994, 2001). Articles in local newspapers, educational materials published by the Virginia Cave Board (a collegial body of the Division of Natural Heritage, Virginia Department of Conservation and Recreation) and other publications have addressed this problem in the Virginias (Hubbard, 1989; Kastning and Kastning, 1990, 1992a, 1995; Zokaites, 1997; Veni and others, 2001).

Sinkholes have been filled with earth materials for the purpose of leveling the land for development. It is important to note that filling a sinkhole with anything is highly undesirable. Sinkholes are natural drains and points of recharge. Filling of sinkholes often leads to undesirable consequences such as groundwater contamination, clogging of natural conduits in the underlying bedrock, flooding on the surface after storms, and suffosion (piping) of the fill which may lead to subsidence or collapse. Emplacement of excavated material onto a karst terrain during the construction of a gas pipeline can lead to blockage of recharge, whether through discrete infiltration into sinkholes or through diffuse infiltration through the overburden.

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Fortunately steps have been taken to legally protect the karstic environment in the Appalachian region. For example, both Virginia and West Virginia have enacted state laws that protect caves and their natural contents from vandalism and contamination. The Commonwealth of Virginia has established the Virginia Cave Board as part of the Department of Conservation and Recreation to take up matters relating to caves and karst in the Commonwealth, to advise other agencies, and to participate in education related to caves, cave science, and cave conservation.

An issue of environmental concern is the likelihood that sinkholes would be filled and drainage blocked as a result of installation of the Mountain Valley Pipeline. This can occur during construction wherein excavated material from the pipeline trench or from roads used to install the line will be displaced into nearby sinkholes. Additionally, erosion produced within the corridor may convey debris downslope into sinkholes. Blockage of natural drainage avenue through sinkholes is detrimental to recharge to an underlying aquifer as well as causing contamination of groundwater with sediment and chemicals associated with pipeline construction and maintenance.

The above paragraph expresses concern that sinkholes would be filled. I will note that the “Karst Mitigation Plan” submitted by the Applicant (Resource Report 6, Appendix D, p. 266-284 via document pagination) calls for “**stabilization**” of sinkholes. Although this term is not defined in the document, it may suggest filling.

The risk of **groundwater contamination by natural gas pipelines** is significant and real, despite the fact that methane, a primary constituent of natural gas, is volatile in the ambient environment. Natural gas transported by commercial pipelines includes many other constituents that could be non-volatile, especially in a groundwater environment. These include high-molecular-weight organic compounds that either originate in the geologic reservoirs or form via hydrocarbon synthesis under the high-pressure conditions that occur within the pipeline. As stated by Resource Report 1 in the application, “typical filtration and separation equipment” is planned for each of the proposed compressor stations, indicating that non-gaseous constituents are expected to be present. Commercial pipelines typically specify contractual limits on non-methane content for transportable fluids (*see for example*, FERC Gas Tariffs that are available on the internet for commercial gas-pipeline companies). Such tariffs typically state the expectation that some liquid contents will be included within the transported fluids. They also state non-zero limits for contaminants such as sulfur, oxygen, and water, the presence of which can stimulate hydrocarbon synthesis under high-pressure such as those that occur in pipelines.) Furthermore, solid particles known as “**black powder**” can accumulate in natural gas pipelines, and may contain toxic metals including lead, mercury, and arsenic (*see* submittal 20160512-5183 to FERC Docket CP16-10 by Sierra Club of Virginia, especially the section entitled “Soil and Groundwater Contamination” on pages 10 and 11 via document pagination). **Such particles, if present in a pipeline experiencing rupture, would likely be released along with gaseous and liquid hydrocarbons, and other contaminants, at the point of rupture.**

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Collapse and Formation of Sinkholes

The potential for spontaneous or catastrophic subsidence or collapse in the karst regions of the Virginias is low. Nonetheless, **collapses occasionally occur throughout the karst.** Massive collapses in which homes or businesses are swallowed by newly formed sinkholes are rare. The most common causes for catastrophic sinkhole collapse are (1) over pumping of groundwater from karstic aquifers, resulting in a relatively sudden loss of buoyancy that uphold roofs of cavernous openings, (2) sudden or oscillatory changes in the position of the water table due to modifications to surficial runoff and infiltration to the karstic groundwater system, and (3) leaky pipelines, such as water mains or sewer lines. Most collapses occur within the overburden (soil or regolith) and seldom does bedrock fall into underlying voids.

Suffosion (Piping)

Collapse of surficial material in karst is very common in areas of construction, especially where fill is used to level land. There have been countless examples of sinkholes developing in these artificial fills. (This author has personally visited, studied, inventoried, documented, and advised landowners in at least 20 such cases from 1985 to the present.) This includes construction sites for road beds, parking lots, and buildings. It is not uncommon for sinkholes to form after construction and to damage structures built on the fill. The process responsible (**suffosion/piping**) may take years to manifest itself in collapse, but this is always a concern where fill is emplaced upon bedrock that may have openings allowing infiltration (*i.e.* karst).

In areas undergoing development, sinkholes are often viewed as unwanted holes in the ground. If they are filled in to produce level land, the potential for ensuing environmental problems is twofold: First, as stated above, naturally developed paths of infiltration are often blocked, leading to ponding or flooding on the fill. Secondly, over the long run, fill materials drain into the subsurface and settling may occur. These disturbances easily impact any structures built on the fill. Additionally, the increased weight of water, fill, and structures upon the cavernous bedrock could cause catastrophic collapse in the future.

The reason that collapses are more common (and more frequent) in artificial fill than in natural undisturbed settings is easy to understand. When fill is put down it is rarely compacted sufficiently to attain the structural strength and density of nearby natural overburden. Porosity in fill is typically much higher than that of the surrounding undisturbed materials. (*see* Figure 5 in Appendix B). This promotes a higher migration of groundwater through the fill, leading to suffosion and eventual collapse.

Intrinsic to construction of gas pipelines is the process of burying the pipes under fill material that came out of the trench, was cut from the slope, or was brought in with trucks. **Despite the effort to compact fill, the former trench will nonetheless become a zone of enhanced percolation and flow of groundwater.** This can be envisioned as two concentric tubes. The central tube is the gas pipe that carries the product. The outer 'tube' is the surrounding fill. Its outer boundary would be the former walls and floor of the trench. **Therefore, the result would be an outer, annular, artificial pipe that carries groundwater parallel to the gas pipeline.**

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As within any aquifer, **discharge is proportional to the hydraulic gradient.** In basic terms this is the slope of the path of flow from high points of recharge down to low points of discharge. The steeper the gradient, the more gravity-induced potential is applied to the flow system. It follows then that the **infilled trench surrounding a pipe on steeper slopes will have a greater discharge than it would on gentler slopes.** By design, the MVP pipeline would in many places be constructed directly up or down steep slopes of the mountains in the region. Therefore, in this case, groundwater flowing in the fill alongside the pipe would likely have a relatively high discharge and velocity of flow. By extension, suffosion and collapse in the fill could ensue, even though this process may take years and go undetected until the surface finally collapses into the growing cavity. **Sudden and unexpected collapse of the material around the pipeline could have profound consequences such as breaks in the line and ensuing cascading calamities (e.g., fire, explosion, and release of toxic gases into the atmosphere and uncontrolled release of pipeline liquids into the groundwater flow system).**

Although large-scale collapse of surficial materials within the study area occurs rarely, the likelihood for karst collapse will increase within the pipeline corridor if the pipeline is constructed. Such increased risk of collapse will occur as a direct result of the construction process. Collapse is a characteristic phenomenon in karst regions where piping (suffosion) is induced by emplacement of artificial fills. Excavation of a trench for a pipeline and subsequent refilling would create subsurface zones with enhanced groundwater flows, with potential to increase rates of underground dissolution at subsurface locations receiving those flows. Underground rock dissolution caused by surface water infiltration is usually undetected until the final roof of an enlarging cavity falls in; such processes could easily and suddenly impact the integrity of the pipe.

Erosion

Erosion of surficial materials may readily ensue when an area is denuded of vegetation. Construction of gas pipelines entails excavation of a trench and subsequent placement of fill once the pipe is laid. It is necessary to construct roads along the line to allow vehicles to service the process and, on very steep slopes, along the tops of ridges to tether heavy equipment used to lay pipe. That too results in significant removal of vegetation and cutting and filling. **In effect there are two adjacent corridors: one for the pipe and one for the road. Erosion becomes a large problem along this rearranged earth material, even if moderate revegetation is carried out.** Unlike other corridors (e.g., highways and some power lines), a gas pipeline would in many places go directly up and down steep mountain sides. The steeper the slope, the greater the tendency is for erosion and the more severe it may become.

To see firsthand the effect of erosion along corridors one need only walk under existing high-voltage power lines in the Appalachia region. Access roads along these lines often exhibit erosion and gouging and typically need to be repaired to be useful.

Sediment from erosion moves downslope and eventually becomes deposited where land levels off at the base of steep slopes. A problem in karst terrains of this region is that they principally exist in relatively low-lying topography, including locations at the bases of slopes.

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Sediment contributed from erosion in the uplands can notably impact the karst below by (1) infilling sinkholes and blocking points of discrete recharge, and (2) blanketing an area and hindering diffuse recharge to the underlying karstic aquifer.

There are many areas where the MVP corridor moves off steep mountain slopes and onto lowlands. In many cases the lowlands are soluble rocks that have karst. Hence there is a pronounced concern that erosional debris from the corridors may impact the karst environment, including local aquifers that supply water for consumption or agriculture.

Slope Stability and Potential Seismicity

The potential for downslope movement of surficial material adjacent to the installed pipeline is an important consideration in these counties. **Movement, whether gradual (surficial creep) or catastrophic (landslide, mudslide, rockslide, or debris slide), may place segments of the pipe under lateral pressure and cause displacement.** This is likely if the material in which the line is entrenched is differentially displaced rather than uniformly along the line. Sudden slope failures would cause displacement at specific locations along the pipe, perhaps breaking welds or bending pipe to the point of failure.

It has been suggested that damage from slope failure is less likely where the line is trending directly up or down a slope (in the direction of the maximum component of gravitational force) than where the line runs parallel along a slope and has little change in elevation over that distance. In the latter situation a slide or zone of enhanced creep may put a severe bend in the line, perhaps compromising the seams where pipe segments join. However, in situations where the line is running directly up or down a slope, severe problems with potential failure may still occur, especially if suffosion is occurring. Additionally, steep segments along the line will create other issues related to movement of groundwater alongside the pipe. Determination of slope steepness and properties of soils in the vicinity of the line are crucial in identifying where this may occur. A detailed discussion of this hazard, wherein slope instability, soil character, and possible seismic disturbances can interact in a compound manner, is presented in Section 4.

Maps of slope intensity were produced in April 2016 by Drs. Stockton Maxwell and Andrew Foy of the GIS Center of the Department of Geospatial Science at Radford University. Percent slope (with 100 percent slope being 45 degrees) was calculated for 100 meter by 100 meter quadrats. The map was produced as an ArcGIS product and is available from the Center (<http://www.arcgis.com/apps/MapTools/index.html?appid=bcc1646d43ad4f7fbfd4953b5d722ec7>).

The New River Valley (NRV) Regional Commission provides area-wide planning for the physical, social, and economic elements of the NRV district (Montgomery, Giles, Pulaski, and Floyd counties and the City of Radford). The Commission produced a Hazard Mitigation Plan for the area that was adopted in 2005 and approved by the Federal Emergency Management Agency (FEMA). It was updated in 2011 (<http://nrvc.org/what-we-do/community-development/2011-hazard-mitigation-plan>; specifically see Section 4.4, *Geologic Hazards: Landslide, Rockfall, Karst, and Earthquakes*). The purpose of the plan is to recognize potential natural or artificial hazards and provide guidance for implementing responses to disasters. The plan included a **Landslide Rating Map** (see Appendix B, Figure 4.). Dr. Chester F. Watts of the Department of

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Geology, Radford University, developed that map. This small-scale map shows Giles and Montgomery counties. Factors of safety were calculated over the area and are shown as color coding on the map. The proposed MVP route traverses areas represented by fairly high risk, particularly in Giles and Montgomery counties. This is expected as the highest ridges and greatest relief are in this area. The assumption for this map is that these slides would be induced by severe storms. But, as discussed later in this report, seismic events may also trigger slides. Parameters in the factor of safety equation included slope of the ground surface, total soil thickness, saturated soil thickness, tree root strength, tree surcharge, soil cohesion, effective internal angle of friction, dry-soil unit weight, moist-soil unit weight, saturated-soil unit weight, and water unit weight. *This hazard plan is very relevant to the pipeline siting process and apparently has not been introduced or referenced by MVP nor by its consultants.*

Soils along the route of the proposed pipeline have been studied by Nan Gray (LPSS), Dr. Steven Hodges, and Meghan Betcher, who have assessed their strength characteristics (*see* Section 4 for this data). Drs. Carl Zipper and Robert Tracy have commented on the seismic (earthquake) potential of the area through information submitted to the Federal Energy Regulatory Commission (FERC). These are submittals 20150223-5031 and 20150401-5083 to Docket PF15-3. Furthermore, the U.S. Forest Service has expressed concerns with seismic risk faced by the proposed routing of the pipeline through the Jefferson National Forest (*see* Submittal 20160311-5013 to Docket CP16-10).

Dr. Richard D. Shingles of Virginia Tech (retired-emeritus), Meghan Betcher, Project Scientist at Downstream Strategies, and Darren Jones, GIS Technician for Roanoke County have compiled tables identifying the most severe slopes and associated soils along the pipeline corridor (Tables 1-A, 1-B, and 2 in Appendix B). The tables were compiled using data from MVP Resource Reports, Appendix 1-J, "Vertical and Lateral Slope Tables," soil data from the GIS Center of the Department of Geospatial Science at Radford University, and input from regional soil experts Nan Gray and Dr. Steve Hodges. The tables list affected soils and slope angles that are keyed to MVP designated mile indicators. These important data are presented in Section 4.

One of the most active earthquake zones in the mid-Atlantic region is the Giles County Seismic Zone (GCSZ). Bollinger (1981) and Bollinger and Wheeler (1983, 1988) present a detailed analysis of the zone with maps, geologic analysis, and seismic history that includes dates and magnitudes of recorded earthquakes in the area dating back into the late 1800s. The largest earthquake of record in the GCSZ occurred on May 31, 1897 and had an estimated Richter magnitude of 5.8 to 5.9 (Mercalli intensity VIII). It caused considerable damage in Pearisburg and surrounding areas, and it remains the largest documented earthquake in Virginia history (<https://www.dmme.virginia.gov/dgmr/majorearthquakes.shtml>). A recent peer-reviewed publication in a scientific journal (Biryol and others, 2016) confirms that the term "Giles County Seismic Zone" remains in scientific use, and that the GCSZ continues to be an area with enhanced seismic risk (see Figure 6, Appendix B)

Biryol and others (2016) describe the GCSZ as a "prominent, densely clustered seismic zone" that "is associated with the reactivation of normal faults in the old crystalline basement". The GCSZ is represented by these investigators as seismically active in their Figures 9 and 10 (not shown

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here). The activity is being driven by underlying asthenospheric movement. (The asthenosphere is the upper layer of the earth's mantle, which lies below the lithosphere). Statements in the MVP application assert that the GCSZ is not a "significant seismic source zone."

MVP Resource Report 6, section 6.6.1.3, should be considered as non-credible by FERC based on the fact that the 1897 earthquake did occur. If the GCSZ is not a "significant seismic source", how would the applicant explain the origin of the 1897 earthquake? FERC should consider the GCSZ as a zone of enhanced seismic risk, which is consistent with an extensive record of peer-reviewed and published work (Bollinger, 1981; Bollinger and Wheeler, 1983, 1988; Bollinger; Biryol and others, 2016).

The preferred route of MVP passes through the center of the Giles County Seismic Zone as discussed in Section 4 and shown in Figure 6 (Appendix B). Should a potential magnitude 4 to 6 earthquake occur once the pipeline is operational, there may well be a triggering of landslides on unstable or metastable slopes that could potentially disrupt the pipeline and cause significant collateral damage. Perhaps the pipeline itself may be directly broken by ground motion during an earthquake.

It is clear that steep mountain slopes in the area of Monroe, Giles, Montgomery, Craig, and Roanoke counties are subject to mass movement including large landslides. Seismicity and severe runoff from storms have triggered these events in the past and can easily do so in the future. Earthquakes do not necessarily have to be large to do damage to the pipeline. Small events can easily trigger mass movement on metastable slopes. The Mountain Valley Pipeline would be most subject to these hazards in the many areas having steep slopes.

Ancillary Environmental Concerns Along the Pipeline Corridor

There are some other considerations relative to karst in the area under consideration. They concern the natural processes and relate to environmental hazards that are germane to siting a gas pipeline.

Valley-Train Aquifers and Allogenic Recharge to Karst

The term '*allogenic recharge*' describes the influx of surface water derived from a mountainside into an aquifer at a lower elevation. Allogenic recharge of karst aquifers is common in Monroe, Giles, Craig, Montgomery, and Roanoke counties as a direct result of the geologic structure of the area, where dense and weather-resistant sandstone tends to form ridgetops. Water originating here, and in other upland slopes, drains into lower-lying terrains that are often underlain by carbonate rock (limestone and dolostone) where karst is typically developed.

In conjunction with the previous comments on surficial processes, erosion, and groundwater contamination, there is another aquifer-related aspect found along mountain fronts, upslope from the valley lowlands. Unconsolidated material on the mountain slopes is extensive and much of this material occupies streambeds in smaller valleys that are cut into the slopes and flow directly downhill into the broader valleys where they become tributaries to the major streams in the lowlands. **These smaller tributary streams flowing off higher elevations, and the larger**

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streams in the valleys, collectively form the rectilinear (lattice) drainage patterns that are characteristic of the Valley and Ridge Province.

Sedimentary material, such as alluvium and colluvium, found in the beds of the valley-side streams, are collectively known as **valley-train deposits**. Water flowing within these deposits is typically perched on underlying impermeable bedrock such as dense, crystalline sandstone in the highest elevations or shale further down the mountainsides. Therefore, water is unable to percolate further into the subsurface.

The importance of groundwater within valley-train deposits is often overlooked or not recognized at all. This is because most people in this region live in the low-lying valleys where the topography is gentle, and fewer homes exist in the steeper, higher elevations. Yet there are places where potable water is obtained from springs issuing from alluvium and colluvium in the streambeds. Contamination and disruption of these smaller, linearly confined aquifers can severely impact vital water supplies (Kastning and Watts, 1997).

Valleys with tributary streams flowing straight downhill to base level are visible all along the mountain fronts. Water flowing in valley-train deposits is often pirated directly into the bedrock where these small streams meet the soluble rock on the lower flanks of the mountains or in the valley bottoms. The point of recharge is often a well-defined sinkhole, pit, or other opening very near the contact of the carbonate rock with the insoluble rock upslope. Therefore, in the Valley and Ridge Province, **allogenic water from the uplands significantly recharges karst in the lowlands.**

Allogenic water derived from upland slopes should be viewed as an integral part of the overall drainage basin that contributes to a karst aquifer. Flow of storm water is very intense and rapid in steep allogenic streams. Thus, any events that alter the quantity and/or quality of water in the valley-train deposits will also rapidly impact that of the water entering a karst aquifer.

Herein lies another important concern about pipeline corridors that may be constructed through the Appalachian fold belt. What happens upstream may have significant consequences downstream. Any activity associated with construction and maintenance of a corridor in the uplands may cause ancillary problems in the lowlands. For example, **if the proposed pipeline were to significantly disturb valley-train deposits and their included water, this would impact the receiving aquifers downstream, including those developed in karst. Such occurrence may also impact users who obtain water directly from springs in the alluvium and colluvium in the upland streams. Negative effects would include reduced flow to springs, siltation, and contamination of the water supply.**

To reiterate, allogenic water, flowing from insoluble rock in the uplands, enters karst aquifers upon making contact with an outcrop of soluble rock. Upstream allogenic zones are important components of recharge for nearly all karst aquifers in this region. Documents submitted to FERC by Mountain Valley Pipeline and Draper Aden Associates do not address allogenic recharge. This is a major omission because allogenic recharge supplies drinking water for homes in karst areas. If constructed, the pipeline would not only directly impact water resources on and within karst terrains, it would also disturb the sources of allogenic water. Much of the

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proposed pipeline corridor is sited in zones where allogenic recharge to karst aquifers is prevalent.

Importance of Establishing Protective Buffer Zones in Karst

A major consideration in protecting natural water supplies is the protection of contributing sources - the "upstream" areas of the flow system (Kastning and Kastning, 1997; Kastning, 2000). For surficial streams such protection entails environmental management of all tributaries within the catchment area (drainage basin). In groundwater-protection strategies, attention is usually focused on all zones that contribute recharge.

Recharge zones in karst vary considerably within a continuum. On one end of the spectrum is *diffuse recharge*, whereby water infiltrates through the soil zone or other overburden to the interface with the bedrock. Under these conditions, recharge occurs over a wide geographic area. At the other end of the spectrum is *discrete discharge*, a process whereby water enters the bedrock in distinct places. Sinkholes are excellent examples of discrete recharge. Some sinkholes take the full discharge of one or more surface streams; these locations are termed *swallets*.

As mentioned in the previous section, allogenic water is often derived from large contributing drainage areas or watersheds on upland slopes. In effect, if upstream areas contribute significant recharge to karst aquifers, they are inherently part of the greater aquifer system. If the contributing areas are subjected to construction impacts, buffer zones should be required to prevent contamination of groundwater through natural filtration. A buffer zone is an area that is identified as having significant impact on the main resource. **In general, buffer zones incorporate most of the drainage area that contributes recharge and that can be environmentally degraded through poor land-use practices.**

It is evident from the foregoing that in the case of sinkholes or sinkhole clusters, buffer zones may have to be one or more orders of magnitude larger than the size of sinkholes as indicated on a map or by other means (Kastning and Kastning, 1997; Kastning, 2000). The determination of the size of a buffer zone is based on any of several criteria: (1) the boundary of the drainage basin that contributes recharge to a sinkhole or a cluster of sinkholes, (2) the area within the contributing basin that is under potential development, (3) the natural settings, including topography, geologic parameters such as bedrock and structure, and vegetative cover, (4) inherent storm-water hydrological responses, and (5) proximity of land-use activities within the basin that may impact recharge at sinkholes and discharge at springs.

Virginia requires that resource protection areas (RPAs) be designated for land development around streams. This is required in the eastern part of the Commonwealth, and stream-buffer ordinances are in effect in various counties. Engineering criteria are available for stream buffers. Implicitly, buffers around recharge zones in karst serve a similar purpose in protecting recharge areas.

If it is known that a karst system is very extensive (often based on dye-trace studies) and that it is sensitive (e.g., having rare or endangered species), it should be required that the entire area be protected with a buffer zone.

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Karst terrains require special consideration for environmental protection. Environmentally sound engineering often requires that areas of karst be sufficiently delineated. This is especially true where recharge zones must be protected from contaminants introduced at the surface that may be readily conveyed into underlying aquifers discretely through infiltration at sinkholes or diffusely along dissolutionally widened fractures.

In the case of the Mountain Valley Pipeline, it is imperative to delineate buffer zones in areas of karst where it is known that there are a high densities of sinkholes, extensive mapped caves, long groundwater flow paths documented by dye-tracing, and significant allogenic recharge. Those areas include (but are not limited to): the Indian Creek to Peters Mountain area of Monroe County, the Canoe Cave area in Giles County, and the Mt. Tabor Karst Sinkhole Plain of Montgomery County, and the Elliston Karst Plain in eastern Montgomery and western Roanoke counties (discussed further in Section 4). Buffer zones would be intended to define areas that should be protected from pipeline development, especially where there are potential impacts to sensitive features within karst. Unfortunately, the MVP application routes the proposed pipeline through areas where potential impact to sensitive karst is likely. Documents submitted by Mountain Valley Pipeline and its consultants have not adequately considered buffer zones.

Water Originating Along the Eastern Continental Divide

Because water on the land surface sheds from the highest places downhill to the lowest places, the first and cleanest water comes from the uplands. Meteoric water (derived from precipitation – for example rain or snowmelt) will flow down each side of the dividing ridge. **The Eastern Continental Watershed Divide** represents an upland in the eastern United States and would be crossed by the proposed pipeline route. The Divide and adjacent ridges are sources for much of the water that flows eastward on the surface and through the subsurface from the mountain crests to the Chesapeake Bay and Atlantic Ocean. The divide also contributes water to streams that flow westward via the Ohio and Mississippi rivers to the Gulf of Mexico. Clean water in the uplands of the Appalachian Mountains is of prime concern owing to its importance as a water source, and it must remain clean. As this water subsequently enters allogenic zones, epikarst, and karst aquifers as recharge, its quality must be maintained. Both the contributing upland watersheds and the highly sensitive karst aquifers in the lowlands must be avoided by large-scale construction projects such as the Mountain Valley Pipeline.

The purity of upland water needs to be maintained. The Mountain Valley Pipeline and its consultants have not addressed this issue.

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Impact of Corridors in Karst

Consideration of corridors is one of the most important aspects in addressing potential hazards posed by the MVP project. Pipelines, by their very nature, occupy corridors that cut across the landscape. In general corridors disrupt the natural environment by dissecting (partitioning) the landscape. This is important in karst as well as in all other types of terrain.

The United States is laced with several types of corridors, including those constructed for transportation (highways and railroad lines), those that transmit electrical energy (high-voltage power lines), and those constructed to transmit fluids (water, oil, natural gas). **Because about 20 percent of the land area in the United States is underlain by soluble rock, many corridors cross karst terrain** (Kastning, 1995a, 1996). **However, to date, nearly all existing natural-gas pipelines that cross karst do so in areas of low relief (low to moderate slopes).**

Corridors differ from other types of construction in one major way - they are narrow and linear. They transect the landscape, whereas buildings and similar constructs are site-specific, occupying sites that are compact in area and do not extend disproportionately far in a linear or curvilinear fashion. Corridors that pass through karst regions cut swaths across the landscape that are hundreds of feet wide. The MVP corridor would be a 50-foot-wide right of way and a construction corridor of 125 feet across. This could be wider on steep slopes.

In the case of highways and railroads, corridors are constructed with relatively gentle grades, generally less than a few percent or a few degrees in slope angle (maximum of 10 percent grade in most cases). This is necessary for efficient and safe movement of vehicles. **Corridors for power lines and pipelines are not so constrained and are often constructed over steep slopes, especially in order to shorten the route.** The movement of fluids in pipelines consumes considerable energy and requires compressor stations along the way. To minimize the expenditure of energy for transmission and also to minimize the costs of construction, design plans often call for the shortest route. However, costs of compressor stations or added costs for constructing on steep slopes are factors in the selection of routes. If the shortest routes are desired in the Appalachian Mountains, then steep ascents and descents would prevail over routes in lowlands and river valleys.

Areas of high relief and steeply sloping topography are not conducive for residential, commercial, industrial, or agricultural use and remain largely undeveloped. For this reason alone, **natural surroundings happen to be best preserved where slopes are steep. It follows that large areas of land may remain contiguous and natural landscapes and ecosystems within these tracts are preserved intact and safe from development.** However, transmission corridors cut across these areas, resulting in partitioning and fragmentation of natural areas.

Caves and other karst features occur in areas of steep slopes as well as in areas of lesser slopes. For this reason, karst landscapes are affected by corridors of all types and configurations. One of the principal environmental concerns in the selection of routes for the Mountain Valley Pipeline is the impact of karst. As previously discussed, the direction of groundwater flow in karstic aquifers is strongly governed by the structure of the bedrock. In most cases, flow is along the strike of the bedrock. This is particularly true in folded rocks such as those in the Appalachian

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Mountain region. Fractures, caves, and sinkholes, as well as the axes of mountain ranges and intervening valleys, are commonly oriented parallel to the structural axes (*i.e.* along strike). This gives both the topography and the karst a hydrologic "grain," so to speak. **Hence, surface water and groundwater generally flows with the grain and less commonly across it. Transverse corridors, cutting across the grain, may lead to partitioning of flow systems** (*see* later discussion). **Additionally, longitudinal corridors that align along the grain may be positioned over karst for long distances, increasing the potential for harm of the underlying aquifers.** Other factors, such as slope stability and erosion of surficial materials, also become considerations. ***For these reasons, there is not a preferred direction for a pipeline corridor across mountainous karst.*** The compound effects of hazards in mountainous karst terrains is discussed more detail in Section 4.

There are five general types of environmental and construction problems associated with karst terrain and each is an important consideration in siting corridors (Kastning, 1995a, 1996): (1) land instability and collapse, (2) flooding and siltation, (3) groundwater contamination, (4) destruction of caves or their contents, and (5) disruption of hydrologic flow paths. They are addressed further here with respect to corridors, such as those of the proposed Mountain Valley Pipeline.

Instability and collapse.

In some localities, karst terrains may be inherently unstable and prone to unexpected collapse of bedrock. Sinkholes (dolines) forming upon catastrophic **collapse of a dissolution void** (*e.g., cave*) in the natural environment of this region are relatively rare. However, if trenching for a pipeline were to remove enough bedrock above such a cavity, collapse of a thinned bedrock roof may be triggered during construction, or it may spontaneously occur at a later time, perhaps severely damaging the pipeline. Moreover, the weight of a pipe and its contents may be enough to collapse a thin roof span that has marginal stability.

As mentioned elsewhere, **suffosion of fill material around a pipeline** (*i.e.* development of cavities in the fill as particles are sapped downward into karstic openings by groundwater) is also likely cause stability problems and collapse. This may occur years after installation of a pipeline, as the sapping of particles and enlargement of a cavity in the fill material is a slow, but steady process.

Often the surface of soluble rock beneath the soil and regolith is pitted, with cutters (typically well etched and dissolutionally widened fractures) and grikes (intervening blades of bedrock separating cutters). Pinnacles (grikes) of bedrock under a pipe may lead to bending of the pipe as it sags into the space between pinnacles (cutters). Therefore, an uneven bedrock surface beneath an entrenched pipe may lead to differential subsidence, and thereby to deformation and failure of the pipe.

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Flooding and siltation

Closed depressions, such as sinkholes, have no natural surficial outlets for excess meteoric water (derived from precipitation). Under normal conditions, sinkholes drain to the subsurface at rates sufficient to allow the recharge water to efficiently percolate into the underlying aquifer. However, at times the bottoms of sinkholes become silted and wholly or partially plugged. This may cause sinkholes to periodically flood under storm conditions. Siltation is often caused by erosion brought on by improper land use adjacent to sinkholes. **Disruption of the surficial topography, clear-cutting, and removal of vegetation along corridors often lead to flooding and siltation in sinkholes unless proper mitigating measures are implemented.**

Pipeline corridors are kept relatively clear of vegetation. Access roads leading to the corridors and also running parallel to the pipelines for maintenance are also devegetated. Both of these components augment erosion and, when corridors are located within or topographically above karst in mountainous terrain, it is likely that the sediment thus derived may be washed into sinkholes, causing siltation and flooding.

Contamination of groundwater.

Accidental spills along a pipeline may occur during construction or maintenance. Of course, if an active line ruptures, the products may easily enter groundwater, including that in karst. **Hydrocarbon compounds** released from gas pipeline ruptures may be carcinogenic.

Destruction of caves or their contents.

Corridors may intersect caves, especially during the excavation of a trench. Occasionally, small caves are totally obliterated. In other situations, new artificial entrances may be added to caves during excavation. Aside from the degradation or elimination of the aesthetic character of a cave (e.g., broken speleothems), there may also be subtle, yet significant, damage to delicate cave ecosystems. In some cases, the effects may be catastrophic. Globally rare or endangered fauna may be threatened or killed. For example, **in the Mt. Tabor Karst Sinkhole Plain, cave conservation areas have been delimited in order to protect rare troglobitic species known to inhabit some of the caves. In some cases, archeological sites in caves may be disturbed.**

Disruption of hydrologic flow paths.

Corridors, once in place and during the construction phase, have the potential to significantly alter the direction of water flow and to disrupt zones of recharge and discharge, particularly in karstic aquifers (Figures 5A and 5B). **Transverse corridors**, cutting across the hydrologic and structural grain, may not only partition the surface environment when such previously contiguous and undeveloped areas are segmented, but may do likewise to flow networks for surface water and groundwater. Partitioning of aquifers occurs (1) where flow paths are interrupted by excavation or (2) where infilling occurs during construction of corridors or after subsequent erosion and

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siltation. This may be an issue in the **Mt. Tabor Karst Sinkhole Plain** where dye traces have shown multiple flow paths. Another highly significant example of disruption of groundwater flow occurs where the line is routed across **Sinking Creek in Giles County** (MVP milepost 210). Both of these locations are discussed in detail in Section 4. The region between Fort Lewis Mountain and Poor Mountain in Roanoke County is underlain by karst (*see* Appendix B, Figure 9). Entrenchment of a pipeline may affect the **Elliston-Lafayette Karst Plain** and water provided by the Spring Hollow Reservoir.

Derangement of drainage networks brought on by corridors can result in severe imbalances in the water budget, and thereby critical lowering of water levels in wells or reduction of discharge through flow systems, including caves. Blockage of natural flow paths could cause back flooding upstream of the blockage. Alteration and derangement of flow paths can readily impact existing water supplies and can change the hydrologic character of caves, severely affecting the growth of speleothems or disrupting delicate biological ecosystems. Unfortunately, once corridors are in place, these effects may not be easily detected from the surface and it may be too late to correct any harm that may have been done. Canoe Cave in Giles County (Appendix B, Figure 7), Slussers Chapel Cave, and others in the Mt. Tabor Karst Sinkhole Plain (Appendix B, Figure 8) are among those of particular concern (*see* discussion in Section 4). Caves and springs along the corridor in Monroe County, between mileposts 181-187 and 194-195, as well as caves in the Ripplemead area in Giles County may also be impacted in this way.

Partitioning of the natural environment

Broad corridors result in dividing natural areas into smaller tracts (Figure 5C). This can severely impact the biological realm. Some land animals may not travel or migrate across a cleared zone and their normal movement may become curtailed or altered, decreasing the diversity of species within smaller tracts. Conversely, newly created open space may provide avenues for undesirable invasive species (animals or plants) to invade an area. Further discussion on partitioning (fragmenting) topic is found in Appendix A.

Partitioning may also disrupt aquatic and terrestrial species that inhabit caves. Some species are globally rare or threatened (including examples in the Mt. Tabor Karst Sinkhole Plain). These species have been identified and listed by the Natural Heritage Program of the Virginia Department of Conservation and Recreation (DCR) which maintains an extensive database of such organisms. S. René Hypes of DCR, in her letter of May 17, 2016 to FERC (20160317-5126(31318143)), identifies some of the species of crucial concern. Avenues of natural migration of animals through caves in a karst aquifer may be severely altered through partitioning by a pipeline corridor. To ensure that this would not occur would require intensive additional study in specific caves and karst areas, including biological inventories.

A Recent Bellwether of Potential Gas Pipeline Problems in the Region

It is instructive here to refer to a recent gas-pipeline incident in the region of interest regarding the threat of groundwater contamination:

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In 2014, **Columbia Gas of Virginia (CGV)** installed a 16-mile long, 8-to-10-inch-diameter pipeline from Peterstown, West Virginia, over Peters Mountain to the Celanese Acetate Plant in Narrows, in western Giles County, Virginia. This line was installed to bring natural gas to the Celanese plant. It was buried in a trench excavated through karst over a recharge area that supplies water to a spring that is used as a water supply by the **Red Sulphur Public Service District (RSPSD)** in Peterstown, West Virginia. In 2015 the Dominion Pipeline Monitoring Coalition (DPMC) registered a formal complaint to the Virginia Department of Environmental Quality (DEQ) regarding several serious issues arising from the new pipeline. These included erosion and sedimentation issues and contamination of groundwater of the RSPSD water supply by diesel fuel from heavy machinery involved in the construction process (*see* Complaint and Request for Compliance Enforcement letter from DPMC to DEQ, dated November 11, 2015). DEQ had inspected the sites in April and May of 2015 and listed several non-compliance citations on the part of CGV with respect to the Celanese pipeline (*see* letter from Robert J. Weld to Rick Webb, dated December 22, 2015). The citations include (1) failure to properly install and maintain sediment control structures, (2) failure to identify and protect sensitive environmental features, and (3) failure to preserve watershed hydrologic function through the development and implementation of a storm-water management plan. Slope stability was also found to be a contributing factor. More recently, additional comments on the CGV Celanese pipeline were submitted by Louisa Gay to FERC, in a letter dated June 20, 2016, addressing how these problems can be extended to other sensitive areas along the route, including the Mt. Tabor Karst Sinkhole Plain.

The CGV Celanese pipeline is a 10-inch-diameter pipe. (CGV is interested in upgrading this to a 12-inch pipe). The problems associated with the pipe installed in 2014 were manifested within a year, and caused a lengthy shutdown of the RSPSD water treatment plant, considerable public outcry, and attention in the media. **The hazardous situations that ensued with this relatively small gas line, as bad as they were, would pale in comparison in magnitude with similar hazards associated with a 42-inch pipeline.** The diameter of a 42-inch pipe is 4.2 times that of a 10-inch pipe, and the cross-sectional area of a 42-inch pipe is 17.6 times that of a 10-inch pipe. It follows that **environmental problems or catastrophic failure of a 42-inch pipe would be at least an order of magnitude larger those corresponding to a failure of a 10-inch pipe. All of this is exacerbated by the long distance that these lines extend over the mountainous and high relief of the Appalachian fold belt in this region.**

Summary

The potential problems discussed in this section regarding pipelines and their corridors as they cross karst landscapes are paramount considerations that must be addressed. Much of the foregoing topics has not been adequately addressed (or in some cases not at all) in the documents submitted by Mountain Valley Pipeline or its consultants in the application process.

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Section 4

Compound Effects of Geologic Hazards: With Significant Examples Along the Pipeline Corridor

Introduction

Any one of the individual hazards discussed to this point is of high concern in ascertaining the viability of an environmentally safe natural-gas pipeline in the Appalachian Valley and Ridge Province. However, karst processes (both on or below the surface), slope stability, soils, surface hydrology, severe weather, seismicity, and natural habitats are interrelated into a natural system. Similarly, the hazards discussed in Section 3 rarely operate alone in this region. Two or more can act simultaneously or they may occur sequentially as a cascading series of events. In fact, one hazard may induce another. (For example, an earthquake may trigger a landslide that, in turn, may block and disrupt a stream.) This section explores potential compounded effects along the pipeline corridor in detail.

Karst is an important environmental consideration in its own right over much of the proposed pipeline route through these counties. However, in most cases, the karst environment can be impacted by changes in its upstream recharge zone, movement of eroded or landslide induced material onto the karst from above, contamination of surface streams that provide recharge to underlying aquifers, and other events. The specific sites discussed in detail below illustrate compound hazards.

The documents submitted by MVP and its consultants in general do not address the aggregate effects of multiple hazards. By addressing hazards individually, combined effects of interrelated simultaneous or cascading events are overlooked. In most cases a hazardous condition or event will be complex, with multiple components. It is imperative that a potentially threatening project such as this maximum-size, highly pressured natural gas pipeline be analyzed systematically based upon compounded potential hazards. The four selected sites discussed later in this section illustrate the need for this approach.

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Potential Slope Failure Along the Proposed MVP Corridor, Compounded by Soil Character and Seismicity

The following discussion has been adapted from material compiled by Richard D. Shingles, Ph.D. with major contributions from Meghan Betcher (Project Scientist at Downstream Strategies), Nan Gray (Licensed Professional Soil Scientist), Darren Jones (GIS Technician for Roanoke County), Carl E. Zipper, Ph.D. and Steven C. Hodges, Ph.D. (Professors, Crop and Soil Environmental Science, Virginia Tech), Robert J. Tracy, Ph.D. (Professor of Geosciences, Virginia Tech), and Alfred M. Ziegler, Ph.D. (Professor Emeritus of Geology, University of Chicago)

An important aspect of geologic hazards along the proposed corridor of the Mountain Valley Pipeline (MVP) is the compound effect of slopes, soils, and potential earthquakes (seismicity). The following is a summary of parameters that impose these hazards along the corridor in Monroe County, West Virginia, and Giles, Craig, Montgomery, and Roanoke counties in Virginia.

Steep slopes are presented first, in relation to soil characteristics that could exacerbate slope failure. Tables of slopes and soil conditions (Appendix B) list these relationships and are keyed to MVP designated mileposts. The seismicity of the area is then summarized. A seismic event could trigger slope failure, especially after soils and vegetation have been disturbed or removed during construction. However, slopes may be unstable or metastable and failure could be triggered by other contributing factors such as severe storms and precipitation or erosion that lessens slope stability. Soils on unstable slopes can also exhibit a form of slow and persistent movement known as 'soil creep' that can exert significant effects over time.

The dictionary definition of "**soil creep**" describes a well-documented phenomenon, *i.e.* "slow down-slope movement of earth materials under the influence of gravitation." Soil creep has been documented to occur in steep-slope terrain by numerous studies and is endemic to Giles County owing to the abundance of shrink-swell soils (*e.g.*, Young, 1960; Yamada, 1999; Oehm and Hallet, 2005).

Steep Slopes

The path of the MVP corridor through Monroe County crosses successive valleys and ridges - characterized by steep slopes (Table 1A, Appendix B, compiled by Meghan Betcher) and karst terrain. Streams, springs, and groundwater in this region provide drinking water to the population of the county, both through private springs and wells and by public drinking-water providers. The construction of the MVP would pose a significant threat to water supplies for a large number of the residents of this and neighboring counties.

The MVP is projected to cross several "**zones of critical concern**" (ZCC) - defined as "a section of corridor along streams within a watershed that warrants detailed scrutiny owing to its proximity

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to a zone of recharge and susceptibility to potential contaminants.” Among the most susceptible in Monroe County are the Big Bend Public Service District (PSD) and Red Sulphur PSD.

The preferred route crosses the ZCC for the **Big Bend PSD** in at least two locations within the county, at Mileposts 175.71-176.06, where slopes are greater than 30 percent with an average maximum vertical slope of 62 percent for approximately one mile.

A significant part of the ZCC for the **Red Sulphur PSD** lies within an area of karst. The proposed route crosses through this ZCC at least three times and runs along a ridge of Little Mountain where slopes average over 40 percent for more than a mile. The extent of the projected MVP that descends on the west slope of Peters Mountain, in the headwaters of the Red Sulphur PSD, traverses slopes greater than 40 percent for nearly a mile. Construction in this area in 2014 for the Celanese 10-inch Natural Gas pipeline in Giles County resulted in significant turbidity in the Red Sulphur PSD, that has since adversely impacted the drinking-water quality. This PSD serves 4,000 households and is supplied by a groundwater well and spring located in karst terrain. A diesel-fuel spill in this right-of-way resulted in a two-week shutdown of the PSD in July, 2015. (See “Watch group files complaint over Columbia gas pipeline project”, <http://www.newsleader.com/story/news/local/2015/11/12/pipeline-watch-group-files-complaint/75647890/>). These problems resulted in considerable controversy and press coverage, leading to investigation and suggested corrective measures that were imposed by the Virginia Department of Environmental Quality. Additional concerns about this situation are presented Section 3.

In addition to impacts to public drinking water systems, many **private drinking water sources** may be impacted by the MVP in this area. A large part of the rural population obtains drinking water from private springs and wells, many of which are located on the steep slopes of Monroe County and fed by waters from within the karst aquifer. These private water sources are at risk from adverse changes in water quality and quantity owing to disruption of flow patterns.

Table 1-B (Appendix B, compiled by Richard D. Shingles and Darren Jones) shows the most severe slopes along the proposed route from Giles County through Roanoke County. The proposed MVP descends from Peters Mountain into Giles County and runs southeastward for about 15 miles across ridges and valleys to Newport, at the eastern end of the county. There it turns northeast, running along the northwestern flank of Sinking Creek Mountain into Craig County and then crosses Sinking Creek Mountain and runs southeast again, over Brush Mountain, and into the Mt. Tabor Karst Sinkhole Plain in Montgomery County. Table 1B (Appendix B) includes twelve areas along the MVP route along the west-east route where the maximum slope averages over 40 percent. Seven of these most severe slopes extend for approximately one mile each. One of the steep zones is at the three-way intersection of Mountain Lake Road, Zells Mill Road, and Sinking Creek (within 300 feet of the Link Covered Bridge, near MVP milepost 210). Another steep zone is above Canoe Cave and related karst features there.

In summary, over half (53.5 percent) of the preferred route from Monroe to Roanoke counties has slopes that are 20 percent grade or greater. Over one-third (36 percent) of the slopes that exceed 20 percent grade are 35 percent grade or greater, requiring “special engineering techniques” according to MVP. Thus 19 percent of the slopes along this route are over 35 percent in grade, creating very serious construction problems that in turn would

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enhance the likelihood of both erosion and slides on slopes.

Soils

The possibility of significant erosion problems, and ensuing slides following construction, is greatly enhanced by a preponderance of the **active shrink-swell soils with significant plasticity**: Carbo, Faywood, Frederick, Nolochucky, Poplimento and Sequoia. Additionally, these soils have **poor drainage** and hence, **low bearing strength** that would enhance sliding on steep slopes. Table 2 (Appendix B, created by Dr. Steven Hodges) lists soils that contribute to slope stability and their key attributes. These pose severe engineering challenges. The construction of the MVP on slopes of 35 percent or higher will require extraordinary techniques, where machines for excavating trenches and laying pipe are attached by cable to heavier equipment atop ridges. This would result in considerable additional clearing of ridge tops and slopes. Soils of poor bearing strength would become loaded with the force of heavy machinery. Indeed, the weight and vibrations of heavy machinery atop ridges covered with these soils, and supporting other heavy machinery, can push saturated cohesive soils over and down ridges (*see* drainage and hydrology ratings in the tables). Thus, ironically, **the extraordinary solution that MVP plans to use for laying pipe on very steep slopes would compound the engineering problems and threaten the integrity of the pipeline.**

It is interesting to note that Giles County is blanketed with slip-swell soils, far more than any of the other counties along the route (compare Tables 2 and 3, Appendix B). It also has more areas of karst (approximately 80 percent of its land area) and is very close to the center of the Giles County Seismic Zone. **Giles County alone would severely impede construction and maintenance of a safe and viable gas pipeline.**

Bedrock

Data in Tables 1 and 2 (Appendix B) underestimate a likely potential cumulative threat. Further hazards occur in sites with relatively undisturbed thin surface soils and regolith. **The extraordinary engineering techniques of MVP would disturb the subsoil, break its structure, expose the subsoil to rainfall and erosion, and compact soils during reclamation.** If the native surface soils are unsuitable, the disturbed soil will very likely be much more so. Depth-to-rock ratings are included in Table 2 because some of the severe ratings result from shallow soil depth. One reason why Giles County has not become highly developed is that steep slopes covered in fragile soils are highly prone to slope slides. The unstable character of these mountain slopes is evidenced by well-documented, extensive and large, historic landslides along the southeastern flank of Sinking Creek Mountain (Schultz, 1986,1993; Schultz and Southworth, 1989; United States Forest Service, 2000; Whisonant and others, 1991). Such slopes will not be able to bear the load that MVP is planning to impose.

Based on depth-to-rock associated with predominant soils along the MVP route, extensive blasting will likely be necessary. Blasting will occur in areas of sink holes, springs, and wells. The extent

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of karst underlying these soils, especially in the vicinity of the karst systems associated with Pig Hole, Echols, Smokehole, Tawney's and Canoe caves and the extensive Clover Hollow karst system along Zells Mill Road, presents significant threats to both residential water sources and to the structural integrity of a large, high-pressure pipeline.

Based on their soil studies, Nan Gray and Steven Hodges judge this region as a **no-build zone for the pipeline**. Upon a close reading and scrutiny of MVP Resource Report 7-Soils (Appendices 7-A1, 7-A2, 7B, 7C, 7D and Table 7.2-4), Gray observes that the contractors for assessing soils along the route "report the dangers of the route in significant detail." The details indicate **approximately 60 percent of the route through West Virginia and Virginia is in karst and/or shrink-swell soils, making it unsafe and unsuitable for the type of construction** proposed in the application. (*see* Review of Resource Report 7 in the Motion to Intervene and Protest (Docket CP16-10-000) submitted by Preserve Giles County (20151201-5127).

Giles County Seismic Zone

The Giles County Seismic Zone (GCSZ) further complicates hazards along the proposed MVP corridor. At Pearisburg, the county seat of Giles County, the planned MVP route passes a very short distance from the center of the active Giles County Seismic Zone (GCSZ; *see* map of Figures 6A and 6B in Appendix B). The Virginia Department of Mines, Minerals and Energy (DMME) has designated the GCSZ as a "Seismic Hazard" (DMME. Mapping Seismic Hazards in Virginia. <http://dmme.virginia.gov/DGMR/EQ/HazardMapping.shtml>). The agency web site reports, "Most earthquakes in Virginia are not associated with a known fault, but occur within three distinct seismic zones....," one of which is the otherwise well-documented Giles County Seismic Zone. This zone was not recognized in the MVP resource reports depicting seismic zones in relation to the proposed pipeline. The GCSZ does not appear in Figure 6.1 of Appendix 6-D of their report on geologic hazards. The source of this map was likely a smaller-scale map of seismicity in the entire United States on which the GCSZ did not appear owing to resolution considerations of the map. Nonetheless, omission of the GCSZ is serious because seismicity provides a significant threat along the pipeline route.

Bollinger (1981) and Bollinger and Wheeler (1983, 1988) have described the GCSZ in considerable technical detail. In their recent peer-reviewed paper, Biryol and others (2016) provide a new and major understanding of seismicity in the southeastern United States, including the GCSZ. They confirm that the term "Giles County Seismic Zone" remains in scientific use, and the GCSZ is considered to be an area with enhanced seismic risk. Dr. A.M. Ziegler, Professor Emeritus of Geology from the University of Chicago, in his letter of November 25, 2015, provides further comment on the GCSZ, including reference to mapping of the zone by DMME (Figure 6).

MVP Resource Report 6 (Geology) acknowledges that the GCSZ is "primarily known for being the epicenter of a strong May 31, 1897 earthquake that was subsequently characterized under modern standards of MM-VIII, magnitude 5.8." MVP dismisses a recurrence of such an event during the life of the pipeline as being exceedingly small. However, the March 9, 2016 letter from U.S. Forest Service to the FERC challenges this conclusion, requesting a more rigorous study of

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the GCSZ. This letter references pertinent publications, including findings indicating that ridgetop amplification of ground shaking of approximately 0.12 G from seismic activity may have been responsible for massive slope slides along Sinking Creek Mountain, reported by Whisonant and others (1991). **These findings forecast the potential for future seismically induced slides on steep slopes in the area.**

The U.S. Forest Service letter cites research by Schultz (1993) that “shows that the rock block slides (along Seeking Creek Mountain) may have been emplaced as a single catastrophic event of short duration.” Schultz and Southworth (1989) state: **‘The apparent clustering of large landslides near the Giles County, Virginia seismic zone suggests that seismic shaking may have been an important triggering mechanism.’**

An important understanding of the effects of earthquakes in the vicinity of the proposed pipeline needs to be emphasized. **Even though a very-high-magnitude earthquake (Richter magnitude 5.0 or greater) has not occurred in the GCSZ since 1897, the more time that elapses, the more likely it is that such event may occur.** This is simply a basic tenet of magnitude-frequency analysis of natural events (such as earthquakes, volcanic eruptions, floods, storms). The recurrence interval for a 5.0 earthquake in the GCSZ is not well determined, yet the possibility exists that one can occur at any time.

The probability of the catastrophic 1897 re-occurring is unknown and *that* is a problem. However, catastrophic seismic activity - like the 5.8 magnitude quake of 1897 in Giles and 2011 in Mineral, Virginia (less than 200 miles from Giles County) are not the only or primary concern. Of equal importance for a 42-inch high-pressure gas pipeline in this area are frequent moderate earthquakes. Bollinger and Wheeler (1983) report nine earthquakes in or near Giles County over a 22-year period (1959-1981), the largest of which was mb = 4.6. MVP Resource Report 6, (Table 6.4-1) indicates a 4.3 GCSZ quake in 1974 and five additional earthquakes of a magnitude of 4.0 or greater within 100 miles of the MVP pipeline for the period 1976-2006. On the basis of these reports, ground shaking of the magnitude 4.0 or higher is highly likely during the planned life time of the pipeline. Given the history of slope slides in Giles County, there should be genuine concern that the combination of steep slopes, poor soils and moderate ground shaking could contribute to an *inmitigable* failure with catastrophic consequences. Emergency response time, let alone mitigation, would be moot. This is a major concern that has not been adequately addressed in the MVP resource reports.

Therefore, continuing seismic activity in the GCSZ (a high frequency of magnitude 2.5 or larger earthquakes), produces a major risk when compounded with the already co-existing problems of karst, slope, and soil hazards at sensitive locations along the proposed pipeline route. This poses severe engineering challenges in constructing the pipeline, and calls into question whether the pipeline should be built at all.

Compounding of hazards along the preferred route alone suggests that avoidance of the region altogether is in the best interest of MVP and FERC, and certainly to the overwhelming majority of residents of Giles and adjacent counties. Many of the residents submitted comments to FERC, demonstrating their anguish over the very real threat to water supplies in karst

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and the possibility of a catastrophic pipeline failure.

With or without a significant seismic event, slope failure is in itself a significant continuing concern. In commenting to FERC on March 30, 2015, Dr. Robert Tracy (Professor of Geosciences at Virginia Tech) states: "Even holding constant the seismic hazards, along the MVP route most subject to seismic activity, there is a very high probability of differential slope failure, with slide masses moving at differential rates with abrupt boundaries (effectively soil faults) separating masses."

Four Examples of Compounded Geologic Hazards Along the Corridor

The foregoing discussions illustrates the most important concerns related to the proposed pipeline. Four sites along the route have been selected for elaboration in order to describe how hazards indeed do interact in this region. This by no means implies that these are the only areas of potential problems along the route as there are many more along the preferred route, such as in the vicinity of Ripplemead and Pembroke in Giles County (MVP mileposts 200-205), Pig Hole Cave area on the southwestern flank of Salt Pond Mountain in Giles County (MVP mileposts 207-209), and the karst plain near Elliston and Lafayette in eastern Montgomery County and western Roanoke County (MVP mileposts 230-240; *see* Appendix B, Figure 9). Compounded hazards also exist along the various alternative MVP routes. In some specific places perhaps only one or two of the hazards may be dominant. In all of the following cases, the severity of the hazards is significant and should not be ignored. It is important that all contributing potential hazards along every mile of the pipeline route, and their cumulative impact be taken into account during FERC deliberation process. Interacting, compound hazards are particularly troublesome and must be considered together as this may cause greater damage and dangers than would occur if they occurred individually.

Karst from Indian Creek to Peters Mountain, Monroe County

Monroe County, West Virginia is well-known for a large number of caves, some of which are extensive (Hempel, 1975). Indeed, it is home to extensive areas of karst (*see* Appendix B, Maps 1 and 3). The proposed Mountain Valley Pipeline poses some significant concerns where it passes through the county.

The significant areas of potential problems associated with karst have been identified in letters and depositions by citizens and experts in Monroe County. Among those who submitted comments to FERC include, Dr. Alfred F. Ziegler (Professor Emeritus of Geology, University of Chicago, and resident of the county), Dr. Paula C. Dodds (Licensed Professional Geologist, Laurel Mountain Preservation Association), Harold 'Rocky' Parsons (geologist, expert on karst, member of the Monroe County Planning Commission), and Judy Azulay and Nancy Bouldin (members of the Indian Creek Watershed Association (ICWA). It is highly recommended that their input be considered. It is also instructive to consult the Karst Hydrology Atlas of West Virginia (Jones, 1997) for an overview of extensive dye traces performed in that state over the years.

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There are several areas of karst where the pipeline could inflict significant potential environmental impact. Some of those are outlined here – the details are in the reports listed by the people above. Of particular interest are the letters from the Indian Creek Watershed Association of October 14, 2015 and November 13, 2015. The letters from Parsons, dated June 6 and November 26, 2015, provide additional information.

Of particular concern are karst features close to where the proposed corridor crosses Indian Creek near Greenville (MVP mileposts 181-182). Indian Creek, which drains significant karst to the east, flows directly into the New River to the west. Surface water and water in the underlying karstic aquifer would be at risk from the pipeline.

Another area of concern lies along Ellison Ridge and in the Hans Creek Valley (MVP mileposts 182-187). Numerous springs are located in this vicinity. Hans Creek is a sinking stream. Considerable recharge enters the underlying aquifer at its resurgence and emerges 0.3 mile downstream. There are numerous subtle karst features, mostly sinkholes, that indicate that this is an important recharge zone.

Numerous karst features occur between Little Mountain and Peters Mountain (MVP mileposts 194-195). As reported in the above cited letters to FERC from the Indian Creek Watershed Association, there are several caves, sinkholes, and a sinking stream in the karst that would be crossed by the pipeline at this locality. There are many springs along Peters Creek Mountain that provide water for all three of the water districts in the county, serving up to 70 percent of the households, public schools, and other users. One of the most at risk is the Red Sulphur Public Service District. Sweet Springs Valley Water Bottling Company, an award-winning water bottling company, derives water from these springs.

As with other mountain ridges along the pipeline corridor, there is significant allogenic recharge to karst aquifers from upland, non-carbonate terrains in this part of West Virginia. The karst aquifers identified above receive considerable recharge from allogenic sources. Hence, watershed delineation and establishment of buffer zones are critical in addressing impacts.

Slope stability and seismicity are 'red flags' in the Indian Creek to Peters Mountain section of the corridor. As seen in the data in Table 1-A (Appendix B), average maximum slopes are in excess of 40 percent. The likelihood of mass movement, including slides, is present along this segment of the corridor, leading to potential problems of slope stability as outlined in this Section of the report.

This part of Monroe County also lies within the Giles County Seismic Zone (see Appendix B, Figure 6A). Dr. Alfred M. Zeigler comments:

"The U.S. Geological Survey (Bulletin. 1839-E) reports that there was a 'landslide of considerable proportions' also reported at the time, on the face of Wolf Creek Mountain in Giles Co. The authors of this bulletin, published in 1990, searched for surface expression of 'neotectonic' features, such as recently active faults, without success, but did report 'a giant rock-slide complex on Sinking Creek Mountain,' also in Giles County, and [hypothesized] that it had been caused by seismic shaking, as had the 'numerous other rock

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falls and slides in the area.' They also implied that crustal warping might be indicated by variations in the elevation of terraces along the New River. Of course, a major rock-slide would completely disrupt a pipeline and this prospect would be worse than crossing a fault. This is because a fault is a known quantity with a known location and sense of movement, and could probably be allowed for by the pipeline engineers. The location of rock-slides, however, would differ each time and the effects could not be allowed for, even if they could be predicted.

In summary, the karst areas in Monroe County, where the proposed pipeline is routed, are subject to the compound hazard conditions that are described earlier in the section. This includes all of the concerns about karst as well as hydrogeology, slope stability, soil strength, and seismicity.

Sinking Creek Along Zells Mill Road, Giles County

Perhaps the most perplexing juxtaposition of the Mountain Valley Pipeline with the geologic and hydrologic settings is at MVP mileposts 208 to 210, where the proposed corridor would come down Salt Pond Mountain and cross Sinking Creek in Giles County (see Appendix B, Maps 1 and 2). This results in a situation in which the complexities result in a proverbial 'weak link' along the route of the pipeline.

First, the area comprised of the flanks of Salt Pond Mountain and Sinking Creek at its base include one of the most significant areas of karst in the county. The caves at the upstream reaches of Clover Hollow (including Clover Hollow and Stay High caves) have water that has been dye-traced to flow to two other significant caves along Sinking Creek, Smokehole and Tawneys caves (Fagan and Orndorff, 2008). The latter caves are less than 0.2 mile from MVP milepost 210, where the pipeline would cross Sinking Creek. This is one of the longest dye-traces performed in Virginia to date (on the order of four miles in straight-line distance). Another one of the longest traces in this vicinity, from where Sinking Creek crosses U.S. Route 460 to the New River, was performed by Saunders and others (1981). Dye placed in Sinking Creek near Smokehole and Tawneys caves emerged at a spring along the New River, over seven miles distant. This information leads to a clear conclusion that **this is an area of extensive and well-integrated flow networks in the subsurface. Hence constructing a pipeline across this area would risk contamination of sizable karst aquifers.**

Even though Sinking Creek at this intersection with Mountain Lake and Zells Mill roads has perennial flow, it is in this reach that a substantial part of the streamflow sinks into its bed and into the soluble bedrock beneath. From here to its confluence with the New River, Sinking Creek continues to lose flow and late in some years the surficial streambed is entirely dry and all of the water is in its subsurficial route.

It is likely that where the MVP would cross Sinking Creek (milepost 210), some of the sinking water is running beneath the stream bed and that it would not be flowing deeply in the karst. Should MVP select to drill a horizontal hole beneath Sinking Creek for the pipe at this intersection, there would be an inmitigable problem with groundwater. Such a horizontally drilled hole would undoubtedly intersect the path of water flow in the bedrock beneath the creek. This would interrupt

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the natural subsurface flow, influencing groundwater resources supplying numerous homes. This placement, within a zone of active and sustained groundwater flow, would also cause unwanted future problems with the pipe, in an aqueous groundwater environment.

Any other choice for a pipe of this size crossing Sinking Creek is also untenable. It would then have to be placed above the stream in some fashion, perhaps suspended on a bridge-like structure. Diverting the flow of Sinking Creek in some way would also not be possible, given the perennial subsurface component of the stream and well-documented frequent flooding of the streambed in response to significant storm and snowmelt runoff.

Groundwater problems constitute only one of the severe challenges at this site. From the data on slopes (*see* above) and slope maps, it can readily be seen that the corridor would descend very steeply from the flanks of Salt Pond Mountain to where it would meet Sinking Creek. The slope here is nearly 55 percent (Table 1-B) and the soils (namely a very rocky Carbo, the most active and problematic of the shrink-swell clays) have poor strength (Table 2). Thus slope stability, owing to the combination of a severe slope and the worst slip soil, is a critical issue at this location. This, in addition to close proximity to the center of the Giles County Seismic Zone (Appendix B, Figure 6A) could induce landslides on metastable slopes. Thus, the Route 700 – Route 604 intersection is one of the worst locations for a large high-pressure pipeline.

So, as with the previous case in Monroe County, **the Sinking Creek site is not suitable for the pipeline.** Crossing Sinking Creek over a reach where it is losing water to the subsurface is a very poor choice. Hydrologic conditions, whether on the surface or in the subsurface would severely impact construction and contribute to degradation of the pipe once it is in place. Also, should a failure in the pipeline occur at Sinking Creek, contaminants would follow the established routes of infiltration and be introduced into the extensive groundwater system of Sinking Creek extending all of the way to the New River (as determined by the dye traces by Saunders and others (1981). Moreover, a pipeline failure would severely impact residents drawing water from wells. Apparently MVP was not aware of these highly important constraints imposed by Sinking Creek. **This location is obviously a ‘no-build’ option.**

Canoe Cave and Karst, Giles County

The proposed route of the Mountain Valley Pipeline appears to go right over Canoe Cave, located along the northwestern flank of Sinking Creek Mountain in Giles County (*see* Appendix B, map of Figure 7). The cave lies beneath the centerline of the proposed MVP corridor between mile posts 213 and 214. At approximately 3000 feet in length, the cave has water and significant biota (letter from S. René Hypes of the Virginia Department of Conservation to FERC dated March 17, 2016).

Although Canoe Cave is still being explored and surveyed, it and its environs have been designated as a cave conservation site by the Virginia Cave Board and the Virginia Speleological Survey. These organizations maintain a list of significant caves and karst areas (Holsinger, 1985). The list is periodically brought up to date to include discoveries of new caves, new passages in caves, or new significant and sensitive findings within caves.

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The entrance to the cave is located about 3500 feet downslope from the crest of Sinking Creek Mountain. This is a fine example of a major cave located below a zone of allogenic recharge from which it derives its water (see previous discussion above). In fact, springs in the colluvium above the cave are reportedly being used as water supplies. Water from this zone enters the soluble rock in the vicinity of Canoe Cave and it is likely that the water encountered in the cave is from a swallet just east of the cave entrance that takes allogenic water from above. Both this swallet and the cave entrance are within a few feet of the center line of the proposed pipeline. In places Canoe Cave is very near the surface, with little overlying bedrock. There is a spring further downslope that may be the exit from water in the cave. This is well illustrated in Figure 7 (Appendix B) and discussion of the Hypes letter referred to above.

Canoe Cave, the colluvial material, swallet, and spring together constitute a hydrologic groundwater system. Steep slopes Frederick soil series at this location indicate that the material above and over the cave is prone to significant mass movement (see Table 2, Appendix B and discussion above in this section). If the pipeline is constructed, this location could be highly problematic (1) should a severe rainfall event occur and enable downslope soil movement, (2) should a sizable earthquake occur (the area is in close proximity to the Giles County Seismic Zone), or (3) should slow and persistent downslope soil movement (soil creep) deform the pipe. Any of these may be sufficient to cause rupture.

Mt. Tabor Karst Sinkhole Plain and Associated Areas, Montgomery County

Arguably the most significant area of karst in the path of the proposed MVP pipeline is the broad lowland area of exposed carbonate rock that constitutes the Mt. Tabor Karst Sinkhole Plain. It is located northeast of Blacksburg in a residential area along Mt. Tabor Road. The proposed MVP pipeline traverses the karst plain for four miles, from mile post 220 to mile post 226 (see Appendix B, Figures 1, 2, and 8). The area is well documented in maps that have been submitted by various individuals and groups. Letters submitted to FERC by S. René Hypes (April 6, 2015; March 17, 2016; May 20, 2016), Louisa Gay (January 6, 2016), and Tim Ligon (December 7, 2015) are among those especially informative and provide detailed information showing sinkholes, dye traces, and the proposed route of the pipeline. It is important to note that the Virginia Department of Conservation and Recreation, the Virginia Cave Board, and the Virginia Speleological Survey have delimited two cave conservation sites that are traversed by the proposed corridor: Slussers Chapel Cave Conservation Site and Old Mill Conservation Site. The proposed routes of the pipeline, shown on the aforementioned maps, traverse these sites. The proposed corridor also passes through a segment of the Mill Creek Springs Natural Area Preserve, as shown in the Hypes letter of May 20, 2016.

Recently (April 21, 2016) MVP proposed an alternative route in the Mt. Tabor Karst Sinkhole Plain in order to address issues raised by the Virginia Department of Conservation and Recreation (Hypes letter of March 17, 2016). The alternate corridor is designed to avoid some of the more imposing sinkhole complexes traversed by the proposed corridor. The new route is shown in the Hypes letter of May 20, 2016. However, the alternate path would traverse the two cave conservation sites. In fact, the length of the proposed alternate corridor within these conservation sites exceeds that of the original proposed corridor. Furthermore, the proposed alternate corridor

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would still be positioned on soluble rock and for an extended length along the lower flank of Brush Mountain where slopes are undesirably steep (*see* data on slopes and soil for this stretch of the pipeline a presented in Table 1B, Appendix B). This leads to very similar slope stability problems that are identified and discussed above for the Monroe County sites and Canoe Cave.

Further along this alternate path, the route passes over another part of the Mt. Tabor Karst Sinkhole Plain. The density of sinkholes appears to be less along this path based on those identified on topographical maps and aerial photography. (It is very likely that a high number of small sinkholes are present that do not show at that scale). Nonetheless, based on extensive dye-traces performed in the area, there is considerable reason to assume that the plain of karst is contiguous in the subsurface. A well-integrated aquifer underlies the entire Mt. Tabor Karst Sinkhole Plain wherein groundwater is efficiently conveyed from places of recharge (sinkholes as well as the interfluves among them) to places of discharge, including the identified springs in the area – such as the primary spring that discharges to Mill Creek Springs Natural Area Preserve (as documented by the 20 May 2016 letter by Hypes). Moreover, there are many wells in the plain that draw water from the aquifer. This water is used for domestic and agricultural needs in an area that is not served by public water supply.

As with the other three case examples discussed above, the Mt. Tabor Karst Sinkhole Plain is also subject to material being derived from uplands such as Brush Mountain and washed onto the karst plain. Slope and soil conditions on Brush Mountain, while not as severe as on Sinking Creek Mountain (Table 1-B, Appendix B), nonetheless contribute material washed onto the sinkhole plain. This area is also within the Giles County Seismic Zone (Appendix B, Figure 6A). Therefore, siting the MVP through the Mt. Tabor Karst Sinkhole Plain is another situation where environmental impacts and hazards are compounded.

There is every reason to believe that the entire Mt. Tabor Karst Sinkhole Plain is a single, extensive, and well-integrated karst aquifer. The only solution that would ensure that a pipeline would not negatively impact this karst and the underlying aquifer would be to entirely avoid the Mt. Tabor Karst Sinkhole Plain and its contributing watershed.

Additional Sites

The four sites evaluated in detail above were selected to illustrate the scope of environmental problems associated with the proposed Mountain Valley Pipeline. They inherently exhibit compound hazards. There are several other places along the proposed corridor that should not be ignored in the deliberation process. For example, Milepost 215.7-215.8 in Craig County, a steeply sloping site declared “unconstructable” by MVP’s routing engineer, passes immediately above two sinkholes and through a third. A second example is near Elliston and Lafayette in eastern Montgomery and western Roanoke counties (*see* Appendix B, Figure 9). There are several caves in this area (Wickersham, 1988), including Dixie Caverns (a popular show cave that offers tours to the public) and Goodwins Cave (the longest known cave in the county). Both of these are listed as ‘cave conservation sites’ by the Virginia Cave Board (within the Department of Conservation and Recreation) and the Virginia Speleological Survey (Holsinger, 1985). Additionally, the Spring Hollow Reservoir, a major water source in the greater Roanoke area, has been constructed on karst

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terrain. The route of the proposed pipeline passes within a mile or so from these features; and the mile-wide corridor includes an extended recharge zone on the karst plain in the lowlands between Paris Mountain and Poor Mountain (Appendix B, Figure 9).

Summary

Four of the most compelling sites where compound hazards are pronounced have been discussed above. It bears restating that there are other areas of karst along the proposed corridor between and among these sites and in Roanoke County to the east and within the larger region. There is no doubt that the extensive karst of the Appalachian Mountains poses an unacceptable risk in constructing a durable pipeline within this very dynamic regional setting.

There are two likely consequences when compound hazards act in unison. First the combination of severe slopes, poor soils, and disturbances and loading during construction of the pipeline can lead to severe erosion and sedimentation and damage to surface water and aquifers that are vital to residents and to the ecosystem. Second, construction in areas of severe slopes, slip soils, and likely ground shaking from earthquakes raises the real possibility of an immitigable failure of the pipeline and ensuing catastrophic events. These issues support the conclusion that this region is a no-build zone for a gas pipeline of this size.

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Conclusions:

Karst Terrain in Appalachians as a 'No-Build' Zone

Construction of a large, 42-inch-diameter gas pipeline across the central Appalachian fold belt is without precedent. The magnitude of this undertaking is daunting. The size of the high-pressure pipe and a terrain that is high in relief and complex in its geology poses considerable risks for planning, avoiding known risks, engineering design, and construction challenges. The Mountain Valley Pipeline proposal creates concern for significant risk of adverse impacts due to the nature of the terrain that the line would cross.

There are serious problems imposed by geologic and hydrogeologic constraints. They fall into two basic categories: (1) the impact of the geologic setting on constructing and safely maintaining the pipeline and (2) the environmental impacts of the pipeline on the land that it would pass through and to the population that is concerned about safety and relies on clean available groundwater.

As discussed in this report, the predominant geologic factors are:

Karst Hydrogeology Slope Stability Soil Seismicity

Although each of these five topics has serious specific considerations that have not been adequately addressed by the applicant, the greatest concern arises when it is realized that all five types of hazards are prominent in the region and often compounded. Where and when they occur together, geologic attributes operate as a system and not individually. A problematic condition in one may cause consequences in one or more of the others. Severe slopes and high-slip soils would challenge engineering design of the pipeline and its operation and maintenance. Such challenges are enhanced by the potential for significant seismic events owing to the proposed location of the pipeline.

The region addressed in this report (Monroe County and a segment of Summers County in West Virginia and Giles, Craig, Montgomery, and Roanoke counties in Virginia) is the most environmentally sensitive along the entire proposed pipeline route. Crossing the Valley and Ridge Province in general raises profound questions and concerns.

I have reviewed materials to date submitted by Mountain Valley Pipeline (MVP), including contributions from their consultants, in its application to the Federal Energy Regulatory Commission. Additionally, I have studied numerous submissions by agencies (U.S. National Forest Service, Virginia Department of Conservation and Recreation, Virginia Department of Environmental Quality), by county governments, and by groups and individuals who live, work, and own property in the affected counties. My evaluations, analysis, and conclusions are based upon careful review of these documents in light of my experience as a professional geologist with

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over 50 years of applied experience in karst and environmental geology, especially pertaining to the Appalachian region of the eastern United States.

Mountain Valley Pipeline has not adequately addressed many of the environmental concerns germane to this region, contrary to FERC policy to “avoid and minimize” adverse effects. Moreover, MVP has totally ignored compound effects of hazards. Numerous findings that have been generated and submitted by registered intervenors, professionally done with due diligence, have brought to light considerable details, many of which bring aspects of the MVP application into question.

The geologic environment, including active processes in karst, slopes, soils, and earthquakes, are a physical part of an overall natural system. However, the findings discussed in this report extend into the biological ecosystem as well. Lifeforms, whether in the forests, grasslands, soil, streams, or in caves and groundwater are an integral part of the system (discussed in Appendix A). Erosion and sedimentation, contamination of surface streams, wells, and aquifers, and partitioning (as mentioned earlier and discussed in Section 3) are destructive to the entire ecosystem, biological as well as physical. The concerns advanced in this report extend well beyond the geological setting.

Karst is one of the most environmentally sensitive geologic landscapes on Earth. It is a major underlying component in the region of this report. Mountain Valley Pipeline and its consultants have barely ‘scratched the surface’ in adequately assessing the three-dimensional attributes of karst and identifying the hazards that it imposes on construction and safe maintenance of the pipeline. Merely mapping sinkholes that appear on topographic maps and aerial imagery not only misses subtle karst features on the surface, but totally ignores the complex, well-integrated, efficient networks of groundwater flow through extensive karst aquifers. Detailed inventories of all sinkholes, caves, recharge areas, and springs, along with systematic dye-tracing, are necessary in order to identify a route through a veritable gauntlet of such features. Based on lengthy experience in studying this region and professional familiarity with karst processes in general, I am confident that a safe and environmentally sound route for a pipeline of this magnitude cannot be identified, engineered, constructed, nor maintained through the karst of the rugged Valley and Ridge Province.

I strongly suggest that the reader, as part of due diligence, closely examine the environmental problems that have occurred shortly after the recent construction of the Columbia Gas of Virginia (CGV) pipeline on Peters Mountain servicing the Celanese plant near Narrows, Virginia. This example, existing in the very setting of the proposed MVP route, serves as an omen. The CGV pipeline is a 10-inch-in-diameter pipe. The proposed MVP 42-inch pipe is 4.2 times larger in diameter and 17.6 times the cross-sectional area than a 10-inch pipe. In turn, the amount of construction and movement of material during trenching would be much greater, adding to the enormity of erosion, groundwater disruption, and failure of slopes. More ominously, if the integrity of this large pipe were to be compromised, the resulting catastrophic events would be at least on order of magnitude greater than with a 10-inch pipe. These are reasons enough to seriously weigh the potential consequences of constructing the MVP pipeline through the hazardous terrain of the Valley and Ridge Province.

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As stated in Section 4 of this report, “there are two likely consequences when compound hazards act in unison. First the combination of severe slopes, poor soils, and disturbances and loading during construction of the pipeline can lead to severe erosion and sedimentation and damage to surface water and aquifers that are vital to residents and to the ecosystem. Second, construction in areas of severe slopes, slip soils, and likely ground shaking from earthquakes raises the real possibility of an immitigable failure of the pipeline and ensuing catastrophic events. These issues support the conclusion that this region is a no-build zone for a gas pipeline of this size.”

The identified problems associated with the pipeline, potentially a major intrusion into the Valley and Ridge region, impact the entire natural environment. Deliberation related to the MVP application must approach the natural system as a whole. In turn, human quality of life is intimately tied to the natural ecosystem. Degradation of the natural environment has direct consequences on individuals and communities living on or near path of the pipeline, including local economies dependent on nature-based tourism.

Mountain Valley Pipeline has routed its proposed pipeline through one of the most environmentally sensitive areas of our nation. As a direct result of the routing, the pipeline (if constructed) would be subjected to serious geologic impact. Many of the potential hazards discussed in this report have not been adequately identified in the MVP application, nor have suitable mitigation measures been advanced. This report, along with the meticulous scrutiny by the U.S. Forest Service (*see* Submittal 20160311-5013 to Docket CP16-10 (31305006)) and reviews by the Virginia Department of Conservation and Recreation (letters from S. René Hypes, March 17 and May 20, 2016) provide a detailed accounting of severe potential hazards along the proposed MVP corridor.

My recommendation, based on the multiple environmental issues and potential hazards, is for FERC to reject the application. The stakes are very high and the risks are far too great.

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Geological Hazards of Mountain Valley Pipeline

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Appendix A

Ecological Implications of Partitioning the Landscape by the Proposed Mountain Valley Pipeline

The following discussion has been adapted from material compiled and submitted to FERC by Brian Murphy, Ph.D., Professor, Department of Fish and Wildlife Conservation, Virginia Tech, Blacksburg, Virginia

Threats posed by the construction of a large high-pressure pipeline through a region characterized by geologic hazards discussed in this report apply to all native species, not just humans. Additionally, the proposed Mountain Valley Pipeline would partition the lands that it traverses. The following discussions address ecological issues as they affect wildlife in or near the path of the proposed pipeline corridor. The ecosystem is intimately linked with the geologic environment that has been addressed earlier in the body of this report.

Any map of gas pipelines in the eastern United States clearly shows that past construction has paralleled the mountains on either side of the Eastern Continental Divide, rather than trying to cross this hazard-prone and ecologically sensitive zone (e.g., <http://naturalgas.org/naturalgas/transport/>). Trying to cross the heart of the Appalachian Mountains continues to be a very bad idea, for all the reasons discussed above and summarized below.

Native Aquatic Fauna

Native aquatic fauna (many of them threatened or endangered) rely on clear mountain streams for survival. Erosion and sedimentation caused by the construction and operation of the MVP would have severe impacts on water quality, and thus on these sensitive species. Erosion from the mountain slopes crossed by the MVP is inevitable. The steepness of slopes to be crossed far exceeds those recommended by the Bureau of Land Management (BLM) for road construction related to oil- and gas-related energy development in their “Gold Book” (http://www.blm.gov/wo/st/en/prog/energy/oil_and_gas/best_management_practices/gold_book.html). Roads to be constructed on slopes between 8 and 16 percent require special permission from the BLM, and construction beyond 16 percent is prohibited owing to the potential for severe environmental damage. The FERC “normal” guidelines for erosion and sedimentation control (ESC) on pipeline projects contain no special recommendations for severe slopes (which can exceed 80 percent on the MVP as currently routed), and sedimentation problems on numerous previous FERC approved projects show the inevitable result. The TRANSCO pipeline in central Virginia, the very pipeline that MVP will connect to, is still causing stream sedimentation problems some 30 years after its construction, and that pipeline is in “flat” terrain compared to the mountainous terrain of the MVP plan. Another FERC approved project (the Tennessee Pipeline) was expected to have extreme erosion potential in Tennessee owing to severe terrain. Those problems indeed materialized despite special precautions designed for mitigation, and threatened freshwater mussels were negatively impacted as a result. While not a FERC approved project, the recent erosion, stream

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sedimentation, and groundwater contamination problems on the Williams Pipeline connector to the Celanese plant in Narrows, Virginia clearly demonstrate the dangers of building in this terrain. Not only will severe slopes lead to inevitable erosion, but the planned “reclamation” of these areas is completely inadequate. The MVP plan to “reclaim” the construction zone by planting grasses is untenable. The soils are shallow and poorly developed and will not support such vegetation. Furthermore, mass movements would accelerate problems of erosion and sedimentation. When reclamation fails, the pipeline corridor would be invaded by a host of nonnative invasive plant species that can thrive in this poor-quality soil. Those invasive plants would spread quickly throughout the corridor and would cause expensive control problems for the U.S. Forest Service and adjacent landowners.

Interior Forest Species

Interior forest species will be negatively impacted by fragmentation of the forest caused by the linear pipeline corridor. The corridor will divide what are now large unbroken tracts of forest. Birds of the interior forest and many other animals (e.g. bears, salamanders, etc.) cannot effectively use the resultant smaller tracts, and many cannot or will not cross the corridor during daily or migratory movements. Many of these animal species and many species of interior-forest plants, cannot function properly within as much as several hundred feet of the forest edge. The pipeline corridor would not just permanently modify the forest within the 125-foot construction corridor, but impacts of the clearing would allow sun and severe weather to penetrate what once was interior forest. This would change the moisture regime and consequently the plant species found in this extended zone. Invasive plants would penetrate what once was interior forest, and invasive animals would readily utilize the corridor and thus negatively impact interior-forest animals that they once never encountered. The zone of major impact on the forest would not be confined to the 125-foot construction corridor. An effective corridor of degraded ecosystems may result that would be five to ten times that wide.

Appalachian Karst and Biodiversity

Dissolution and erosion of limestone and dolostone in this region have created an extensive karst landscape, creating a network of sinkholes, underground streams, caves, and the like. This has also resulted in unusual communities on these carbonate rocks. During glaciations of the Pleistocene Epoch, the Appalachians acted as a mesic and thermal refuge for a number of species and communities. In a similar manner, after the retreat of the glaciers, cold-adapted communities, such as cranberry bogs, remained in refugia in cooler parts of the Appalachians, well south of their usual range. The prevalent carbonate rocks and karst in this ecoregion are associated with unique fauna within caves, including bats, salamanders, and a wide variety of invertebrates. The diversity and distribution of these species are not yet adequately known, but they likely rival cave faunas around the world in richness and endemism. Cave habitats in the Appalachian region include several federally listed rare and/or endangered species including the Madison cave isopod, Townsend's big-eared bat and Indiana bat. (From: <https://lccnetwork.org/lcc/appalachian>)

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Partitioning (fragmentation) of ecosystems by construction has been studied in many places on the Earth. There is an extensive literature addressing the effect of swaths of denuded land (*e.g.* corridors) on distribution of animals and plants distribution and movement and migration of animals. How construction allows the introduction of invasive species is also a topic of major concern among ecologists. The recent bestselling book, *The Sixth Extinction* (Kolberg, 2014) is a valuable resource in understanding these global problems. Chapter 9 discusses fragmentation of forests and Chapter 10 addresses invasive species.

Additional supportive information on the ecosystems of the Appalachian Mountains and biodiversity on land, in streams, and in the subsurface can be found on the following web sites:

<http://applcc.org/cooperative/our-plan/section-1/biodiversity-hotspot>
<https://lccnetwork.org/lcc/appalachian>

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Appendix B

Tables, Figures, and Maps

The tables, figures, and maps in this appendix have been cited in the text of the report. They are included here in one place in order to facilitate referring to them because most are referenced several times and in different sections of the report.

The three tables, 1-A, 1-B, and 2, show data related to slopes and soils along the route of the proposed Mountain Valley Pipeline. They were compiled by Dr. Richard D. Shingles from sources identified in Section 4 of this report and stated on the tables themselves. The primary references to these tables is in Section 4 of this report, beginning on page 44 with the discussion on slope failure.

The first three figures (regional maps) are described in detail below. The remaining figures (4 through 9) have self-explanatory captions. The significance and content of each figure are given in the appropriate places in the text.

Notes on the Regional Maps

The first three Figures are maps that been adapted and compiled by Dr. Richard D. Shingles from ArcGIS mapping by Drs. Stockton Maxwell and Andrew Roy of the GIS Center, Radford University. Data used in the mapping originates from various published sources and base maps available from online databases.

Figures 1, 2, and 3 show the general configuration of selected stratigraphic units with respect to the path of the proposed Mountain Valley Pipeline. They illustrate areas of outcrop of carbonate rock units that are considered soluble, in this case limestone and dolostone.

Soluble rocks are typically prone to the development of karst on the surface (sinkholes, swallets, sinking streams, dry valleys, springs, etc.) and/or in the subsurface (enlarged fractures, cavities, enterable caves, etc.). Sinkholes that are large enough to be indicated on the maps have been incorporated from mapping by Hubbard (1984, 1988) and Miller and Hubbard (1986).

It needs to be pointed out that soluble rocks may or may not always exhibit developed karst on the surface. However, in this region it is highly likely that karst landforms can be found throughout the delineated areas, especially where karst is present in the subsurface (caves and other openings).

One of the most striking observations is the amount of soluble rock within the counties. Giles County has the greatest area of exposed soluble rock (approximately 80 percent coverage) and Montgomery is also high (approximately 60 percent coverage). In terms of potential environmental problems, these two counties are the most significant of those along the MVP pipeline corridor. However, Monroe County in West Virginia and Craig and Roanoke counties in Virginia also have extensive areas of karst.

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It should be understood that karst features (sinkholes, caves) as shown on these maps are incomplete. Those shown are sinkholes identifiable on topographic maps and aerial imagery. Many of those have been verified during field reconnaissance. These surveys of karst were completed prior to the year 2000 (Hubbard, 1984, 1988; Miller and Hubbard, 1986). This data has subsequently been incorporated into the karst maps of Tobin and Weary (2004) and Weary (2008). Countless smaller sinkholes remain unrecorded owing to the resolution and techniques used in the mapping process (Kastning, 1989b; Kastning and Kastning, 1993, 2003). As discussed in Section 3, the identification of small sinkholes is an important step in designating buffer zones during development and construction in karst terrains (Kastning, 2000; Kastning and Kastning, 1997).

Exploration and mapping of karst features within areas traversed by the proposed pipeline corridor continues. For example, a new cave entrance was discovered in early 2016 at a distance of approximately 1000 feet from milepost 223 along the proposed corridor in the Mt. Tabor Karst Sinkhole Plain. This is a potentially significant karst feature that has not yet been fully explored or mapped. Initial explorations have found cavities large enough for human entry and extend approximately 100 feet vertically and 300 feet horizontally. Additional cavities are very likely awaiting exploration. Air flows within the new cave indicate a connection to one or more other openings on the surface at unknown locations. (These details are via personal communication from Dr. Carl E. Zipper, and indirectly from personnel who have explored the new cave on behalf of the Virginia Speleological Survey.)

Figure 1: Valley and Ridge Province: Karst-Bedrock and Sinkholes

This map shows the entire length of the Mountain Valley Pipeline as it extends across Monroe County in West Virginia, and Giles, Craig, Montgomery, and Roanoke counties in Virginia. It is a small-scale map providing an overview of the extent of karst in the region. The topography is shown in shaded relief and the carbonate rocks prone to development of karst are superimposed. Major sinkholes in Giles and Montgomery counties, Virginia, are shown.

Figure 2: Giles to Mount Tabor Plain in Montgomery County, Ridges & Valleys, Soluble Rock and Prominent Karst Features

This is an expanded map (larger scale) of part of the area shown in Figure 1, specifically for Giles and Montgomery counties in Virginia. It includes details of sinkhole distribution. The red-circled areas (in Virginia) from left to right are (1) Sinking Creek, along Zells Mill Road, Giles County, (2) Canoe Cave and Karst, Giles County, and (3) Mt. Tabor Karst Sinkhole Plain, Montgomery County.

Figure 3: Monroe County from Little Mountain to Peters Mountain: Steep Slopes & Soluble Rock

This is an expanded map (larger scale) of part of the area shown in Figure 1, specifically for Monroe County in West Virginia. As in Figures 1 and 2, areas of soluble rock are indicated. The proposed Mountain Valley Pipeline is outlined as a 1.5-mile wide corridor. Steep slopes are indicated within that corridor.

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Table 1-A. Ridge and Valley Severe Slopes and Soils on MVP route, Monroe County

Mile Posts	Distance miles	Mountain	Ave. Max Vertical Slope %	Predominant Soil Types
175.71-176.06	0.97	Wind Creek crossing, within Zone of Critical Concern for Big Bend Public Water Supply	61.81	Catawba Litz complex
176.57-176.68	0.11	Crossing of tributary to Stony Creek	57.02	Catawba Litz complex
180.33-180.66	0.33	High Top	40.46	Catawba Litz complex, Dekalb channery loam
181.82-183.9	2.08	Crossing of Indian Creek, ridge above Hans Creek, crosses tributaries to Hans Creek	42.76	Litz silt loam, Dekalb channery loam
184.81-186.84	2.03	Hilison Ridge and Hans Creek crossing	51.60	Lily sandy loam, Dekalb channery loam, Laidig channery loam
187.90-187.95	0.05	2,393 Ft. Mountain	61.49	Catawba-Litz complex
190.59-191.48	0.89	Little Mountain	46.38	Frederick and Danmore, Dekalb channery loam
192.55-192.84	0.29	Little Mountain	41.01	Dekalb channery loam and Weikert channery silt loam
193.62-193.71	0.09	Slope leading to Painter Creek crossing and Red Sulphur PWS/D	55.14	Weikert channery silt loam
194.72-195.69	0.73	Peter's Mountain western slope and RS PWS/D	48.64	Laidig channery loam

Table derived from MVP 1-J Slope Tables, MVP 7.5 Minutes Topo Maps, and Mountain Valley Pipeline Exploratory GIS Map

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Geological Hazards of Mountain Valley Pipeline

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Table 1-B. Ridge and Valley Severe Slopes and Soils on MVP route, Giles Co., Franklin Co.

Mile Posts	Distance miles	Mountain	Ave. Max Vertical Slope %	Predominant Soil Types
196.84 - 198.03	1.99	Peters Mountain west slope	49.24	Red clay very stony loam
198.87 - 199.92	1.05	Down slope west of Klamberton	45.7	Reddish very stony silt loam
200.12 - 200.64	0.52	2317 Ft Mountain	56.1	Brookside sandy loam
201.43 - 202.42	0.99	2532 Ft Mountain	45.7	Cartersville clay loam very stony
203.1 - 203.23	1.13	2592 Ft Mountain	47.5	Reddish clay very stony sandy loam
204.56 - 204.76	0.2	2609 Ft Mountain	52.5	Frederick very gravelly silt loam
204.77 - 205.38	0.61	2592 Ft Mountain	45.0	Frederick very gravelly silt loam
206.79 - 207.27	0.48	2683 Ft Mountain	55.1	Cartersville
207.82 - 208.24	0.42	Down hill steep slopes	59.0	Frederick gravelly silt loam
209.71 - 209.86	0.15	Down slope at Rt 700 & Rt 564	54.9	Cartersville clay loam very stony
209.93 - 210.31	0.38	Rt 700 at Weidling Way Dr	40.5	Brookside, Olin, Georgian
211 - 212.55	0.95	Neoplat, Rt 700 at Rt 42	54.0	Frederick gravelly clay loam
213.65 - 213.79	0.14	Caroco Cave	56.4	Frederick, Thompson, Catawba
214.5 - 214.92	0.42	Rock outcrop complex	61.5	Cartersville
219.64 - 220.83	1.19	Shoreline Mt. Turner Spoketite Perm	52.0	Frederick-Olin
225.06 - 225.26	0.2	Peter's Mountain western slope	73.3	Cartersville - Chalkover
229.54 - 229.83	0.29	Shoreline Mt. Spoketite Co. Line	73.5	undifferentiated
231.66 - 233.17	1.51	Shelby, Moore-Retzelle Co. Line	60.8	undifferentiated
236.12 - 236.84	0.72	Free Mountain	64.31	Sylvaus Very Channery Silt Loam
237.67 - 238.81	1.14	Free Mountain	53.2	Sylvaus Very Channery Silt Loam

Table derived from MVP 1-J Slope Tables, MVP 7.5 Minutes Topo Maps, and Mountain Valley Pipeline Exploratory GIS Map

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Table 2. Soils that Contribute to Slope Stability and Their Key Attributes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Soil Series	Plasticity Index	Shrink-swell Potential	Bearing Strength (in Roadway)	Drainfield Suitability	Depth to Rock	Hydrology	Mineralogy
Allegheny	15	L	Good	Mod (Flooding)	>60"	Flooding	Mixed
Pattezap	20	L	Poor (Stony)	Sec	40-60"		Siliceous
Pauls	10	L	Very Good	Sec (Depth)	20-50"		Mixed
Bradlock	23	M	Fair	Mod (Perce)	>60"		Mixed
Earle	55	H	Poor (LS, SS)	Sec (Perce)	20-40"		Mixed
Chagrin	NP, Sandy	L	Good	Sec (Flooding)	>60"	Flooding	Mixed
Chavies	10	L	Good	Mod (Flooding)	>60"	Flooding	Mixed
Ontaco	15	L	Fair (Wetness)	Sec (Wetness)	>60"	Wetness	Mixed
Drill	10	L	Poor	Sec (Sandy)	40-60"		Siliceous
Raywood	45	M	Poor (LS)	Sec (Perce)	20-40"		Mixed
Fluvagments	No Data	No Data		Sec (Flooding)		Flood plain	No data
Pinkstak	55	H-M	Poor (LS)	Sec (Perce)	>60"		Mixed
Gilpin	15	L	Poor (Thinness)	Sec (Depth)	30-40"		Mixed
Jefferson	15	L	Good	Slight	>60"		Siliceous
Jehem	7	L	Poor	Sec (Depth)	20-40"		Mixed
Jelly	15	L	Poor	Sec (Depth)	20-40"		Siliceous
Nelchuck	25	M	Poor (LS, SS)	Mod (Sec Perce)	>60"		Siliceous
Opplamsanto Sandy	60 Clayey	H-M	Poor (LS, SS)	Sec (Perce)	>60"		Mixed
Siquaia	40	M	Poor (LS)	Sec (Perce)	20-40"		Mixed
Timberville	50	M	Fair (LN, SS)	Sec (Wetness)	>60"	Flooding	Mixed
Wallas	10	L	Poor (Stony)	Sec (Depth)	20-40"		Siliceous

Compiled by Dr. Steven Halpern, Soil Scientist, from USDA NRCS 1985 Soils Survey of Giles County, Virginia, Tables 10-16.
 Notation: L = Low, M = Medium, H = High, Mod = Moderate, Sec = Severe, Perce = shallow percolation, Depth = shallow, LS = low strength, SS = shrink-swell.

Special construction techniques are required for plasticity soves over 20, M, H, Poor, Mod, Sec and mixed. Blasting required for depth > 60".

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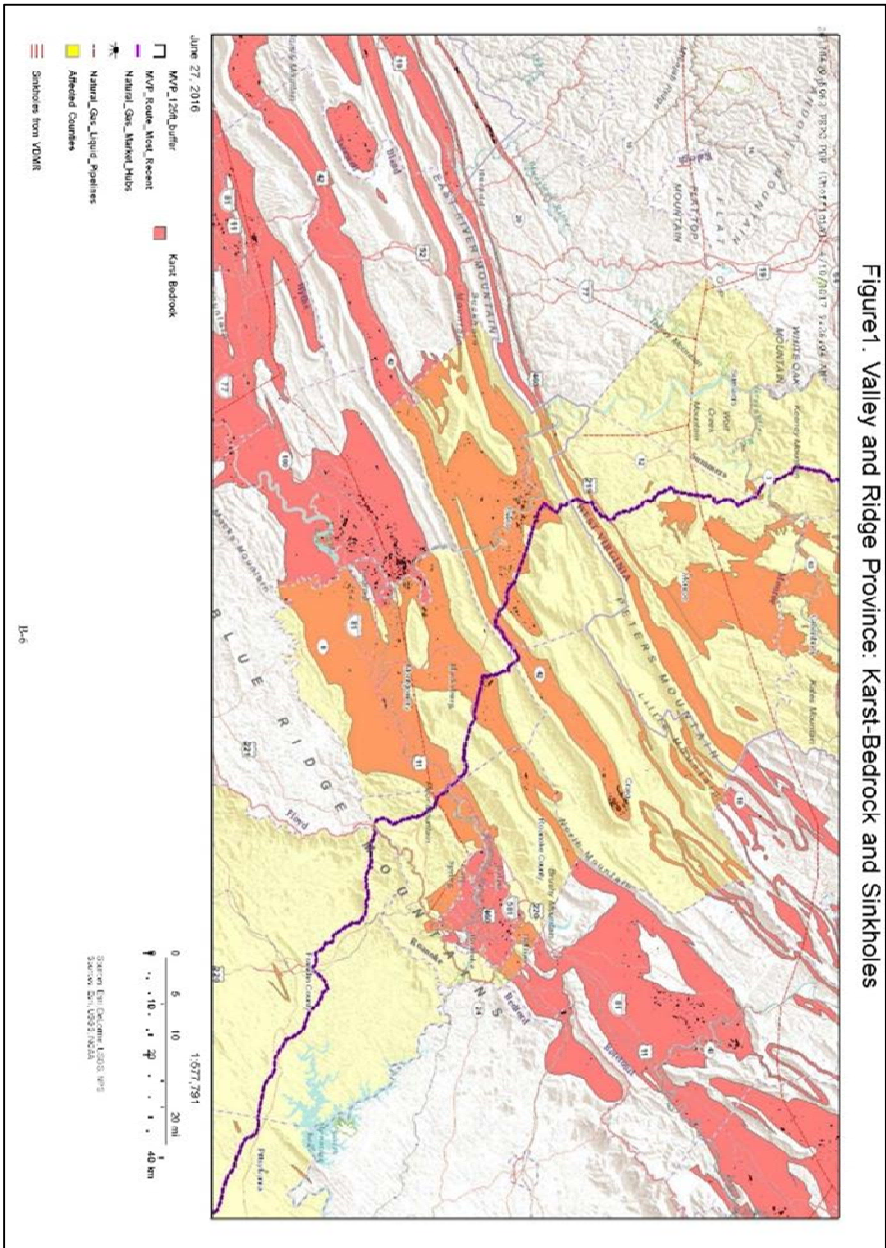
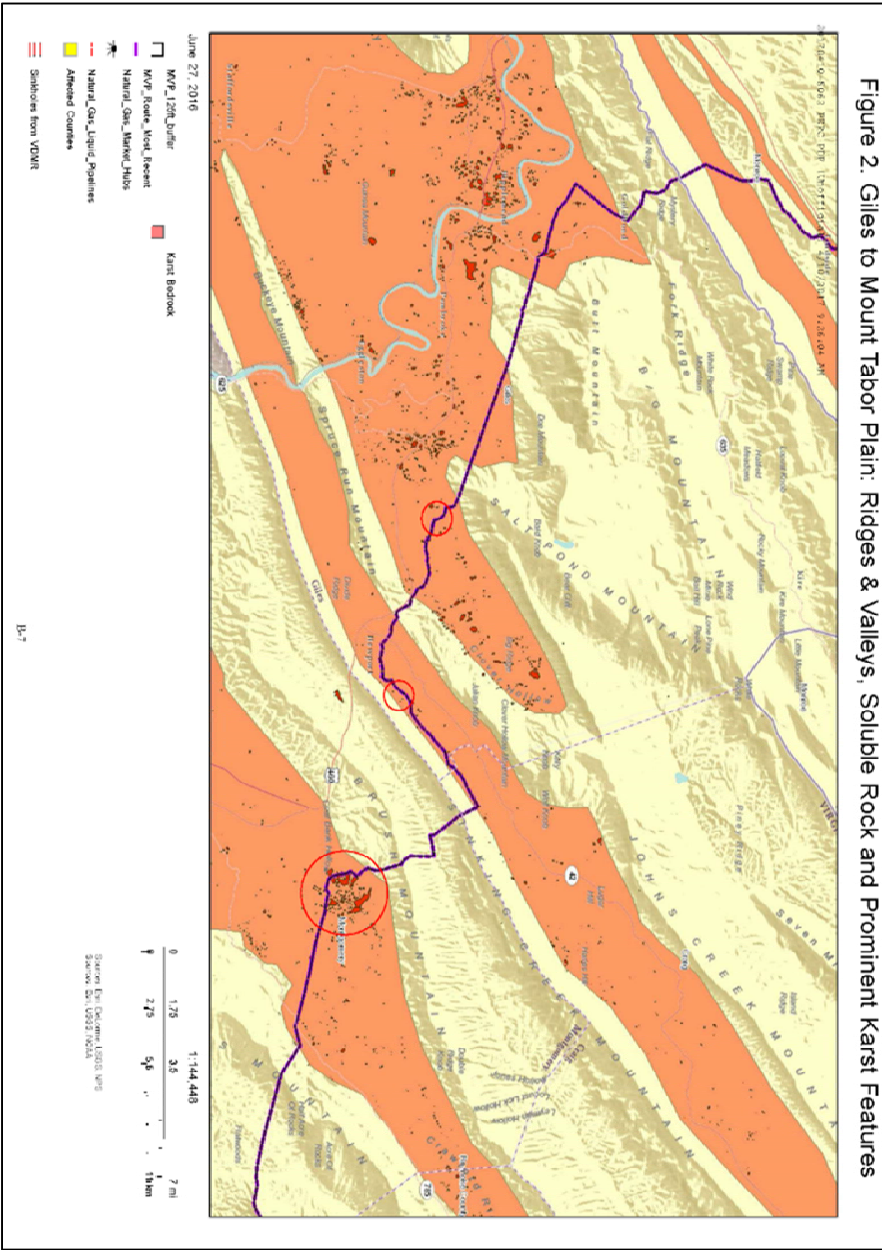


Figure 1. Valley and Ridge Province: Karst-Bedrock and Sinkholes

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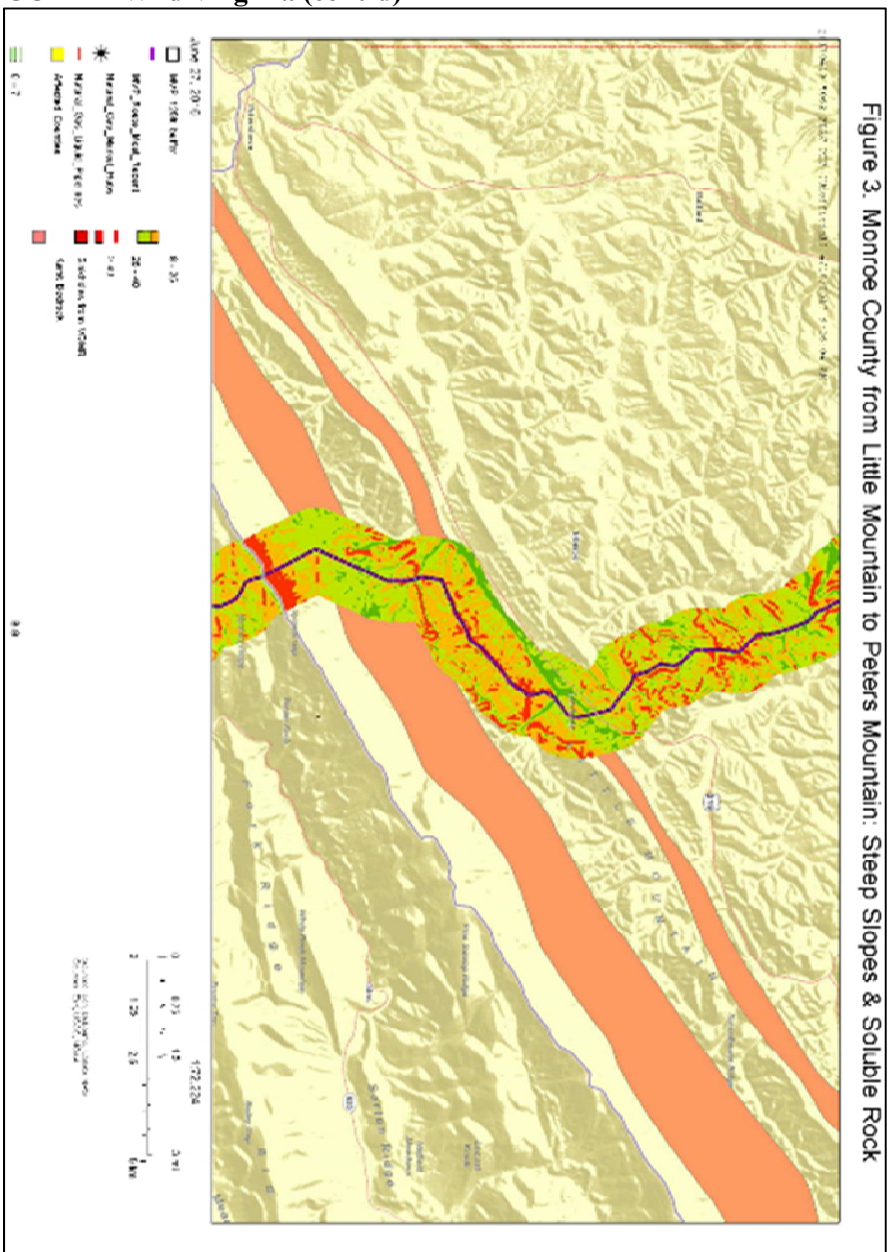
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Figure 3. Monroe County from Little Mountain to Peters Mountain: Steep Slopes & Soluble Rock



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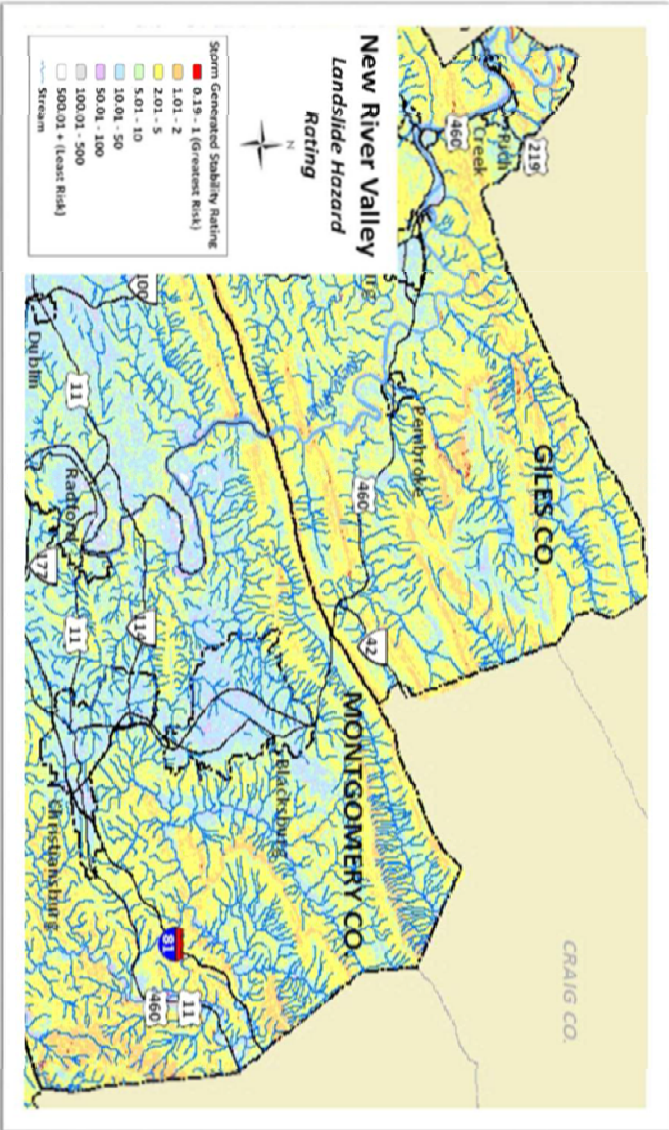


Figure 4. A part of the New River Valley Landslide Hazard Rating map excerpted from the 2011 New River Valley Regional Commission's Hazard Mitigation Plan, as described and referenced in Section 3 of the text. In essence, this is a map of slopes that are prone to failure in response to large storms. Seismic shocks in the Giles County Seismic Zone may also cause failure as well in the areas of risk. The values in the explanation are factors of safety derived using a Level I Stability Analysis Model.

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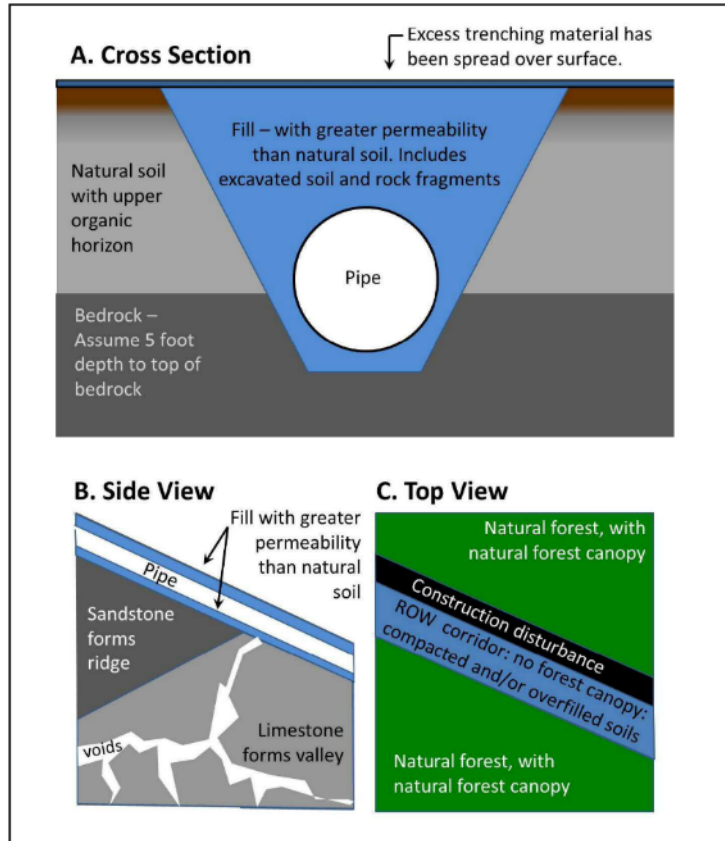


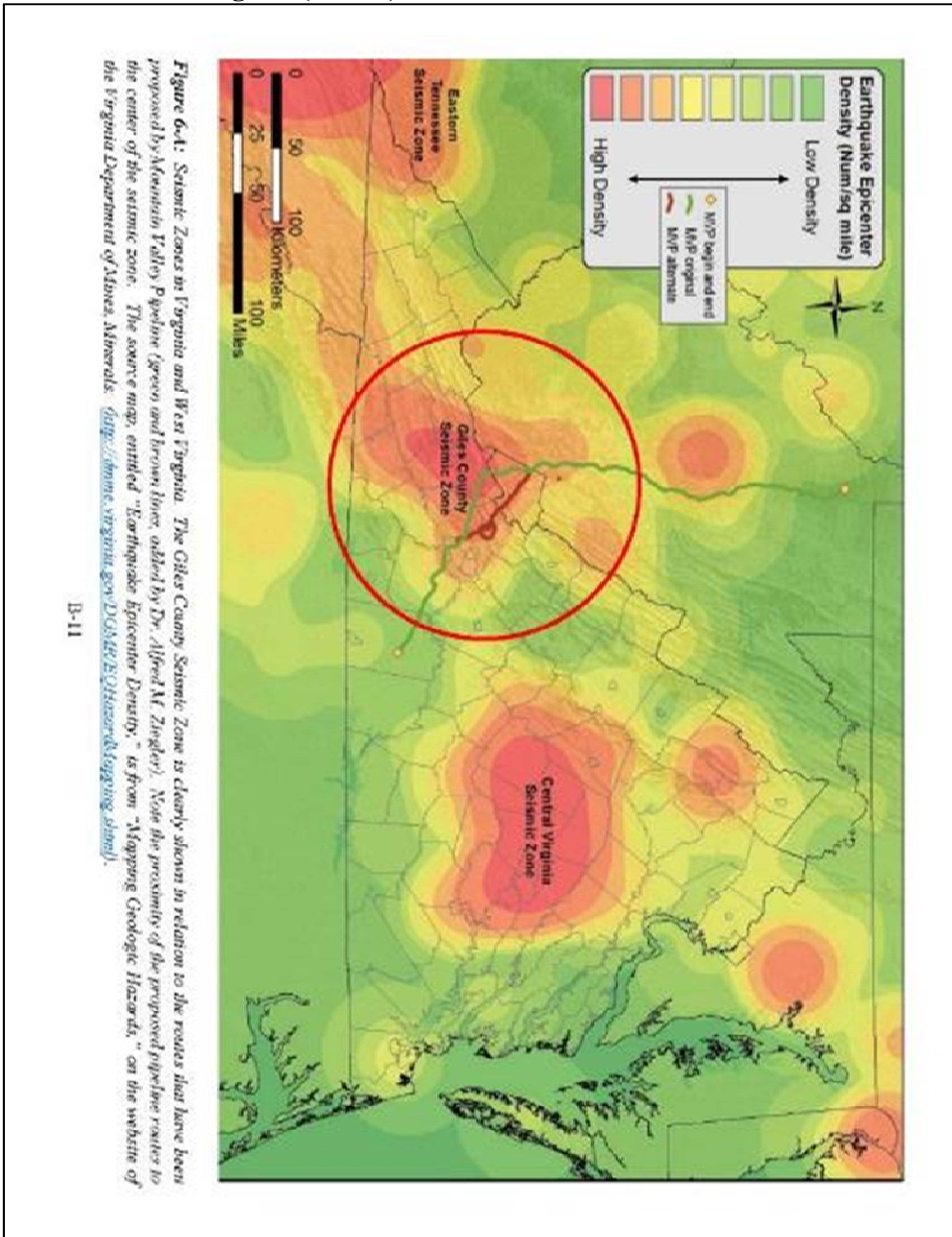
Figure 5. Sketch of pipeline configuration. (A) Cross section of pipeline showing typical dimensions, bedrock, natural regolith (and soil) zone, and fill materials after construction. (B) Longitudinal section showing typical surface slope with pipeline in filled trench. Variations in substrate include insoluble bedrock upstream in allogenic recharge zone (here depicted as sandstone) and soluble bedrock with developed voids (here depicted as limestone). (C) Plan view indicating that the pipeline right-of-way corridor (including disturbed adjacent zone) has transected a forested area (for discussion, see Appendix A). Drawing by Dr. Carl Zipper.

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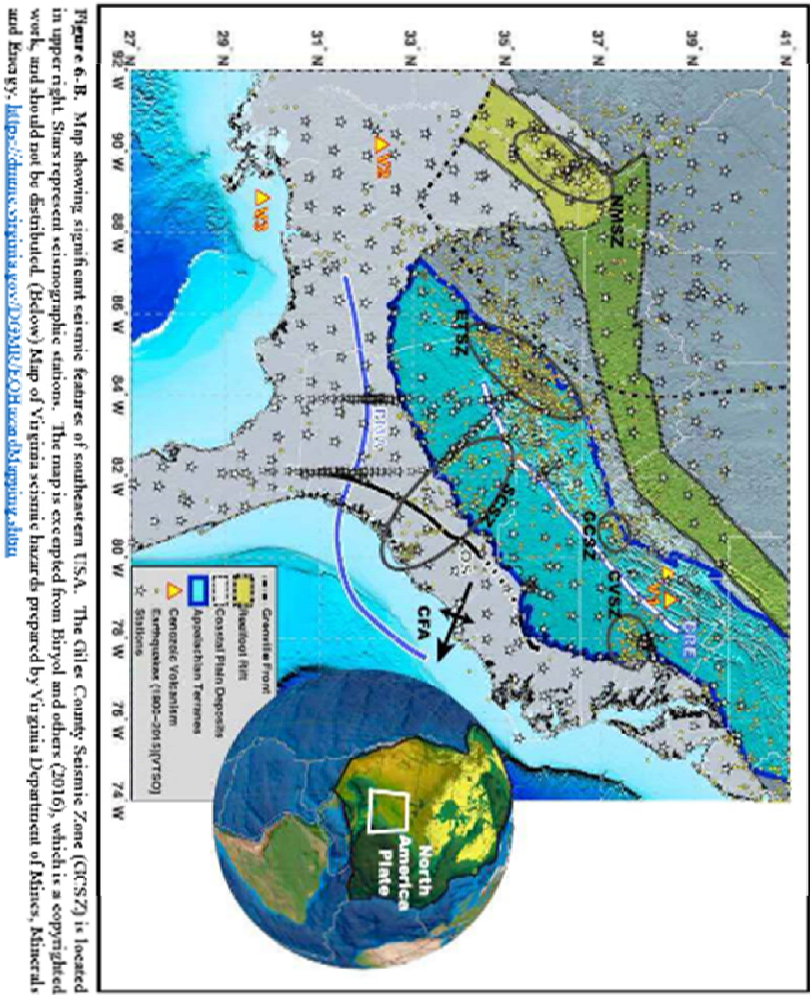


Figure 6-B. Map showing significant seismic features of southeastern USA. The Giles County Seismic Zone (GCSZ) is located in upper right. Stars represent seismic stations. The map is excerpted from Biryol and others (2016), which is a copyrighted work, and should not be distributed. (Below) Map of Virginia seismic hazard prepared by Virginia Department of Mines, Minerals and Energy. <http://dmr.virginia.gov/DEPRM/COHazardMap.aspx#action>

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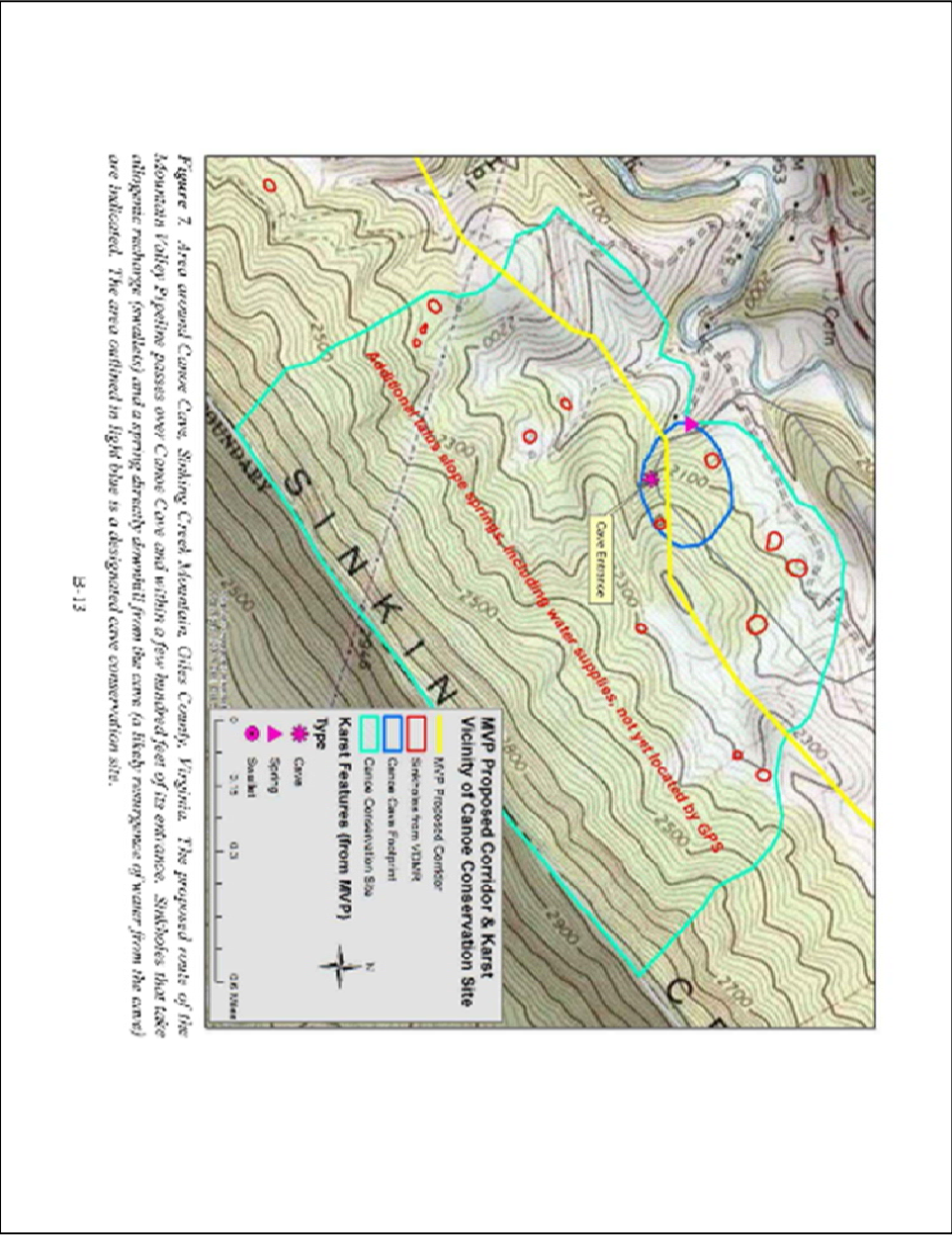


Figure 7. Area around Canoe Cave, Shaving Creek Mountain, Giles County, Virginia. The proposed route of the Mountain Valley Pipeline passes over Canoe Cave and within a few hundred feet of its entrance. Sinkholes that take allogenic recharge (swales) and a spring directly downhill from the cave (a likely resurgence of water from the cave) are indicated. The area outlined in light blue is a designated cave conservation site.

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CO122 – Wild Virginia (cont'd)

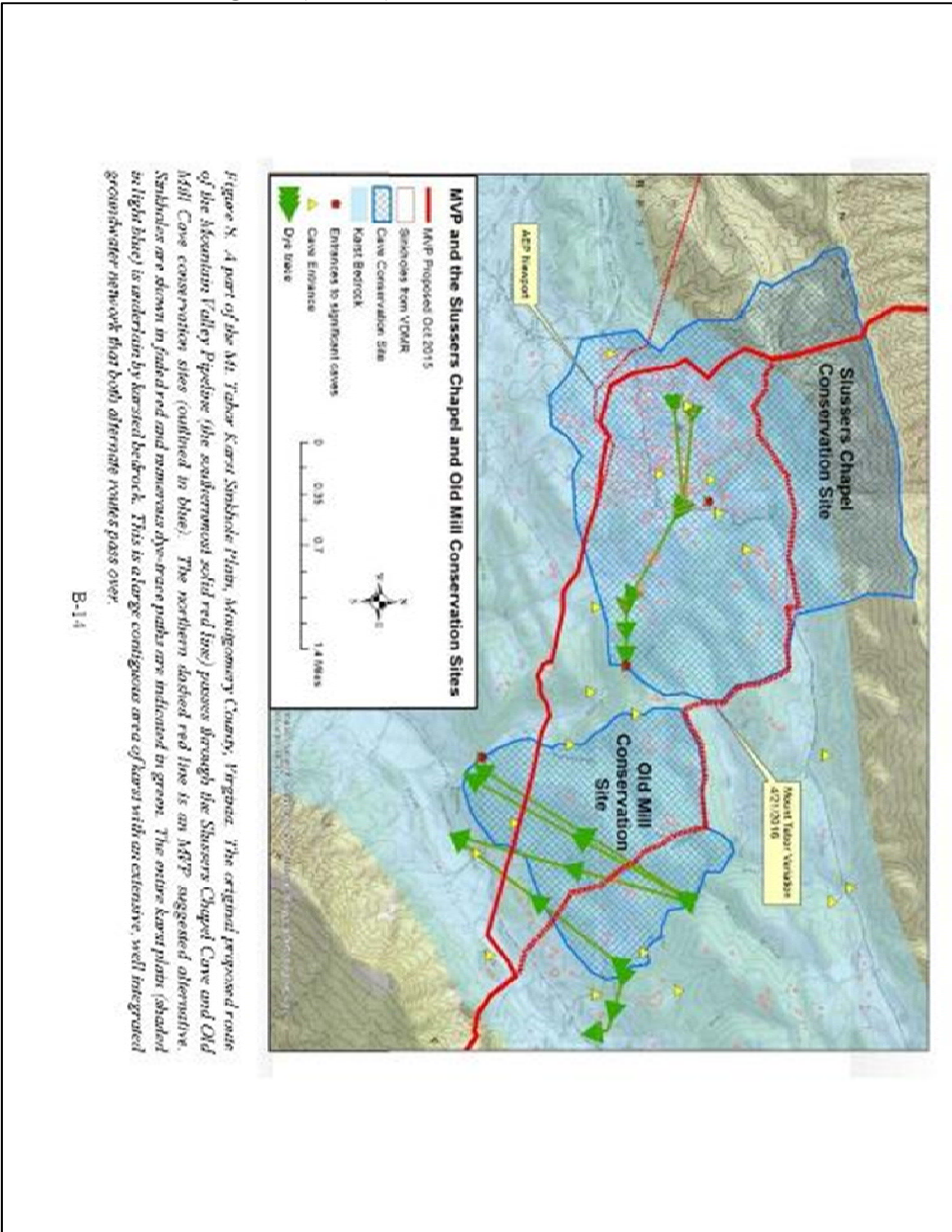


Figure 8. A part of the Mt. Tabor Kari's Bedrock Hill, Montgomery County, Virginia. The original proposed route of the Shenandoah Valley Pipeline (the southeastern solid red line) passes through the Slussers Chapel Cave and Old Mill Cave conservation sites (outlined in blue). The northern dashed red line is an MVP suggested alternative. Shaded areas shown in faded red and numerous dry-river paths are indicated in green. The entire kari's plan (shaded in light blue) is underlain by karst bedrock. This is a large contiguous area of kari's with an extensive, well integrated groundwater network that both alternate routes pass over.

B-14

Z-2695

COMPANIES/ORGANIZATIONS COMMENTS

CO122 – Wild Virginia (cont'd)

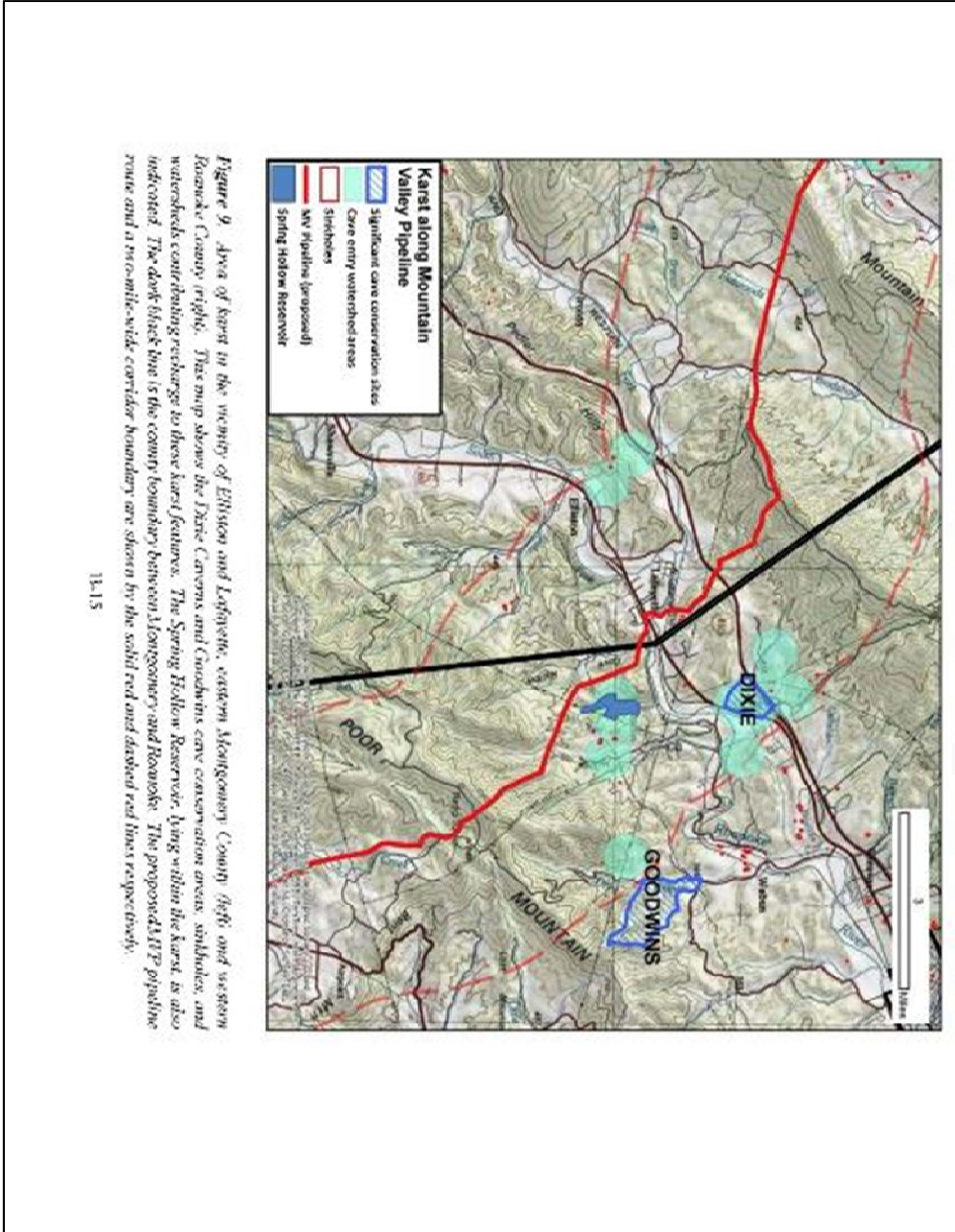


Figure 9. Area of karst in the vicinity of Etison and Loftisville, eastern Montgomery County (left) and western Roanoke County (right). This map shows the Dixie Caverns and Godwins cave conservation areas, sinkholes, and watersheds contributing recharge to these karst features. The Spring Hollow Reservoir, lying within the karst, is also indicated. The dark black line is the county boundary between Montgomery and Roanoke. The proposed MTP pipeline route and a two-mile-wide corridor boundary are shown by the solid red and dashed red lines respectively.

13.15

Z-2696

COMPANIES/ORGANIZATIONS COMMENTS

CO122 – Wild Virginia (cont'd)

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ERNST H. KASTNING, JR., PH.D., P.G.
P.O. Box 1404, Radford, Virginia 24143-1404
(603) 545-9396 ernst@skvhopper.net

GEOSCIENTIST....HYDROGEOLOGIST....ENGINEER, HISTORIAN....FREELANCE WRITER

Resource Management Education and Interpretation Natural and Human History

Summary of Qualifications

Ph. D. and M. S. Degrees in Geology with extensive professional experience as a Scientist and Educator in resource management including environmental problems associated with land use and hydrogeological problems associated with management of fragile ecosystems both above and below ground. Demonstrated ability to lead cross-functional teams, to coordinate and manage complex problems. Designed and implemented policies and procedures with respect to applied geosciences, engineering geology, and hydrogeology. Outreach education and interpretation regarding geologic, environmental, and historic resources. Includes over forty-seven years of experience with karst processes. Retired from university teaching.

Expertise and Knowledge:

- | | | |
|-------------------------------|--------------------------------|-----------------------|
| - Project Leadership | - Performance Analysis | - Presentations |
| - Administration & Planning | - Regulatory Issues/Compliance | - Report Writing |
| - Program Development | - Risk Assessment/Evaluation | - Community Relations |
| - Needs Assessment/Evaluation | - Instructor/Facilitator | - Problem Solver |
| - Alliances/Partnerships | - Data Collection/Analysis | - Computer Proficient |

Selected Accomplishments

Produced high-quality geotechnical and hydrogeologic studies for a wide range of clients including engineering/environmental consulting firms, governmental organizations (local, state, and federal), and developers. Have authored over 40 technical consulting reports and cartographic products. Recognized expert in my field, providing input to governmental agencies, military bases, planning committees, civic organizations, citizen-action groups, and educational institutions. *

Managed and *advised* projects, including the geologic mapping program of the New Hampshire Geological Survey, projects of geotechnical consulting companies, and graduate-thesis research of a number of graduate students. These have included grant and proposal writing, budget management, and public outreach and education. *

Regularly presented and *submitted* results of research and geotechnical findings at professional and technical meetings, symposia, public hearings, and as an expert witness in courts of law. Have authored approximately 15 monographs, 80 articles and geologic maps, and 60 abstracts in the geologic literature. Have led over 30 field trips. Designed and scripted high-profile, museum-quality displays and exhibits. Accomplished cartographer, photographer, editor, and media spokesperson. *

* Detailed supportive information available on request.

Z-2697

COMPANIES/ORGANIZATIONS COMMENTS

CO122 – Wild Virginia (cont'd)

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ERNST H. KASTNING, JR., PH.D., P.G.

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Professional Experience

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICE, Concord, NH 2007-2011

Manager of Geologic Mapping – New Hampshire Geological Survey
Water Conservationist – Drinking Water and Groundwater Bureau

- Managed bedrock and surficial geologic mapping (1:24,000-scale-quadrangles) under the National Cooperative Geologic Mapping Program (StateMap) of the U.S. Geological Survey.
- Supervised 4 to 5 contract geologists as well as personally mapping surficial geology.
- Provided for GIS compilation and assembly of maps for on-demand availability.
- Worked with various federal and state agencies as well as with local governments.
- Gave presentations at professional meetings and leading geological field trips including public outreach and education programs.
- Involved in grant proposal writing, budgeting, financial operations, and personnel allocation.

ENVIRONMENTAL ENGINEERING, INC., Blacksburg, VA 2007

Consulting Engineer.

- Conducted various geophysical investigations.
- Provided for remediation of ground-water contamination, in cooperation with the Virginia Department of Environmental Quality.

RADFORD UNIVERSITY, Radford, VA 1985-2006

Professor/Associate Professor – Department of Geology

- Taught Geomorphology, Hydrogeology, Advanced Groundwater Hydrogeology (graduate course), Environmental Geology (beginning and intermediate), Physical Geology, Historical Geology, and occasionally special topics (e.g. Karst Geology).
- Advised graduate students, 1996-2006 (Senior advisor for two completed M.S. degrees).
- Instructor, Elderhostel courses, Department of Continuing Education.
- University service: Departmental, college, and university-wide committees.
- Highly active in research, publishing, outreach, and consulting.

UNIVERSITY OF CONNECTICUT, Storrs, CT 1981-1985

Assistant Professor/Instructor – Department of Geology and Geophysics

- Taught Hydrogeology, Engineering Geology, Advanced Hydrogeology, Field Problems in Hydrogeology, Geomorphology, and introductory and seminar courses.
- Advised graduate students (Senior advisor for five completed M.S. degrees).
- Served on various departmental, college, and university-wide committees.
- Highly active in research, publishing, outreach, and consulting.

Previous positions included Assistant Professor at Murray State University (KY), Geologist, Environmental Geologist, Geophysicist, Hydrogeologist, Research Scientist, and Analytical Engineer at organizations including the University of Texas, Radian Corporation, Texaco, Inc., and Pratt and Whitney Aircraft

Education & Certification

Doctor of Philosophy in Geology, The University of Texas at Austin, Austin, Texas, 1983
Master of Science in Geology, The University of Connecticut at Storrs, Storrs, Connecticut, 1975
Bachelor of Electrical Engineering, Rensselaer Polytechnic Institute, Troy, New York, 1966

Certified Professional Geologist (Commonwealth of Virginia) – Active

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COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association

CO123-1 Comment noted.

Wintergreen ORIGINAL
88 Wintergreen Drive
Wintergreen Resort, VA 22967-2162

Wintergreen Property Owners Association
Jay W. Roberts, Executive Director
Tel. 434 325 8531 jayroberts@wpoainc.org

February 25, 2017

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission (FERC)
888 First Street, NE
Washington, DC 20426

Re: Docket No. CP15-554-000; Response to the FERC DEIS on the ACP

Dear Ms. Bose:

This letter is submitted by the Wintergreen Property Owners Association (WPOA) in response to the FERC Notice of Availability of the Draft Environmental Impact Statement for the Proposed Atlantic Coast Pipeline (ACP) issued on 30 December 2016. The DEIS requested comments be submitted from intervenors by 6 April 2017. The Wintergreen Property Owners Association registered as an intervenor on October 4, 2015 and filed its first protest on 11 December 2015.

Please find enclosed a recent report on bedrock geology associated with The Atlantic Coast Pipeline where it crosses The Blue Ridge Parkway in Virginia at approximately milepost 13. The DEIS does not adequately address the construction concerns and high likelihood of catastrophic slope failure given the known geology of this area. The area is known locally as "Pond Hollow" and/or "Reeds Gap".

The attached report and map were based on a recent field survey by geologist Dr. Jerome Bartholomew. Dr. Bartholomew originally mapped the geology of the Sherando quadrangle as part of his doctoral thesis. Both his published maps and a complete report resulting from that work remain the official document used by Virginia's Department of Mines and Minerals. A copy of the state publication is also enclosed.

Dr. Bartholomew's published work and resume (also attached) include many, many relevant published studies completed on sites with geology similar to this area of Virginia's Blue Ridge and he currently consults and teaches at The University of Memphis in Tennessee. His early work in Virginia coincided with the August 1969 Hurricane Camille event where he witnessed catastrophic slope failure associated with colluvial deposits in Nelson, one of which is directly in the proposed Atlantic Coast Pipeline path. Subsequently and much more recently the adjacent community of Wintergreen has witnessed three similar events along the same geologic formation in the same area. These dangerous and costly failures were on engineered sites, fortunately, none of these resulted in loss of life.

www.wtgpoa.org

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REGULATORY COMMISSION

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CO123-1

COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)



88 Wintergreen Drive
Wintergreen Resort, VA 22967-2162

Wintergreen Property Owners Association

Jay W. Roberts, *Executive Director*
Tel. 434 325 8531 jayroberts@wpoaine.org

CO123-1
(cont'd)

Given the local geology, a recently engineered site for a 5 million gallon water tank was abandoned and a new site was selected.

It is important for FERC to understand that Wintergreen has learned from its mistakes. It is dangerous to excavate colluvial deposits, especially those that overly southeast dipping bedrock as is the case in the proposed pipeline route. Water perking through fault zones into adjacent colluvial material greatly enhances the danger of landslides even without a catastrophic rain event. A tunneled pipeline effort through the mountain would breach four of these faults (one of which incorporates a shear zone) likely channeling the water flow into overlying colluvial material.

We have watched Dominion Power responsibly reroute the pipeline around wetlands, historic structures, and municipal areas. As we continue to study Dr. Bartholomew's report and continue to use Lidar and other new technology available to us, we are at a loss as to explain why a high pressure 42 inch pipeline route is currently engineered to disturb a potentially catastrophic landslide area. In the event of slope failure and any potential related explosion, Wintergreens police offices, 911 command center and the community's administrative offices would likely experience destruction and loss of life. In addition, the Wintergreen community's only entrance and exit would be blocked by the resulting debris avalanche and/or a fire. To further this point, Virginia recently retired state forester describes his concerns in a separate letter enclosed. When considered objectively, the potential risks to human life of this route are real and well supported by science.

The FERC DEIS issued on December 30th 2016, makes no mention of bedrock geology, the shear zone, faults, colluvial material, recent slope failures and many other challenges that must be overcome to protect the people who work in or must pass through Pond Hollow. WPOA objects to the ACP on multiple grounds, however, in this request we ask FERC to focus attention on Dr. Bartholomew's work. The current path of the ACP through Pond Hollow represents a genuine risk to the Wintergreen Community and other landowners in the area.

Respectfully,

Jay Roberts
Executive Director
Wintergreen Property Owners Association

www.wtgpooa.org

Z-2700

COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

Wintergreen Property Owner's Association
88 Wintergreen Drive
Roseland, Virginia 22967
Attn: Jay Roberts/Executive Director

**The Reeds Gap – Pond Hollow,
Debris-Avalanche/Debris-Flow Collection Basin,
Nelson County, Virginia**

Some classic and very expensive induced landslide-failures in Virginia (e.g., along I-81 near Hollins, Roanoke Co.; along I-81 near Dixie Caverns, Montgomery Co.; and along I-64 near Afton Mountain, Albemarle, Co.) should not have happened! Although geotechnical work may have been of high quality along the actual right of ways, the geological mapping and broader assessment of the surrounding areas should have been one of the required necessary and sufficient conditions needed to demonstrate that failure was likely. Thus, stretches of these highways could have been relocated without disastrous results.

On a recent visit to the Reeds Gap – Pond Hollow area in Nelson Co., it was apparent that some geotechnical work (as indicated by cuttings at some shallow boreholes) had been done along a narrow proposed pipeline route across the collection basin. This was near a debris-avalanche chute (Figure 1) that crossed VA highway 664 near Reeds Gap. In 1969 I observed the 7-10m-high mud ring on trees that lined this chute. I also observed that this debris avalanche stopped about 0.5 km down the mountain where the gradient flattened in the catchment basin. I mapped the geology around Wintergreen (Bartholomew, 1971). I located and logged some of the first water wells along the sheared granite/greenstone contact (Figure 1) drilled on top of the mountain at Wintergreen (1971-1973). Later I published the Sherando and Greenfield quadrangles (Bartholomew, 1977) where I mapped many of the debris avalanche chutes and later analyzed some of the contributing factors that produced more than 1100 debris avalanches during Hurricane Camille (Gryta and Bartholomew, 1987 and 1989).

Being on the perimeter of the high rainfall area during Hurricane Camille, the Wintergreen area received only a few debris-flows/debris-avalanches and only one occurred within the collection basin. Still that slide was triggered along the contact (Figure 1) between Catoclin Greenstone and a weathered, thin phyllitic metasediment with a gently dipping foliation. This contact is very similar to the contact between Catoclin Greenstone and a thick, weathered phyllite that generated the Afton Mountain slide along I-64 near Royal Orchards as well as similar contacts in the Wintergreen area.

Thus, when I observe minimal geological and/or geotechnical work being done in an area where repeated debris-flows/debris-avalanches are known to have occurred, I am concerned because I know that high-rainfall events like Camille will happen again and again! Indeed, in a recent study (Soplata, Bartholomew, and Wooten, 2016) along Hickory Nut Gorge near Chimney Rock, North Carolina, a Camille-type event killed seven people and triggered about 300 debris avalanches in 1916. Major flooding occurred in 1994, 1996, 2008, and 2014. The 1996 rainfall event triggered a mudslide that pushed a house 150 feet down the slope of the gorge (just 80 years after the 1916 event). Thus major rainfall events do not need a Camille-type storm to trigger landslides. Even moderate rainfall and groundwater movement along faults and shear zones, bedding contacts, foliation planes and joints can trigger landslides as witnessed by the tubing-park slope failure at Wintergreen and the subsequent decision to move the water tank because of it.

Z-2701

COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

While Wintergreen was in its nascence, I recommended that the Pond Hollow access road not be used as the principal access route to Wintergreen because of the high risk that the Reeds-Gap/Pond-Hollow collection basin possesses from repeated debris-flows/debris-avalanches. Although the road was essential to gain access to the mountain, Wintergreen did follow a policy that residential homes were not built along this roadway (Wintergreen Drive). By avoiding residential development in the basin, only people driving up or down the mountain are at risk from major rainfall events. The Police Emergency and Command Center (Figure 1) was placed at junction of VA Highway 664 and Wintergreen Drive to have a staging area for emergency deployment to the mountain. The administration building for the Wintergreen Property Owners Association is located nearby as well as several maintenance buildings, but none of these are residences.

My concern was magnified many times over when I recently visited and walked the route of the proposed pipeline and learned of the intention to put a large, high pressure gas pipeline across the funnel of the tracks of many debris-flows/debris-avalanches. Considering the size of many very large boulders in past debris flows and the sheer weight and size of these debris flows, a gas pipeline is not safe a safe structure to install on the surface of the ground nor within surficial debris-flow deposits in this catchment area. The debris-flow/debris-avalanche deposits in the collection basin are relatively shallow and a Camille-type rainfall event centered on this collection basin could literally "pull the plug" and all of the deposits could be swept down the funnel scouring the base of the granite floor with debris tracks!

A tunnel bored within the granite bedrock beneath the surficial colluvial deposits, would provide better protection to a pipeline (Figure 1). But considerable care must be exercised because SE-dipping lithologic contacts, SE-dipping faults and shear zones, and a strong SE-dipping foliation all favor weathering and groundwater movement down-slope toward and into the collection basin. The proposed pipeline actually crosses a SE-dipping thrust fault that places highly sheared granitic gneiss over top of highly sheared metasediments of the Swift Run Formation. Foliation in this ~30m-thick shear zone dips SE and is likely to be a major conduit along which groundwater moves. Additionally, downhill from the thrust fault, two high-angle faults likely cross this proposed pipeline. Along one of these two faults, two water wells were drilled along the contact between sheared granite and the greenstone to depths of ~200 feet (Figure 1). The shear zone in the granite was ~50 feet wide. These fault zones are also groundwater conduits. As was the case with the tubing-park slope failure at Wintergreen, enhanced groundwater along a lithologic contact toward a shear zone promoted weathering and contributed to slope failure. Problems with construction of the water tank at Wintergreen were also linked to deep weathering of the Catoctin Greenstone and joint-sets within the greenstone that promoted oxidation and deeper weathering near the fault zone.

I have spent many years studying the sequence and relationships among different fracture sets to aid in the understanding how groundwater flows through fracture systems (Bartholomew and Rich, 2012; Bartholomew and Van Arsdale, 2012; Bartholomew et al., 1994, 1998, 2000, 2002, 2007, 2009; Evans and Bartholomew, 2010) in crystalline rocks of the Appalachian Piedmont, Mesozoic Basins, and Coastal Plain sediments, in part related to multi-year studies around the DOE Savannah River site (Bartholomew et al., 1995, 1996, 1997) and the "North Carolina low-level radioactive waste disposal facility project" (Bartholomew and Fleischmann, 1993; Wooten et al., 2001). Any tunnel across the collection basin needs to be concerned that groundwater flow within shear zones, along lithological contacts and faults, and through fracture sets is not altered or redirected in ways that might enhance slope failures.

Detailed geological mapping around the Reeds Gap-Pond Hollow collection basin should follow standard practices in the collection and analysis of data, such as was done by Law Engineering, Inc. and Harding Lawson

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COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

Associates in the multi-year assessments of the "North Carolina low-level radioactive waste disposal facility project" for Chem-Nuclear Systems, Inc. in the 1990s. The procedures for mapping, trenching, coring, groundwater studies, and geophysical investigations need to be standardized and rigorously applied so that concerns for human safety are constantly maintained. For this and other projects, I have coordinated teams of 2-9 people for geological work. The NC project required more than 4000 feet of trenching with careful mapping of soils, bedrock lithology, and structural features and public walk-throughs of the trenches where people can ask whatever questions they feel are relevant. Such procedures insure public confidence in the work. Future studies near Reeds Gap should include such things as Lidar, coring, OSL and ¹⁴C dating, and geophysical work coupled with mapping of surficial deposits. Using such techniques can help avoid costly mistakes.

Because this location is the only entrance and exit for both security and administrative buildings as well as for the larger community, the current route is inadvisable and the risk of failure is high. I recommend that the pipeline be relocated and not be placed across this collection basin where the geologic factors indicate greater concern for public safety.



Dr. Mervin J. Bartholomew

North Carolina Licensed Geologist No. 583 (1987-2017)

1. Bartholomew, M.J., 1971, *Geology of the Humpback Mountain Area of the Blue Ridge in Nelson and Augusta Counties, Virginia*. Ph.D. dissertation, Virginia Polytechnic Institute & State University, Blacksburg, Virginia, 159p.
2. Bartholomew, M.J., 1977, Geology of the Greenfield and Sherando quadrangles, Virginia: *Virginia Division of Mineral Resources, Publication 4*, 43p. with 1:24,000-scale maps.
3. Bartholomew, M.J., Heath, R.D., Brodie, B., Evans, M.A., 1995, Year 1 Progress Report on the Structural Controls on the Groundwater Regime of the Central Savannah River Area, South Carolina and Georgia: *Earth Sciences & Resources Institute Report F128-95-01*, 125 p.
4. Bartholomew, M.J., Brodie, B.M., Lewis, S.E., Evans, M.A., Heath, R.D., Greenwell, R.A., Blanchard, J.S., Syms, F.H., 1996, Year 2 Progress Report on the Structural Controls on the Groundwater Regime of the Central Savannah River Area, South Carolina and Georgia: *Earth Sciences & Resources Institute Report F128-96-01*, 230 p.
5. Bartholomew, M.J., Lewis, S.E., Evans, M.A., Rich, F.J., Brodie, B.M., Heath, R.D., Greenwell, R.A., Pray, J.R., Whitaker, A.E., Blanchard, J.S., Syms, F.H., 1997, Year 3 Final Report on the Structural Controls on the Groundwater Regime of the Central Savannah River Area, South Carolina and Georgia: *Earth Sciences & Resources Institute Report F128-97-01*, 142 p.
6. Bartholomew, M.J., Brodie, B.M., Willoughby, R.H., Lewis, S.E., Syms, F.H., 2002, Mid-Tertiary paleoseismites: Syndepositional features and section restoration used to indicate paleoseismicity, Atlantic Coastal Plain, South Carolina and Georgia, p. 63-74 in F.R. Ettensohn, N. Rast, C.E. Brett, editors, *Ancient Seismites. Geological Society of America, Special Paper 359*, 190p.
7. Bartholomew, M.J., Evans, M.A., Rich, F.J., Brodie, B.M., Heath, R.D., 2009, Rifting and drifting in South Carolina. Fracture history in Alleghanian granites and Coastal Plain strata. *Carolina Geological Society 2009 Annual Field Trip. Georgia Southern University, Department of Geology and Geography, Contribution Series no.2*, 50p.
8. Bartholomew, M.J., Fleischmann, K.H., 1993, Structural characterization and analysis of the Wake/Chatham county potentially suitable site, North Carolina: *Earth Sciences & Resources Institute Report 93-04-432*, 126 p.
9. Bartholomew, M.J., Fleischmann, K.H., Wilson, J.F., 1994, Structural features associated with the Jonesboro fault where it crosses U.S. Highway 70, Wake County, North Carolina, p.69-74 in E.F. Stoddard, D.E. Blake, editors, *Geology and Field Trip Guide, Western Flank of the Raleigh Metamorphic Belt, North Carolina. Carolina Geological Society Field Trip Guidebook 1994*. North Carolina Geological Survey, 110p.
10. Bartholomew, M.J., Rich, F.J., 2012, Pleistocene shorelines and coastal rivers: Potential sensitive indicators of Quaternary tectonism along the Atlantic Coastal Plain of North America, p. 17-36 in Cox, R.T., Tuttle, M.P., Boyd, O.S., Locat, J., editors, *Recent Advances in North American Paleoseismology and Neotectonics East of the Rockies. Geological Society of America, Special Paper 275p*. doi:10.1130/2013.2493(02)
11. Bartholomew, M.J., Rich, F.J., Lewis, S.E., Brodie, B.M., Heath, R.D., Slack, T.Z., Trupe, C.H., III, and Greenwell, R.A., 2007, Preliminary interpretation of Mesozoic and Cenozoic fracture sets in Piedmont metamorphic rocks and in Coastal Plain strata near the Savannah River, Georgia and South Carolina, p.7-37 in F.J. Rich, ed., *Guide to Field Trips - 56th Annual Meeting, Southeastern Section Geological Society of America*: Georgia Southern University, Department of Geology and Geography, Contribution Series no.1, 198p.
12. Bartholomew, M.J., Rich, F.J., Whitaker, A.E., Lewis, S.E., Brodie, B.M., Hill, A.A., 2000, Preliminary interpretation of fracture sets in Upper Pleistocene and Tertiary strata of the lower Coastal Plain in Georgia and South Carolina, p.19-27 in C. Abate, editor, *A Compendium of Field Trips of South Carolina Geology with Emphasis on the Charleston, South Carolina, Area. Conducted in Association with the Geological Society of America - Southeastern Section Meeting, March 23-24, 2000 Charleston South Carolina*: South Carolina Department of Natural Resources, Geological Survey, Columbia, South Carolina, 65p.
13. Bartholomew, M.J., Van Arsdale, R., 2012, Structural controls on intraplate earthquakes, U.S.A., p. 165-189 in Cox, R.T., Tuttle, M.P., Boyd,

Z-2703

COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

- O.S., Locat, J., editors, *Recent Advances in North American Paleoseismology and Neotectonics East of the Rockies: Geological Society of America, Special Paper 493*, 275p. doi:10.1130/2013.2493(08).
14. Bartholomew, M.J., Whitaker, A.E., Barker, C.A., 1998, Preliminary Mesozoic-Cenozoic brittle-deformation history of Eocambrian rocks (Ridgeway gold mine, SC), Carolina Terrane, p.19-27 in D.T. Secor, Jr., editor, *1998 Special Issue devoted to the 1998 Field Trip for the Carolina Geological Society: South Carolina Geology*, V.40, 83p.
 15. Evans, M.A., Bartholomew, M.J., 2010, Crustal fluid evolution during deformation, uplift, and exhumation of the southeastern Piedmont of the southern Appalachians: Late Paleozoic through Mesozoic rifting, p. 553-577 in Tollo, R.P., Bartholomew, M.J., Hibbard, J.P., Karahinas, P.M., editors, 2010, *From Rodinia to Pangea: The Lithotectonic Record of the Appalachian Region: Geological Society of America Memoir 206*, Boulder, Colorado, 956p.
 16. Gryta, J.J., Bartholomew, M.J., 1989, Factors influencing the distribution of debris avalanches associated with the 1969 Hurricane Camille in Nelson County, Virginia, p. 15-28 in A.P. Schultz, R.W. Jibson, editors, *Landslide Processes of the Eastern United States and Puerto Rico: Geological Society of America, Special Paper 236*, 102p.
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 18. Soplata, A., Bartholomew, M.J., Wooten, R.M., 2016, Historically destructive landslides of the Hickory Nut Gorge near Chimney Rock, North Carolina: *Geological Society of America, Abstracts with Programs*, V.48, no.3, T7-poster 51.
 19. Wooten, R.M., Bartholomew, M.J., Malin, P.E., 2001, Structural features exposed in Triassic sedimentary rocks near the proposed low-level radioactive waste disposal site, southwestern Wake County, North Carolina, p.51-74 in Hoffman, W., editor, *Guidebook for 2001 Geological Society of America - Southeastern Section Meeting, April 5-6, 2001*, North Carolina State University, Raleigh, North Carolina, 203p.

Z-2704

COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

RESUME

MERVIN J. BARTHOLOMEW

North Carolina Licensed Geologist No. 583 (1987-2017)

Department of Earth Sciences, 002 Johnson Hall

University of Memphis, Memphis, TN 38152

Office: (901) 678-4536; Email: jbrthlm1@memphis.edu

EDUCATION

Ph.D. 1971, *Virginia Polytechnic Institute & State University*, Blacksburg, Virginia

M. S. 1969, *University of Southern California*, Los Angeles, California

B. S. 1964, *The Pennsylvania State University*, University Park, Pennsylvania

EXPERIENCE

- 2002-2017: **Professor**; served as **Chair** (FY03-14), *Department of Earth Sciences*, University of Memphis, Memphis, Tennessee; **Instructor** (summers 02-13) for YBRA/Penn-YBRA/Houston geology field camps: Yellowstone-Bighorn Research Association, Red Lodge, MT
- 1992-2002: **Research Professor**, Earth Sciences and Resources Institute; served as **Program/ Graduate Director** (FY94-01), *Master of Earth & Environmental Resources Management Program*, School of the Environment, University of South Carolina, Columbia, South Carolina
- 1983-1992: **Professor/Associate Professor**; served as **Chief** (FY83-85; FY87-90), *Geology & Mineral Resources Division*, Montana Bureau of Mines & Geology, Montana Tech of the University of Montana, Butte, Montana
- 1979-1983: **Geologist-in-charge**, Virginia Tech (Blacksburg) office, Virginia Division of Mineral Resources, P.O. Box 3667, Charlottesville, Virginia
- 1976-1979: **Contract/WAE Geologist**, Virginia Division of Mineral Resources P.O. Box 3667, Charlottesville, Virginia
- 1975-1980: **Contract Geologist**, North Carolina Division of Land Resources, Raleigh, North Carolina
- 1972-1975: **Assistant Professor**, Department of Geosciences, North Carolina State University, Raleigh, North Carolina
- 1971-1972: **Instructor**, Department of Geological Sciences, Virginia Polytechnic Institute and State University, Blacksburg, Virginia

Earlier Experience

- 3 years: Standard Oil Company of California (CHEVRON), western Los Angeles basin (Inglewood District), California
- 4 years: geologic consultant for planning & developmental phases for 4612-unit Wintergreen recreational community in Virginia Blue Ridge: *Virginia Landmark Corporation, Richmond, VA; Cabot, Cabot & Forbes Company, Boston, MA; Dufresne-Henry Engineering Corporation, North Springfield, VT; C C & F Wintergreen, Inc., Wintergreen, VA*; Invited for 10 May 2008 dedication of Wintergreen Founders Vision Overlook on the Blue Ridge Parkway by Wintergreen Nature Foundation
- 1 field season: Los Angeles County Museum, California
- 1 field season: Atlantic-Richfield Oil Company (ARCO), California
- 1 field season: Central Savannah River Area Project, University of Georgia, Georgia
- 1 field season: Tennessee Copper Company, Alabama/Georgia

PROFESSIONAL ACTIVITIES

Special Conferences and Sessions

- 2017 Co-organizer & Session Co-chair, SE section meeting Geological Society of America, Richmond, VA
- 2012 Field Trip Co-Chair, National Annual Meeting, Geological Society of America, Charlotte, NC
- 2001 Co-organizer & Session Co-chair, Proterozoic Tectonic Evolution of the Grenville Orogen in Eastern North America, Topical Session T2-1 & II, Annual Meeting, Geological Society of America, Boston, MA
- 1997 Organizer & Session Co-chair, Interdisciplinary characterization of major, environmentally sensitive sites, SE USA, Symposium 10-1, II, & III, SE Section meeting, Geological Society of America, Auburn, AL
- 1995 Co-organizer & Session Co-chair, Fracture Development, Reactivation, and Mineralization Session, 12th International Conference on Basement Tectonics, Norman, OK
- 1988 Organizer & General Chair, 8th International Conference on Basement Tectonics, Butte, MT
- 1982 Organizer and Session Co-chair, Symposium on Grenville Terranes of the Appalachians, (Parts I & II) joint NE/SE Sections meeting, Geological Society of America, Washington, DC
- 1988 Session Chair, SE section meeting Geological Society of America, Columbia, SC
- 1988 Session Chair, Montana Mining Association, Butte, MT
- 1987 Session Chair, 7th International Conference on Basement Tectonics, Kingston, Ontario
- 1988 Geohazards 88, U. S. Geological Survey, Menlo Park, CA

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COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

1988 Research Applications workshop, National Earthquake Hazards Reduction Program, Denver, CO
1987 Penrose Conference, construction and balancing of geologic cross sections, Rosendale, NY
1986 IGCP Project 233 - International Conference on Iberian Terranes, Oviedo, Spain
1981 Basement and Basement-Cover Symposium, Uppsala Caledonide Symposium, Uppsala, Sweden

Field Trips

2016 Colader, 50th Annual Field Trip, Georgia Geological Society, Jekyll Island, GA
2012 Principal leader, field trip #415 for National Annual Meeting, Geological Society of America, Charlotte, NC
2009 Principal leader, Carolina Geological Society, Columbia, SC
2008 Principal leader, field trip # 2, Tobacco Root Geological Society, Red Lodge, MT
2007 Colader, field trip #425 for National meeting, Geological Society of America, Denver, CO
2007 Principal leader, field trip #2 for SE section meeting, Geological Society of America, Savannah, GA
2001 Colader, field trip #3, SE section meeting, Geological Society of America, Raleigh, NC
2000 Principal leader, field trip #3, SE section meeting, Geological Society of America, Charleston, SC
1998 Colader, field trip, Carolina Geological Society, Columbia, SC
1994 Principal leader, field trip #6, SE Section meeting, Geological Society of America, Blacksburg, VA
1993 Principal leader, Appalachian Tectonic Studies Group field conference, Christiansburg, VA
1991 Principal leader, field trip #3, joint NE/SE Sections meeting, Geological Society of America, Baltimore, MD
1990 Colader, field trip, Friends of the Pleistocene, Ennis, MT
1989 Leader, trip #2, Tobacco Root Geological Society, Dillon, MT
1989 Stopleader, field trip T380, International Geological Congress, Dillon, MT
1987 Colader, field trip, Rocky Mountain Section, American Association of Petroleum Geologists, Boise, ID
1983 Principal leader, field trip, Carolina Geological Society, Boone, NC
1982 Principal leader, Field Trip #6, joint NE/SE Sections meeting, Geological Society of America, Washington, DC
1982 Colader, field trip, Virginia Oil and Gas Conference, Roanoke, VA
1980 Colader, field trip #6, National meeting, Geological Society of America, Atlanta, GA

Professional Societies: Geological Society of America (*Fellow*, 1982-2016); American Geophysical Union (*Life Member*); Yellowstone-Bighorn Research Association (Board member, 2007-2015); International Basement Tectonics Association, Inc.; International Association of Structural/Tectonic Geologists; Appalachian Tectonic Studies Group; Tobacco Root Geological Society (1991 & 1992 *Vice-President*); Central Savannah River Area Geological Society (*Charter Member*; 1993-95 *Advisory Board*); Carolina Geological Society (*Life Member*); Montana Geological Society; Society for Pennsylvania Archaeology (*Life Member*).

BOOKS

1. Eppes, M.C., Bartholomew, M.J., editors, 2012, *FROM THE BLUE RIDGE TO THE COASTAL PLAIN: FIELD EXCURSION IN THE SOUTHEASTERN U.S.*: Geological Society of America Field Guide 29, Boulder, Colorado, 395p.
2. Tollo, R.P., Bartholomew, M.J., Hibbard, J.P., Karabinas, P.M., editors, 2010, *FROM RODINIA TO PANGEA: THE LITHOTECTONIC RECORD OF THE APPALACHIAN REGION*: Geological Society of America Memoir 206, Boulder, Colorado, 950p.
3. Tollo, R.P., Corriveau, L., McLelland, J.B., Bartholomew, M.J., editors, 2004, *PROTEROZOIC TECTONIC EVOLUTION OF THE GRENVILLE OROGEN IN NORTH AMERICA*: Geological Society of America Memoir 197, Boulder, Colorado, 820p.
4. Bartholomew, M.J., Hyndman, D.W., Mogk, D.W., Mason, R., editors, 1992, *BASEMENT TECTONICS 8: CHARACTERIZATION AND COMPARISON OF ANCIENT AND MESOZOIC CONTINENTAL MARGINS*— *Proceedings of the Eighth International Conference on Basement Tectonics, held in Butte, Montana, USA, August, 1988*: Kluwer Academic Publishers, Dordrecht, The Netherlands, 745p.
5. Bartholomew, M.J., editor, 1984, *THE GRENVILLE EVENT IN THE APPALACHIANS AND RELATED TOPICS*: Geological Society of America Special Paper 194, Boulder, Colorado, 287p.

PUBLICATIONS (Active Tectonics, Cenozoic & Environmental Geology)

- ACTIVE FAULTS, SEISMICITY, EARTHQUAKE HAZARDS
1. Pujol, J., Bartholomew, M.J., Mickelson, A.M., Bone, M.J., 2015, Shallow seismic imaging of the fault zone associated with a high scarp in SW Montana: *Interpretations, Society of Exploration Geophysicists and American Association of Petroleum Geologists*, V. 3, no.1, p.T25-41 (posted online 31 Dec. 2014) online publication date: Feb. 2015.
 2. Bartholomew, M.J., Rich, F.J., 2012, Pleistocene shorelines and coastal rivers: Potential sensitive indicators of Quaternary tectonism along the Atlantic Coastal Plain of North America, p. 17-36 in Cox, R.T., Tuttle, M.P., Boyd, O.S., Locat, J., editors, *Recent Advances in North American Paleoseismology and Neotectonics East of the Rockies*: Geological Society of America, Special Paper 275p. doi:10.1130/2013.2493(02). Bartholomew, M.J., Van Arsdale, R., 2012, Structural controls on intraplate earthquakes, U.S.A., p. 165-189 in Cox, R.T., Tuttle, M.P., Boyd, O.S., Locat, J., editors, *Recent Advances in North American Paleoseismology and Neotectonics East of the Rockies*: Geological Society of America, Special Paper 493, 275p. doi:10.1130/2013.2493(08).
 3. Feng, C., Li, D., Bartholomew, M.J., Luo, W., 2012, Characteristics and patterns of surface ruptures caused by the Yushu earthquake. *Geotectonica et Metallogenia*, V. 36, no. 1, p.69-75.
 4. Mickelson, A. M., Bartholomew, M.J., Chapman, A., Sease, R., 2011, Paleoseismites which formed prior to and during the 31 August 1886 Charleston earthquake in colonial Dorchester, South Carolina: *Southeastern Geology*, V.48, no.3, p.129-146.

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COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

5. Pujol, J., Bartholomew, M.J., Michelson, A., Bone, M. J., 2010, Using synthetic data to guide processing of shallow seismic reflection data collected across a high scarp in SW Montana: Symposium on the Application of Geophysics to Engineering and Environmental Problems, 2010 Annual Meeting, Keystone Colorado, no. 99, p.593-601.
6. Bartholomew, M. J., Greenwell, R.A., Wasikiewicz, T.A., Stickney, M.C., 2009, Alluvial fans: sensitive tectonic indicators of fault-segmentation and stress-field partitioning along the Red Rock fault, northern Basin and Range of southwestern Montana, U.S.A.: *Northwest Geology*, V. 38, p. 41-66.
7. Bartholomew, M.J., Rich, F.J., 2007, The walls of colonial Fort Dorchester: A record of structures caused by the August 31, 1886 Charleston, South Carolina earthquake and its subsequent earthquake history: *Southeastern Geology*, V.44, no 4, p.147-169.
8. Bartholomew, M.J., Stickney, M.C., Wilde, E.M., Dundas, R.G., 2002, Late Quaternary paleoseismites: Syndepositional features and section restoration used to indicate paleoseismicity and stress-field orientations during faulting along the main Lima Reservoir fault, southwestern Montana, p. 29-47 in F.R. Etensohn, N. Rast, C.E. Brett, editors, *Ancient Seismites: Geological Society of America, Special Paper 359*, 190p.
9. Hill, A.A., Bartholomew, M.J., 1999, Seismic hazard susceptibility in southwestern Montana: Comparison at Dillon and Bozeman, p. 131-139 in S.S. Hughes, G.D. Thackray, editors, *Guidebook to the Geology of Eastern Idaho*: Idaho Museum of Natural History, 350p.
10. Bartholomew, M.J., Stickney, M.C., Wilde, E.M., 1990, Late Quaternary faults and seismicity in the Jefferson Basin, p. 238-244 in R.D. Hall, editor, *Quaternary Geology of the Western Madison Range, Madison Valley, Tobacco Root Range, and Jefferson Valley--Rocky Mountain Friends of the Pleistocene, August 15-19, 1990, Fieldtrip Guidebook*: Department of Geology, Indiana University at Indianapolis, 309p.
11. Bartholomew, M.J., 1989, The Red Rock fault and complexly deformed structures in the Tendoy and Four Eyes Canyon thrust sheets - examples of late Cenozoic and late Mesozoic deformation in southwestern Montana, p. 21-35 in J.W. Sears, editor, *Structure, Stratigraphy and Economic Geology of the Dillon Area: Tobacco Root Geological Society 14th Annual Field Conference - July 20-22, 1989: Northwest Geology*, V. 18, 86p.
12. Stickney, M.C., Bartholomew, M.J., 1987, Seismicity and Quaternary faulting of the northern basin and range province, Montana and Idaho: *Bulletin of the Seismological Society of America*, V. 77, No. 5, p. 1602-1625.
13. Wilson, J.R., Bartholomew, M.J., Carson, R.J., 1979, Late Quaternary faults and their relationship to tectonism in the Olympic Peninsula, Washington: *Geology*, V. 7, No. 5, p. 235-239.
14. Bartholomew, M.J., 1970, San Jacinto fault zone in the northern Imperial Valley, California: *Geological Society of America, Bulletin*, V. 81, p. 3161-3166.
- **FRACTURES SYSTEMS: TRIASSIC RIFT BASINS, ATLANTIC PASSIVE MARGIN, APPALACHIAN PIEDMONT**
15. Jackson, W.T., Jr., Bartholomew, M.J., Dupre, W.R., Armstrong, T.F., Stewart, K.G., 2016, Campanian paleoseismites of the Elk Basin anticline, northern Big Horn Basin, U.S.A.: A record of initial Laramide deformation. *Journal of Sedimentary Research*, V.86, p.394-407.
16. Evans, M.A., Bartholomew, M.J., 2010, Crustal fluid evolution during deformation, uplift, and exhumation of the southeastern Piedmont of the southern Appalachians: Late Paleozoic through Mesozoic rifting, p. 553-577 in Tollo, R.P., Bartholomew, M.J., Hibbard, J.P., Karabinas, P.M., editors, 2010, *From Rodinia to Pangea: The Lithotectonic Record of the Appalachian Region. Geological Society of America Memoir 206*, Boulder, Colorado, 956p.
17. Bartholomew, M.J., Evans, M.A., Rich, F.J., Brodie, B.M., Heath, R.D., 2009, Rifting and drifting in South Carolina: Fracture history in Alleghanian granites and Coastal Plain strata. Carolina Geological Society 2009 Annual Field Trip: *Georgia Southern University, Department of Geology and Geography, Contribution Series no.2*, 50p.
18. Bartholomew, M.J., Stewart, K.G., Wise, D.U., and Ballantyne, H.A., 2008, Field Guide: Paleoseismites: Indicators of Laramide tectonism and other events near the Bighorn Basin, Montana and Wyoming, p. 135-158 in Thomas, R.C., and Gibson, R.L., eds., *The Red Lodge Area, Montana: Tobacco Root Geological Society 33th Annual Field Conference - July 31 - August 3, 2008: Northwest Geology*, v. 37, 172p.
19. Stewart, K.G., Bartholomew, M.J., Ballantyne, H.A., 2008, Laramide paleoseismites of the Bighorn Basin, p.249-264 in R.G. Reynolds, ed., *Roaming the Rocky Mountains and Environs: Geological Field Trips: Geological Society of America Field Guide 10*, Denver, Colorado, 310p.
20. Bartholomew, M.J., Rich, F.J., Lewis, S.E., Brodie, B.M., Heath, R.D., Slack, T.Z., Trupe, C.H., III, and Greenwell, R.A., 2007, Preliminary interpretation of Mesozoic and Cenozoic fracture sets in Piedmont metamorphic rocks and in Coastal Plain strata near the Savannah River, Georgia and South Carolina, p.7-37 in F.J. Rich, ed., *Guide to Field Trips - 56th Annual Meeting, Southeastern Section Geological Society of America*: Georgia Southern University, Department of Geology and Geography, Contribution Series no.1, 198p.
21. Bartholomew, M.J., Brodie, B.M., Willoughby, R.H., Lewis, S.E., Syms, F.H., 2002, Mid-Tertiary paleoseismites: Syndepositional features and section restoration used to indicate paleoseismicity, Atlantic Coastal Plain, South Carolina and Georgia, p. 63-74 in F.R. Etensohn, N. Rast, C.E. Brett, editors, *Ancient Seismites: Geological Society of America, Special Paper 359*, 190p.
22. Wooten, R.M., Bartholomew, M.J., Malin, P.E., 2001, Structural features exposed in Triassic sedimentary rocks near the proposed low-level radioactive waste disposal site, southwestern Wake County, North Carolina, p.51-74 in Hoffman, W., editor, *Guidebook for 2001 Geological Society of America - Southeastern Section Meeting, April 5-6, 2001*, North Carolina State University, Raleigh, North Carolina, 203p.
23. Bartholomew, M.J., Rich, F.J., Whitaker, A. E., Lewis, S. E., Brodie, B. M., Hill, A. A., 2000, Preliminary interpretation of fracture sets in Upper Pleistocene and Tertiary strata of the lower Coastal Plain in Georgia and South Carolina, p.19-27 in C. Abate, editor, *A Compendium of Field Trips of South Carolina Geology with Emphasis on the Charleston, South Carolina, Area; Conducted in Association with the Geological Society of America - Southeastern Section Meeting, March 23-24, 2000 Charleston South Carolina*: South Carolina Department of Natural Resources, Geological Survey, Columbia, South Carolina, 65p.
24. Bartholomew, M.J., Whitaker, A.E., Barker, C.A., 1998, Preliminary Mesozoic-Cenozoic brittle-deformation history of Eocambrian rocks (Ridgeway gold mine, SC), Carolina Terrane, p.19-27 in D.T. Secor, Jr., editor, *1998 Special Issue devoted to the 1998 Field Trip for the Carolina Geological Society: South Carolina Geology*, V.40, 83p.
25. Secor, D.T., Jr., Barker, C.A., Gilton, K.A., Mitchell, T.L., Bartholomew, M.J., Hatcher, R.D., Balinsky, M.G., 1998, A field guide to the geology of the Ridgeway-Camden area, South Carolina Piedmont, p.71-83 in D.T. Secor, Jr., editor, *1998 Special Issue devoted to the 1998 Field Trip for the Carolina Geological Society: South Carolina Geology*, V.40, 83p.
26. Bartholomew, M.J., Fleischmann, K.H., Wilson, J.F., 1994, Structural features associated with the Jonesboro fault where it crosses U.S. Highway 70, Wake County, North Carolina, p.69-74 in E.F. Stoddard, D.E. Blake, editors, *Geology and Field Trip Guide, Western Flank of the Raleigh Metamorphic Belt, North Carolina, Carolina Geological Society Field Trip Guidebook 1994*: North Carolina Geological Survey, 110p.
- **RIVER /LANDSCAPE EVOLUTION, LANDSLIDE HAZARDS, VOLCANIC ROCKS, GEOMORPHOLOGY**
27. Derkey, R.E., Watson, S. M., Bartholomew, M.J., Stickney, M.C., Downey, P. J., 2004, Geologic map of the Deer Lodge area with text on the geology of the Deer Lodge area, Deer Lodge and Powell counties, Montana by Derkey, R.E., Bartholomew, M.J.: *Montana Bureau of Mines and Geology, Open-File Report: MBMG 271*, 1:48,000-scale map with 23 p. pamphlet.
28. Bartholomew, M.J., Lewis, S.E., Russell, G.S., Stickney, M.C., Wilde, E.M., Kish, S.A., 1999, Late Quaternary history of the Beaverhead River

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COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

- canyon, southwestern Montana, p. 237-250 in S.S. Hughes, G. D. Thackray, editors, *Guidebook to the Geology of Eastern Idaho*: Idaho Museum of Natural History, 350p.
29. Schultz, A.P., Bartholomew, M.J., Lewis, S.E., 1991, Surficial Geology and SLAR image of the Radford (0° 30' x 1° 00') quadrangle, Virginia-West Virginia: *U.S. Geological Survey, 1 Map, I-2170 A* (1:100,000-scale map with text).
30. Bartholomew, M.J., Mills, H.H., 1991, Old courses of the New River: its late Cenozoic migration and bedrock control inferred from high-level stream gravels, southwestern Virginia. *Geological Society of America, Bulletin*, V.103, No. 1, p. 73-81.
31. Gryta, J.J., Bartholomew, M.J., 1989, Factors influencing the distribution of debris avalanches associated with the 1969 Hurricane Camille in Nelson County, Virginia, p. 15-28 in A.P. Schultz, R.W. Jibson, editors, *Landslide Processes of the Eastern United States and Puerto Rico: Geological Society of America, Special Paper 236*, 102p.
32. Derkey, P.D., Bartholomew, M.J., 1988, Geologic map of the Ramsay quadrangle, Silver Bow County, Montana: *Montana Bureau of Mines and Geology, Geologic Map Series, No. 47* (1:24,000-scale map with text).
33. Gryta, J.J., Bartholomew, M.J., 1987, Frequency and susceptibility of debris avalanches induced by the 1969 Hurricane Camille in central Virginia, p. 16-18 in A.P. Schultz, C.S. Southworth, editors, *Appalachian Landslides: U.S. Geological Survey Circular 1008*, 43p.
34. Gryta, J.J., Bartholomew, M.J., 1983, Debris-Avalanche type features in Watauga County, North Carolina, p.53-61 in S.E. Lewis, editor, *Geological Investigations in the Blue Ridge of Northwestern North Carolina: Carolina Geological Society Fieldtrip Guidebook 1983*, North Carolina Division of Land Resources, 105p.

PUBLICATIONS (Grenville Province of USA; Iapetan Geology)

35. Bartholomew, M.J., Hatcher, R.D., Jr., 2010, The Grenville orogenic cycle of southern Laurentia: Unraveling sutures, rifts, and shear zones as potential piercing points for Amazonia (invited paper), p.4-20 in Casquet, C., Cordani, U., Pankhurst, R.J., eds., *The Grenville Orogen of Central and South America*: Special Issue 1, *Journal of South American Earth Sciences*, 159p.
36. Bartholomew, M.J., Tollo, R.P., 2004, Reply to a Discussion by Bailey, C., Owens, B., and Shirvell, C.R. of: Northern ancestry for the Goochland terrane as a displaced fragment of Laurentia. *Geology*, v. 32, no. 12, Online Forum.
37. Bartholomew, M.J., Tollo, R.P., 2004, Northern ancestry for the Goochland terrane as a displaced fragment of Laurentia. *Geology*, v. 32, no.8, p.669-672.
38. Tollo, R.P., Corriveau, L., McLelland, J., Bartholomew, M.J., 2004, Proterozoic tectonic evolution of the Grenville orogen in North America: An introduction, p.1-18 in R.P. Tollo, L. Corriveau, J.B. McLelland, M.J. Bartholomew, editors, 2004, *Proterozoic Tectonic Evolution of the Grenville Orogen in North America: Geological Society of America Memoir 197*, 820p.
39. Hughes, S.S., Lewis, S.E., Bartholomew, M.J., Sinha, A.K., Herz, N., 2004, Geology and geochemistry of granitic and charnockitic rocks in the central Levingston massif of the Grenvillian Blue Ridge Terrane, U.S.A., p.549-569 in R.P. Tollo, L. Corriveau, J.B. McLelland, M.J. Bartholomew, editors, 2004, *Proterozoic Tectonic Evolution of the Grenville Orogen in North America: Geological Society of America Memoir 197*, 820p.
40. Tollo, R.P., Ashnikoff, J.N., Bartholomew, M.J., Rankin, D.W., 2004, Neoproterozoic A-type granitoids of the central and southern Appalachians: Intraplate magmatism associated with episodic rifting of the Rodinian supercontinent. *Precambrian Research*, V.128, no.1, p.3-38.
41. Hughes, S.S., Lewis, S.E., Bartholomew, M.J., Sinha, A.K., Hudson, T.A., Herz, N., 1997, Chemical diversity and origin of Precambrian charnockitic rocks of the central Piedlar massif, Grenvillian Blue Ridge Terrane, Virginia. *Precambrian Research*, V. 84, p.37-62.
42. Glover, L., Jil, Klitgard, K.D., Sheridan, R.E., Costain, J.K., Coruh, C., Holbrook, W.S., Poag, C.W., Farrar, S.S., Evans, N.H., Mixon, R.B., Hutchinson, D.R., Gates, A.E., Pavides, L., Musser, D.L., Drake, A.A., Jr., Benson, R.N., Froelich, A.J., Wehr, F.L., Dawson, J.W., Schneider, C., Bartholomew, M.J., Gibson, R.G., Simmons, N.G., Spears, D.B., 1995, E-3 Southwestern Pennsylvania to Baltimore Canyon trough: *Geological Society of America, Centennial Continent/Ocean Transect #19* (2 sheets).
43. Bartholomew, M.J., 1992, Structural characterization of the late Proterozoic (post-Grenville) continental margin of the Laurentian craton, p.443-467 in M.J. Bartholomew, D.W. Hyndman, D.W. Mogk, R. Mason, editors, *BASEMENT TECTONICS 8: Characterization and Comparison of Ancient and Mesozoic Continental Margins—Proceedings of the Eighth International Conference on Basement Tectonics, held in Butte, Montana, USA, August, 1988*. Kluwer Academic Publishers, Dordrecht, The Netherlands, 745p.
44. Bartholomew, M.J., Lewis, S.E., 1992, Appalachian Grenvillian massifs: pre-Appalachian translational tectonics, p.363-374 in R. Mason, editor, *BASEMENT TECTONICS 7: Proceedings of the Seventh International Conference on Basement Tectonics, held in Kingston, Ontario, Canada, August, 1987*. Kluwer Academic Publishers, Dordrecht, The Netherlands, 480p.
45. Bartholomew, M.J., Lewis, S.E., Hughes, S.S., Badger, R.L., Sinha, A.K., 1991, Tectonic history of the Blue Ridge basement and its cover, central Virginia, p. 57-90 in A. Schultz, E. Compton-Gooding, editors, *Geologic Evolution of the Eastern United States: Fieldguide for the NE-SE GSA Meeting: Virginia Museum of Natural History Fieldguide Number 2*, Martinsburg, Virginia, 304p.
46. Stoval, R.L., Robinson, E.S., Bartholomew, M.J., 1989, The relationships between gravity anomalies and the geology of the Blue Ridge Province near Floyd, Virginia, p. 61-71 in N.H. Evans, editor, *Contributions to Virginia Geology, Volume VI: Virginia Division of Mineral Resources, Publication 88*, 91p.
47. Bartholomew, M.J., Lewis, S.E., 1988, Pregrignation of middle Proterozoic massifs and terranes within the Appalachian orogen, eastern U.S.A., in E. Martinez Garcia, editor, *Geology of the Iberian Massif with communications presented at the International Conference on Iberian terranes and their regional correlation: Trabajos de Geologia*, University of Oviedo (Spain), V. 17, p. 155-165.
48. Bartholomew, M.J., 1986, Massif, p. 290-293 in McGraw-Hill Yearbook of Science & Technology, 1987: McGraw-Hill Book Company, New York, New York, 521p.
49. Bartholomew, M.J., Lewis, S.E., 1984, Evolution of Grenville massifs in the Blue Ridge geologic province, southern and central Appalachians, p. 229-254 in M.J. Bartholomew, editor, *The Grenville Event in the Appalachians and Related Topics: Geological Society of America, Special Paper 194*, 287p.
50. Sinha, A.K., Bartholomew, M.J., 1984, Evolution of the Grenville terrain in the central Virginia Appalachians, p. 175-186 in M.J. Bartholomew, editor, *The Grenville Event in the Appalachians and Related Topics: Geological Society of America, Special Paper 194*, 287p.
51. Bartholomew, M.J., 1983, Palinspastic reconstruction of the Grenville terrane in the Blue Ridge geologic province, southern and central Appalachians, U.S.A.: *Geological Journal (England)*, V. 18, no. 3, p. 241-253.
52. Bartholomew, M.J., 1983, Geologic map and mineral resource summary of the Baldwin Gap quadrangle, North Carolina-Tennessee: *North Carolina Division of Land Resources, GM 220-NW* (1:24,000-scale map with text) & *MRS 220-NW*, 5p.
53. Bartholomew, M.J., Lewis, S.E., Wilson, J.R., Gryta, J.J., 1983, Deformational history of the region between the Grandfather Mountain and Mountain City windows, North Carolina and Tennessee, p.1-16 in S.E. Lewis, editor, *Geological Investigations in the Blue Ridge of Northwestern North Carolina: Carolina Geological Society Fieldtrip Guidebook 1983*, North Carolina Division of Land Resources, 105p.

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COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

54. Fullagar, P.D., Bartholomew, M.J., 1983, Rubidium-strontium age of the Watauga River, Cranberry and Crossing Knob Gneisses northwestern North Carolina, p.17-24 in S.E. Lewis, editor, *Geological Investigations in the Blue Ridge of Northwestern North Carolina: Carolina Geological Society Fieldtrip Guidebook 1983*, North Carolina Division of Land Resources, 105p.
55. Bartholomew, M.J., Lewis, S.E., Ussler, W., Feiss, P.J.G., Goldberg, S.A., Gulley, G.L. Jr., Monrad, J.R., Gryta, J.J., 1983 Road log and stop descriptions for field trip, p.81-105 in S.E. Lewis, editor, *Geological Investigations in the Blue Ridge of Northwestern North Carolina: Carolina Geological Society Fieldtrip Guidebook 1983*, North Carolina Division of Land Resources, 105p.
56. Bartholomew, M.J., Gathright, T.M., II, Henika, W.S., 1981, A tectonic model for the Blue Ridge in central Virginia: *American Journal of Science*, V. 281, No. 9, p. 1164-1183.
57. Bartholomew, M.J., 1981, Geology of the Roanoke and Stewartville quadrangles, Virginia; geologic map of the Roanoke quadrangle and a summary of tectonic history-Valley and Ridge by Bartholomew, M.J., Hazlett, W.H., Jr.: *Virginia Division of Mineral Resources, Publication 34*, 23 p. with 1:24,000-scale maps.
58. Bartholomew, M.J., Gryta, J.J., 1980, Geologic map of the Sherwood quadrangle, North Carolina-Tennessee; mineral resource summary of the Sherwood quadrangle by Bartholomew, M.J.: *North Carolina Division of Land Resources, GM 214-SE (1:24,000-scale map with text) & MRS 214-SE*, 8p.
59. Bartholomew, M.J., 1977, Geology of the Greenfield and Sherando quadrangles, Virginia: *Virginia Division of Mineral Resources, Publication 4*, 43p. with 1:24,000-scale maps.
60. Bartholomew, M.J., Dietrich, R.V., 1973, Pygma enigmas, p. 53-58 in L.A. Lister, editor, *Symposium on Granites, Gneisses and Related Rocks: Geologic Society of South Africa, Special Publication No. 3*, 509p.

PUBLICATIONS (Appalachian and Cordilleran Fold & Thrust Belts/Forelands)

61. Schultz, A.P., Bartholomew, M.J., Brown, K.E., Ingram, G.R., 2017, Geologic map of the White Gate quadrangle, Virginia: *Virginia Division of Geology and Mineral Resources, Open File Report 16-7*, 1:24,000-scale map (in press).
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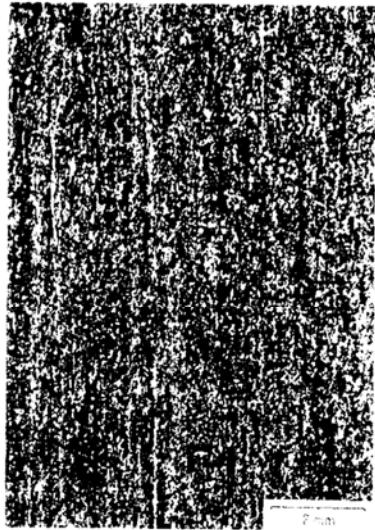


Figure 31. Photomicrograph of a blastomylonite layer (R-6793) within interlayered mylonitic gneiss and schist from the cataclastic rocks. Subparallel biotite and muscovite foliations are vertical.

QUATERNARY SYSTEM

Terrace Deposits

Extensive terrace deposits are found in Rockfish Valley (Plates 1, 2) and in Sherando valley west of Back Creek (Plate 2). In Sherando valley the younger alluvium was not differentiated from terrace deposits; the valley is covered by poorly sorted quartzite cobbles and boulders in a brown to reddish-brown, poorly sorted, loosely compacted matrix of sand, silt, and clay. Knechtel (1943) shows that the depth of unconsolidated material ranges from 15 to 150 feet (5 to 46 m) near the abandoned Lyndhurst and Mount Torry tract mines. This broad plain, covered with terrace material, is part of a bajada that extends west-southwestward from Sherando for about 15 miles (24 km) along the foot of the Blue Ridge to the vicinity of Vesuvius (Werner, 1966, his Plate 1). In the vicinity of the Lyndhurst mine east of Back Creek several small dissected terrace deposits are also present. These deposits probably

developed contemporaneously with the bajada and differ only in that a large portion of the detritus was of local origin derived from the mountains to the west.

In Rockfish Valley a well-dissected bajada is also present at elevations from 10 to 40 feet (3 to 12 m) above the present drainage. This feature consists mainly of confluent alluvial fans that were formed by the formerly eastward-draining Stony, Little Stony, and Spruce creeks. Allen Creek and other nearby small creeks are abandoned channels cut into the bajada by Stony and Little Stony creeks when they formerly drained eastward. The bajada extends as far north as Meriwether Creek, and a similar dissected alluvial slope is found along and north of Goodwin Creek. Detrital material on the bajada reflects the local derivation of detritus. Pebbles, cobbles, and boulders of quartz, granite, gneiss, and greenstone dominate the clasts in a brown to reddish-brown matrix of sand, silt, and clay. Except locally the thickness of these terrace deposits seldom exceeds 10 feet (3 m).

Alluvium

Alluvium includes flood-plain and mountain-stream deposits. Flood-plain deposits are present along Rockfish River, Back Creek, and the lower parts of most of their tributaries. They generally consist of light- to medium-brown, pebbly or gravelly sand and silt and locally contain cobbles and boulders. Flood-plain detritus similar to terrace deposits reflects the local origin of the material. Mountain-stream deposits are present along all high-gradient perennial and intermittent streams in both quadrangles. These deposits consist of loosely piled boulders and cobbles with lesser amounts of pebbles, sand, silt, and clay of local origin. Debris-avalanches are believed to be the principal transporting mechanism for much of the material in mountain stream deposits.

Landslide Areas

In 1969 extensive debris-avalanches, landslides, and flooding in the Tye and Rockfish river basins caused extensive material damage and loss of human life. In the 1969 catastrophe most damage was attributed to a torrential rainfall (numerous accounts report more than 27 inches in less than 8 hours during the night of August 19-20) that accompanied Hurricane Camille during its east-northeastward movement across Virginia. The Sherando and Greenfield quadrangles are on the northern fringe of the severely devastated region (Virginia Division of Mineral Resources, 1969; Webb, Nunan, and Pendley, 1970), and as such they were not as seriously affected as regions to the south. Within the Sherando quadrangle, numerous small landslides occurred, primarily along roadcuts and other steep

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slopes in the Rockfish Valley, along the Blue Ridge Parkway, and along many jeep trails and stream valleys in the mountains in the southern half of the quadrangle. Within the more devastated region to the east debris-avalanche chutes were developed in the southeastern part of the Greenfield quadrangle in soil and saprolite of the Lovington Formation and layered granulite gneiss in about 100 steep ravines (Plate 1). By contrast, only 13 debris-avalanche chutes were formed in the southern part of the Sherando quadrangle (Plate 2). Seven of these chutes were developed in soil and saprolite of Pedlar charnockite (Figure 17 and road log cumulative miles 61.4). Five chutes (road log cumulative miles 54.70) and one landslide were formed in saprolite of the Catoclin and Swift Run metasediments, and one in saprolite of granulite gneiss. Unique chutes developed on the Swift Run and Catoclin metasediments. In all six chutes in these rocks the slide material detached along southeastward-dipping foliation surfaces, which in three instances were subparallel to dip-slope bedding. In most cases, the metasedimentary saprolite transmitted ground water beneath unweathered or slightly weathered greenstone causing the detachment of a large mass of material consisting mainly of greenstone blocks with or without blocks of fresher metasedimentary material. The potential for this kind of detachment is great on all steep, southeastward-dipping slopes underlain by the Catoclin and Swift Run formations.

METAMORPHISM

Two distinct, contrasting periods of metamorphism are easily recognizable in the Precambrian rocks of the Blue Ridge core whereas only one period of metamorphism affected the upper Precambrian(?) and overlying lower Paleozoic rocks. The earlier period is generally correlated with metamorphism of the Grenville province of Canada, and it is therefore commonly referred to as "Grenville metamorphism" (Espenshade, 1970; King, 1970; Rodgers, 1972). In the Blue Ridge of Virginia, Grenville metamorphism is characterized by widespread massive charnockite associated with layered granulite gneiss. The younger period of polyphase Paleozoic metamorphism, however, only reached lower-greenschist to lower-amphibolite facies in this region.

PRECAMBRIAN (GRENVILLE) METAMORPHISM

Grenville metamorphism in this part of Virginia was characterized by prograde metamorphism of quartzofeldspathic rocks to the granulite facies, more or less coincident with emplacement of extensive biotite-bearing granitic and charnockitic plutons. As a result of

Paleozoic thrusting, rocks of the eastern (Lovington) massif were thrust over rocks of the western (Pedlar) massif. Thus, within the confines of the Sherando and Greenfield quadrangles some differences in metamorphism exist between rocks on opposing sides of the zone of cataclastic rocks that now separates the two massifs. The massive, biotite-bearing granitic gneiss (Lovington Formation) of the Lovington massif is cut by only a few small intrusions of massive charnockite, whereas the Pedlar massif is primarily massive charnockite with no biotite granitic gneiss. Thus, the Lovington massif probably represents a higher crustal level than the Pedlar massif.

In general, the layered granulite-gneiss of the Pedlar massif is evidence for a slightly deeper crustal level (higher grade) of metamorphism than that of the Lovington massif for the following reasons: (1) segregation layering is better developed in gneiss of the Pedlar massif (Figures 2, 6); (2) contacts between individual layers and rock types are much sharper and better defined (Figures 2, 5, 16); (3) anatexis of the Cooks Hollow dome appears to have progressed farther than that of the Pilot Mountain and Ennis Mountain roof pendants, and (4) garnet, indicative of higher pressure (Saxena, 1968), is widespread throughout the western massif (Plates 1, 2), but it is generally lacking in the eastern massif except for a few scattered outcrops in rocks within and near the cataclastic zone (R-6496). Grenville mineral assemblages are shown in Table 3.

PALEOZOIC METAMORPHISM

All rocks southeast of the Back Creek fault were regionally metamorphosed progressively from lower-greenschist facies on the west (Sherando quadrangle) to upper-greenschist and lower-amphibolite facies on the east (Greenfield quadrangle). Extensive cataclasis and thrusting of the Lovington massif over the Pedlar massif along the Rockfish Valley fault took place more or less concurrent with polyphase Paleozoic metamorphism that produced the prominent northeastward-trending axial-plane foliation in the folded Catoclin and younger rocks (Figure 23) and the northeastward-trending blastomylonitic fluxion structure in the cataclastic rocks and Lovington mylonitic gneiss. Fullagar and Dietrich (1976, p. 358-359) place a Rb-Sr age of 520-583 million years on this period of metamorphism.

Continued metamorphism produced lower oxidation state assemblages, indicative of a slight increase in metamorphic grade, more or less coincident with the formation of a secondary crinkle foliation in the Catoclin metavolcanics. The various metamorphic mineral assemblages are shown in Tables 4 and 5. The

Z-2717

COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

Z-2718

TO: Whom It May Concern

September 8, 2015

FROM: J. W. Garner

State Forester of VA (Ret.)

Ref: the Atlantic Coast Pipeline PF 16-5

I write not to debate the merits of the pipeline but to express my concerns for public safety along the proposed southern route - specifically in Nelson County at the entrance to the Wintergreen Resort.

I am a retired forester after 46 years with the Virginia Department of Forestry - 21 years as State Forester (agency director). During my field time I was on-the-line involved with forest fires, many in the mountainous terrain. Although the size of Virginia fires is not as large (a 1000 acre fire is not a rare event here), the intensity of a given event equals that of the notable western wildland fires.

During the early development of Wintergreen Resort, I participated in planning sessions and publicly expressed my concerns about the potential hazards of forest fires and the challenges of protection in such topography. This topography, while wild and beautiful, lends itself to rapidly spreading fire and very limited and difficult access for firefighters and equipment. There have been several "near miss" fires surrounding the Wintergreen mountain. However, other mountain developments in Virginia have not been so fortunate where wildfires resulted in the loss of homes and structures.

Compounding the normal challenges of fire control, there is only one steep, winding, two lane road to the resort at the top of the mountain. The resort has over 1000 permanent residents plus an equal number of full time employees on any given day. Special events at the resort increases this number multiple times. One way in and the same way out! Early in the development an attempt was made to seek an emergency exit at the top to the Blue Ridge Parkway. This was never approved by the National Park Service.

This southern proposed route shows the pipeline will be bored under the Blue Ridge Parkway, coming out just west of the Wintergreen entrance, and then buried under Beach Grove Road. The proposal plans a large construction site directly across from the entrance and the line buried once again under Beach Road east of the entrance. It will be debated that the construction will be temporary and all care and safety precautions will be implemented. However, this major construction site is directly across from the Wintergreen exit/entrance. The construction will last for some time (several fire seasons). There will be heavy equipment, cutting & welding, temporary road closing and other activities. One mistake or mishap could create a serious threat.

Again, I am not debating the merits of the pipeline, but specifically the location of this proposed route. Located at the very entrance to a highly populated area with such limited ingress/egress causes me significant concern. If ACP deems the most efficient way to cross the mountains is to bore under the Blue Ridge Parkway, then I would strongly urge a review and a change of the exact location of that passage. Several miles south, or preferably, north of the proposed location would avoid the potential of a catastrophic occurrence.

COMPANIES/ORGANIZATIONS COMMENTS

CO123 – Wintergreen Property Owners Association (cont'd)

LARGE-FORMAT IMAGES

One or more large-format images (over 8 ½" x 11") go here.
These images are available in e-Library at:

Accession Number(s) 20170314-0384

<input checked="" type="radio"/> PUBLIC	<input type="radio"/> CEII	<input type="radio"/> PRIVILEGED
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File Date 3/13/2017

Docket No. _____

Parent Accession No.

20170314-0383

Number of page (s) in set: 2

REVISED: 11/06 DLBA

Z-2719

COMPANIES/ORGANIZATIONS COMMENTS

CO124 – Wild Virginia

20170411-5031 FERC PDF (Unofficial) 4/10/2017 10:02:00 PM

No Pipeline through our National Forests

Joby Timm, Forest Supervisor

George Washington and Jefferson National Forest

5162 Valleypointe Parkway

Roanoke, VA 24019

CO124-1

We request that you do not amend the Land and Resource Management Plan for the George Washington National Forest in creating a new management area in the forest that would allow construction of the proposed Atlantic Coast Pipeline.

The 2014 Plan was the result of ten years of information gathering and public input. Thousands of comments were submitted that were considered in the creation of the final plan. The plan contains areas that have management prescriptions consistent with the citing of natural gas infrastructure, yet Dominion has failed to consider any route that utilizes these areas. We can see no reason to change the existing management areas by amending the current plan.

The plan was finalized only 2 years ago and it should not be changed for the convenience of a for-profit, investor owned energy company that chose not to engage in that planning process.

Thank you for this consideration.

CO124-1

FS response: The opposition to the LRMP amendments is noted. The FS no longer proposes to change any land allocations to the Rx5C-Designated Utility Corridors on the GWNF. All proposed amendments are now project-specific, so that they only apply to the ACP project, so the management area prescriptions within the 2014 plan will remain unchanged.

Z-2720

COMPANIES/ORGANIZATIONS COMMENTS

CO124 – Wild Virginia (cont'd)

20170411-5031 FERC PDF (Unofficial) 4/10/2017 10:02:00 PM

ACP Draft Environmental Impact Statement is Deeply Flawed

Dear Senator Warner and Senator Kaine

CO124-2

The Federal Energy Regulatory Commission (FERC) has released a Draft Environmental Impact Statement (DEIS) for the proposed Atlantic Coast Pipeline that is incomplete, inaccurate and deeply flawed.

While it includes hundreds of pages of information submitted by the applicant, much specific and detailed information submitted by individuals and local citizen groups regarding potential impacts has been omitted.

In its place is a cursory statement of a general issue, and dismissal of the issue as "insignificant."

This deprives members of the public and local, state and federal agencies of critical information necessary to evaluate and comment on the environmental impacts of the proposed pipeline. This includes impacts on cultural and historical resources, steep slopes and slope failures, roads, bridges, emergency services and economic impacts to businesses, communities and landowners.

Most critical, however is the absence of any detailed analysis for the purpose and need for the project which is also clearly required by the National Environmental Policy Act.

In addition, Atlantic Coast Pipeline LLC subsequently submitted 95 additional filings after the DEIS was released, most of which contain environmental information that could have and should have been included in the DEIS.

We request that you demand that FERC:

- 1) create a revised DEIS that includes the aforementioned information, and
- 2) re-set the comment and review clock so that concerned members of the public and federal, state, and local government authorities can have a full 90 days to review and comment on the revised DEIS.

CO124-2 See the responses to comments CO6-1 and CO97-1.

Z-2721

COMPANIES/ORGANIZATIONS COMMENTS

CO124 – Wild Virginia (cont'd)

20170411-5031 FERC PDF (Unofficial) 4/10/2017 10:02:00 PM

The Public Must be Involved in Virginia's Review of Pipelines

Governor McAuliffe c/o Paul Reagan, Chief of Staff

We request that you form a Citizen's Advisory Panel to hold discussions with concerned citizens, representatives of impacted citizen groups and members of your administration in order to properly review the Atlantic Coast and Mountain Valley Pipelines.

If the Atlantic Coast and Mountain Valley Pipelines are built they will cut across all regions of the State and would cause irreversible damage to mountain brook trout streams, public and private water supplies, sensitive species, and areas of great natural and historical importance. We are confident that a full and fair open and public accounting of these costs will prove as much.

Please act as soon as possible to restore the public's trust in your administration. In a representative democracy the government belongs to the people and public policy must be made in the open.

We trust that you will defend our rights, interests and values by forming a Citizen's Advisory Panel promptly.

The attachments to this letter have been reviewed by FERC staff and can be found on the FERC eLibrary site under FERC Accession Nos. 20170411-5031 and 20170411-5032.

Z-2722

COMPANIES/ORGANIZATIONS COMMENTS

CO125 – Lewis Airstrip, LLC

Z-2723

20170320-0032 FERC PDF (Unofficial) 03/17/2017

LEWIS AIRSTRIP, LLC.

PO Box 2123
Buckhannon, WV 26201
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NEAL W. ROHR
MEMBER and MANAGER
rohrmw@yahoo.com

FILED ORIGINAL
SECRETARY OF THE COMMISSION
2017 MAR 17 10 31 33
FEDERAL ENERGY REGULATORY COMMISSION

March 9, 2017

Mr. Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

Re: CP15 - 554

Dear Mr. Davis:

Thank you for the opportunity to review the draft Environmental Impact Statement. I have done so with great interest. As shown in the CD, Volume 2, CD page 151, our field is being considered for a Contractor Yard.

SUMMARY

CO125-1 These statements (shown here in part) are included in 4.8.1.1, pages 4 – 287 & 288 (CD pages 470 & 471) concerning pipeline construction:

- Prior to construction identify existing drain tile....
- If construction activities damage a drain tile....
- Repair the damaged tile immediately and temporarily....
- Make permanent drain tile repairs....
- Repair the system to its former condition....
- Repair drain tile line with materials....

Please include these statements in their entirety in a new section (suggest 4.2.5.1) concerning drainage in contractor yards.

DISCUSSION

In section 4.2.5, page 4-55 (CD page 238) concerning contractor yards, there is this statement: "Additionally, yards would be monitored for at least two growing seasons post-construction to determine the success of revegetation and correct any problems if the drainage had been modified because of construction...."

NR 3/9/17

CO125-1 These statements apply to all areas affected by project construction and operation. For brevity, they have not been repeated in multiple locations. Also see the response to comment CO8-1.

COMPANIES/ORGANIZATIONS COMMENTS

CO125 – Lewis Airstrip, LLC (cont'd)

20170320-0032 FERC PDF (Unofficial) 03/17/2017

LEWIS AIRSTRIP, LLC.

PO Box 2123
Buchannon, WV 26201
Cell: 304.439.0153
Fax: 304.472.3668

NEAL W. ROHR
MEMBER and MANAGER
rohrw@yahoo.com

CO125-1 | Our field, and probably others, has subsurface 4inch and 6inch terracotta
(cont'd) | drain tile. Our tile are unusually deep at 22 inches below the surface, so
reasonable preventive actions will preserve tile integrity. Likely it will be
impossible to achieve pre-construction drainage and vegetation if these
drainage tile have been compromised. Tile replacement would be required.
It is most probable that my suggestion – identify, protect, and monitor the
drain tile – exemplifies the principle that an ounce of prevention saves a
pound of cure.

Thank you.

Sincerely,

Neal W Rohr 3/9/17

Z-2724

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups)

20170124-5016 FERC PDF (Unofficial) 1/23/2017 5:51:55 PM

UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

In the matter of:)
Atlantic Coast Pipeline, LLC)
Docket Nos. CP15-554-000)
PF15-6-000)
Dominion Transmission, Inc.)
Docket Nos. CP15-555-000)
PF15-5-000)
Atlantic Coast Pipeline, LLC and)
Piedmont Natural Gas Company)
Docket No. CP15-556-000)

January 23, 2017

JOINT MOTION TO RESCIND OR SUPPLEMENT DEIS

CO126-1 | PURSUANT to FERC Rule 212 at 18 C.F.R. § 385.212, the National Environmental Policy Act ("NEPA") at 42 U.S.C. § 4332, and 40 C.F.R. § 1502.9, now come the North Carolina Waste Awareness and Reduction Network ("NC WARN"); Clean Water for North Carolina; the NC APPL: Stop the Pipeline; the Blue Ridge Environmental Defense League ("BREDL"), and its chapters, Protect Our Water! (Faber, VA), Concern for the New Generation (Buckingham, VA), Halifax & Northampton Concerned Stewards (Halifax and Northampton, NC), Nash Stop the Pipeline (Spring Hope, NC), Wilson County No Pipeline (Kenly, NC), Sampson County Citizens for a Safe Environment (Faison, NC), and Cumberland County Caring Voices (Eastover, NC); Sustainable Sandhills; Beyond Extreme Energy; The Climate Times; Triangle Women's International League for Peace and Freedom; Haw River Assembly; Winyah Rivers Foundation, Inc.;

CO126-1 See responses to comments CO6-1 and CO55-19.

Z-2725

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

20170124-5016 FERC PDF (Unofficial) 1/23/2017 5:51:55 PM

CO126-1
(cont'd)

River Guardian Foundation; 350.org Triangle; Eno River Unitarian Universalist Fellowship – Earth Justice; and NoFrackingInStokes (together “the Public Interest Groups”), by and through the undersigned counsel, with a joint motion to the Commission to rescind or supplement the Draft Environmental Impact Statement (“DEIS”) on the Atlantic Coast Pipeline (“ACP”) issued on December 30, 2016 in the above captioned dockets.

MOTION

Pursuant to NEPA at 42 U.S.C. § 4332, and the rules promulgated under it implementing its procedural provisions, and specifically 40 C.F.R. § 1502.9(c)(1)(ii), the Public Interest Groups move that the Commission rescinds and supplements the DEIS in this matter because “[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.” At the same time, the present public comment period should be placed in abeyance until a new or supplemental DEIS is issued.

SUPPORTING FACTS AND LAW

1. The Public Interest Groups are not-for-profit corporations under the laws of North Carolina and Virginia law acting in the public interest and community groups organized to protect the family and property of their members. Several of the Public Interest Groups, including but not limited to NC WARN and BREDL are intervenors in this proceeding pursuant to Commission Notice Granting Late Interventions, November 8, 2016. As intervenors they have the ability to make motions to the Commission

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

20170124-5016 FERC PDF (Unofficial) 1/23/2017 5:51:55 PM

CO126-1
(cont'd)

pursuant to Commission Rule 212, 18 C.F.R. § 385.212. Although the interests of the intervenors are more clearly stated in their respective motions to intervene, those same interests are held by each of the Public Interest Groups. The Public Interest Groups and their members will be significantly affected by the proposed ACP.

2. On September 18, 2015, the ACP LLC filed an application under section 7(c) of the Natural Gas Act, requesting authorization to construct, own, and operate the ACP, including three compressor stations and at least 564 miles of pipeline across West Virginia, Virginia, and North Carolina. The ACP is a joint venture of Dominion Resources, Inc., Duke Energy Corporation, Piedmont Natural Gas Company, Inc. (now a wholly owned subsidiary of Duke Energy), and AGL Resources, Inc. (collectively, "Dominion").

3. On October 2, 2015, the Commission filed its Notice of Application, providing additional details about the application and outlining the review process, and opportunities for public comment.

4. The Commission has authority under NGA Section 7 (Interstate Natural Gas Pipelines and Storage Facilities) to issue a Certificate of Public Convenience and Necessity ("certificate") to construct a natural gas pipeline. As described in the Commission guidance manuals, environmental documents are required to describe the purpose and commercial need for the project, the transportation rate to be charged to customers, proposed project facilities, and how the company will comply with all applicable regulatory requirements.¹ The applicants must evaluate project alternatives,

¹ Both the FERC Guidance Manual for Environmental Report Preparation (August 2002) and the Draft Guidance Manual for Environmental Report Preparation (December 2015) provide the minimum analysis required by the agency in preparing environmental documents. Neither guidance manual discusses the requirement to supplement environmental documents so the Commission must rely on NEPA guidance.

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

20170124-5016 FERC PDF (Unofficial) 1/23/2017 5:51:55 PM

CO126-1
(cont'd)

identify a preferred route, and complete a thorough environmental analysis – including consultation with appropriate regulatory agencies, data reviews, and field surveys. The Commission is required to analyze the information provided by Dominion to determine if the project is one of public convenience and necessity. The purpose of the Commission's review is to reduce overbuilding of pipeline capacity in order to protect consumers and property owners.

5. As part of its review process, the Commission prepares environmental documents, and in this case, a DEIS was prepared and released on December 30, 2016. As part of the release, the Commission provided a public comment period until April 6, 2017. Subsequently, the Commission scheduled "public comment sessions" in ten locations along the ACP route to allow for public comments.

6. On January 10, 2017, Dominion filed an additional fourteen documents supplementing its original application.² This filing of new information contains thousands of new pages of information, voluminous appendices, and attachments on environmental issues directly relevant to the DEIS.³ ATTACHMENT A to this motion briefly summarizes the contents of the new documents including, but not limited to:

- historic properties in West Virginia, Virginia, and North Carolina

² https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20170110-5142

³ On January 23, 2017, Dominion filed an additional 12 files of supplemental information and another seven files updating its visual impact assessment. Although none of these files have been reviewed by the Public Interest Groups, the filing of new information supports their legal argument the DEIS is required to be supplemented. http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170123-5110
http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170119-5180

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

20170124-5016 FERC PDF (Unofficial) 1/23/2017 5:51:55 PM

CO126-1
(cont'd)

- supplemental updates on compressor stations, metering and regulation stations, steep slopes in West Virginia and Virginia, archaeological sites, and impacts of forest fragmentation on bird species
- maps of non-jurisdictional facilities
- engineering updates on horizontal directional drilling, river crossings, and hydrofracture risk
- geological considerations in West Virginia
- cultural resources in West Virginia, including cemeteries
- restoration plans for wetlands
- considerations of soil, erosion, and steep slopes; direct impacts on forested sites in West Virginia, Virginia, and North Carolina
- impacts on streams and biotic resources
- removal and relocation of aquatic species
- correspondence with state agencies and between state and federal agencies on water quality, air quality, wildlife resources, threatened and endangered species, and mitigation

This new information clearly supplements the information in the original application, the information supplied to FERC staff for their review, and any information available to intervenors and the public.

7. As such, the Commission is required to supplement the DEIS after receiving the new filings. Rules promulgated by the Council on Environmental Quality pursuant to NEPA provide mandatory guidance to all Federal agencies on the preparation of

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

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CO126-1
(cont'd)

environmental statements. 40 C.F.R. 1502.9(c)(1)(ii) specifically addresses the obligation of the agencies to supplement to the environmental statements, stating:

(c) Agencies:

(1) **Shall** prepare supplements to either draft or final environmental impact statements if:

(i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or

(ii) **There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.**

(emphasis added). As shown above, the new filings by Dominion on January 10, 2017, are squarely within the requirements of this rule. The information is significant and directly relevant to environmental concerns and impacts addressed in the DEIS and, after review by the agency and public review, the information in the new filings is likely to have a bearing on the Commission's action.

8. The timing of Dominion's filing of the new information is suspect and appears to have been held until the agency had issued the DEIS. Most, if not all, of the information filed on January 10, 2017, has clearly been prepared earlier to its filing date and withheld from public and agency review until after the DEIS was issued. One of the relevant documents (Appendix B, HDD Design Report) was dated as early as December 14, 2016. Even giving Dominion the benefit of the doubt over the propriety of a late filing, the information in new filings is both substantive and relevant, fitting clearly under the provisions of 40 C.F.R. 1502.9(c)(1)(ii). Therefore, the public comment period on the DEIS should be held in abeyance until agency staff and the Commission review the new information and supplement the DEIS.

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

20170124-5016 FERC PDF (Unofficial) 1/23/2017 5:51:55 PM

CO126-1
(cont'd)

9. Case law on the agency's requirement to supplement an environmental document is clear. New information causes environmental documents to be supplemented, even after the environmental document has been completed and the agency action taken. In its review of one action, the Court found there "are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." *Norton v. Southern Utah Wilderness Alliance*, 542 U.S. 55 (2004) (new study of use of park lands). Of course, not all new information is significant or relevant; but the Commission is required to take a "hard look" at the new information and, after review, incorporate it into environmental documents. As discussed in *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989), "

The parties are in essential agreement concerning the standard that governs an agency's decision whether to prepare a supplemental EIS. They agree that an agency should apply a "rule of reason," and the cases they cite in support of this standard explicate this rule in the same basic terms. These cases make clear that an agency need not supplement an EIS every time new information comes to light after the EIS is finalized. To require otherwise would render agency decisionmaking intractable, always awaiting updated information only to find the new information outdated by the time a decision is made. On the other hand, and as the petitioners concede, NEPA does require that agencies take a "hard look" at the environmental effects of their planned action, even after a proposal has received initial approval.

The Court endorsed the "hard look" at new information even after a proposal had received its initial approval, and permit, from the agency. "When new information is presented, the agency is obligated to consider and evaluate it and to make a reasoned decision as to whether it shows that any proposed action will affect the environment in a significant manner not already considered." *Ibid.*, 490 U.S. at 374; also endorsed by the Court in *Arkansas Wildlife v. U.S. Army Corps*, 431 F.3d 1096 (Fed. 8th Cir., 2005).

Z-2731

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

20170124-5016 FERC PDF (Unofficial) 1/23/2017 5:51:55 PM

CO126-1
(cont'd)

10. The Public Interest Groups believe the mandate for a full analysis of the “public convenience and necessity” for pipelines involves more than responding to a professed need for capacity. The new, late-filed information from Dominion is relevant and significant, directly concerning many of the environmental issues the Commission is required to review and fully analyze. The burden is on the Commission to fully investigate the environmental risks and costs associated with the ACP, including all new and supplemental information.

RELIEF REQUESTED

The Public Interest Groups respectfully request that the Commission grant their joint motion. In this matter, the Commission must take a “hard look” at the new information, review it in the context of the application and current public comments, and then supplement the DEIS to incorporate the new information. At the same time, the Commission should rescind the DEIS and hold the public comment period in abeyance until it issues the supplemental DEIS.

ON BEHALF OF THE PUBLIC INTEREST GROUPS

/s/ John D. Runkle

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COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

ATTACHMENT A

Supplemental Filing for ACP DEIS - filed with FERC on 1/10/17
 all files accessed from: https://elibrary.ferc.gov/dms/file_list.asp?accession_num=20170110-5142

Link to doc	FERC document number	Document Name	Content
PUBLIC Cover Letter_1-10-17 Suppl info.PDF	30381	PUBLIC Appendix F Part 1, WV Structures	Historic properties in WV covered under Section 106 of the Historic Preservation Act
PUBLIC Supplemental Filing 1-10-2017.PDF	315864	Supplemental	Update on Non-jurisdictional facilities: <ul style="list-style-type: none"> • Update on compressor stations 1 and 3 • Update on Northampton office building and M&R (metering and regulation) station • Update on steep slopes in WV and VA • Archaeological sites in WV, VA and NC • Effects of forest fragmentation on bird species • North Carolina aquatic species removal plan
PUBLIC Appendix A Non-Jur Facilities.PDF	3553746	Supplemental Appendix A	Maps of non-jurisdictional facilities

1

PUBLIC Appendix B HDD Design Report.PDF	12120999	Appendix B, HDD Design Report (12/14/16)	Engineering updates: <ul style="list-style-type: none"> • HDD (Horizontal Directional Drilling) (how pipeline is installed) • Discusses pipeline crossings on rivers and highways - pipes range from 20 to 42 inches in diameter, and length - 1500 to 4700 feet horizontally. Rivers include Cape Fear, James, Tar, Pamlico • Factors that affect feasibility of HDD - p 4-5 • Area required, drilling fluid (including p 8 photo of drilling fluid problems) • Page 10 has hydrofracture risk by location (including one is high on Route 17) <ul style="list-style-type: none"> ◦ Engineering stress criteria, "pulling loads" ◦ Has stress loads by pipe diameter ◦ Risks at listed rivers • Engineering documents and maps
PUBLIC Appendix C Site Specific Geo Design.PDF	3476698	Appendix C, Revised Site Specific Geohazard Mitigation Design Drawings. 61 pp	<ul style="list-style-type: none"> • steep slopes in WV • Addresses concerns brought up by Tom Collins of the Forest Service on mountainous terrains and geography
PUBLIC Appendix F Part 1 WV Structures Add 4.PDF	8997021	Appendix F, Cultural Resources	117 pages, addresses cemeteries and other cultural resources in WV

2

Z-2733

COMPANIES/ORGANIZATIONS COMMENTS

CO126 – Public Interest Groups (representing 14 separate groups) (cont'd)

Z-2734

PUBLIC Appendix x F Part 2b VA Structures Add 4.PDF	16268172	Section 106 Review, VA only	138 pages, re historic properties in VA, only refers to North Carolina in historic accounts of settlement
PUBLIC Appendix y F Part 2b VA Structures Add 4.PDF	36181750		Addendum to above filing on VA historic properties
PUBLIC Appendix x F Part 3 NC Structures Add 3.PDF	8637095	Section 106 review in North Carolina;	84 pages, includes 10 historic dwellings in Cumberland County, NC on p. 36
PUBLIC Appendix x G Restoration and Rehab Plan.PDF	2964624	Appendix G, Restoration and Rehabilitation Plan	<ul style="list-style-type: none"> Restoration plans for sites in NC and VA; 93 pages (Updated, Rev. 4) Re: erosion, soil, steep slopes, agricultural areas, wetland restoration experts consulted list of sites in North Carolina and drainage characteristics by county
PUBLIC Appendix x H Forest Fragmentation Analysis.PDF	389979	Appendix H, Forest Fragmentation Analysis	Direct impacts on list of forested sites in WV, VA and NC
PUBLIC Appendix x I NC Aquatics	609664	Appendix I, North Carolina Fish and	letter to NC Wildlife Resources Commission requesting comments on Tier 1 and Tier 2 streams; biotic resources, including mussels;

3

Removal.PDF		Non-Fish Aquatics Collection and Relocation Protocol for Instream Construction Activities	netting and removal/relocation of fish and non-fish species
PUBLIC Appendix x J ACP Agency Correspondence.PDF	47297233	Correspondence with all agencies	306 pp. on correspondence with state agencies and communications between state agencies and federal agencies on air and water quality; wildlife resources (including specific species threatened by pipeline); mitigation
PUBLIC Appendix x K SHP Agency Correspondence.PDF	205694	PA Section 106 review	Additional historic review

4

COMPANIES/ORGANIZATIONS COMMENTS

CO127 – Friends of Nelson, Wild Virginia, and Heartwood

20170308-5213 FERC PDF (Unofficial) 3/8/2017 3:05:49 PM

UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

In the matter of:

Atlantic Coast Pipeline, LLC
Docket Nos. CP15-554-000
PF15-6-000

March 3, 2017

Dominion Transmission, Inc.
Docket Nos. CP15-555-000
PF15-5-000

Atlantic Coast Pipeline, LLC and
Piedmont Natural Gas Company
Docket No. CP15-556-000

MOTION TO RESCIND AND REVISE DEIS

CO127-1 | PURSUANT to FERC Rule 212 at 18 C.F.R. § 385.212, the National Environmental Policy Act (“NEPA”) at 42 U.S.C. § 4332, and 40 C.F.R. § 1502.9, Friends of Nelson, Wild Virginia and Heartwood with a joint motion to the Commission to rescind or revise the Draft Environmental Impact Statement (“DEIS”) for the Atlantic Coast Pipeline (“ACP”) issued on December 30, 2016 in the above captioned dockets.

MOTION

CO127-1 See responses to comments CO6-1 and CO55-19.

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COMPANIES/ORGANIZATIONS COMMENTS

CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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Pursuant to NEPA Section 102, 42 U.S.C. § 4332, and its implementing rules, specifically 40 C.F.R. § 1502.9, Friends of Nelson, Wild Virginia and Heartwood move that the Commission rescind and revise the DEIS in this matter because the DEIS is “so inadequate as to preclude meaningful analysis,” *id.*, § 1502.9(a), as demonstrated by the copious amount of crucial information that has been submitted to FERC after the release of the DEIS. The present public comment period should be placed in abeyance until a revised DEIS is issued, at which time a new public comment period should be granted.

Alternatively, Friends of Nelson, Wild Virginia and Heartwood move that the Commission issue a supplemental DEIS that fully addresses and provides the public an opportunity to comment on the significant new information that has been submitted to FERC since the release of the DEIS. Such a supplement is required where “[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.” *id.*, § 1502.9(c)(1)(ii). A new public comment period must be granted for the supplemental DEIS.

SUPPORTING FACTS AND LAW

1. Friends of Nelson is a not-for-profit membership corporation under the laws of Virginia organized to protect the property rights, property values, rural heritage and the environment for all the citizens of Nelson County, Virginia. Wild

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CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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Virginia is a non-profit organization, incorporated in the Commonwealth of Virginia, with the mission of protecting and conserving the wild and natural values of Virginia's Natural Forests. Heartwood is a non-profit organization, incorporated in the state of Indiana, with the mission of protecting national forests throughout the central and eastern United States. Friends of Nelson, Wild Virginia and Heartwood are intervenors in this proceeding pursuant to Commission Notice Granting Late Interventions, November 8, 2016. As intervenors, Friends of Nelson, Wild Virginia and Heartwood have the ability to make motions to the Commission pursuant to Commission Rule 212, 18 C.F.R. § 385.212. The interests of Friends of Nelson, Wild Virginia and Heartwood and its members will be significantly affected by the proposed ACP.

2. On September 18, 2015, the ACP, LLC filed an application under section 7(c) of the Natural Gas Act, requesting authorization to construct, own, and operate the ACP, including three compressor stations and at least 564 miles of pipeline across West Virginia, Virginia, and North Carolina. The ACP is a joint venture of Dominion Resources, Inc., Duke Energy Corporation, Piedmont Natural Gas Company, Inc. (now a wholly owned subsidiary of Duke Energy), and AGL Resources, Inc. (collectively, "Dominion").

3. On October 2, 2015, the Commission filed its Notice of Application, providing additional details about the application and outlining the review process, and opportunities for public comment.

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CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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4. The Commission has authority under NGA Section 7 (Interstate Natural Gas Pipelines and Storage Facilities) to issue a Certificate of Public Convenience and Necessity ("certificate") to construct a natural gas pipeline. As described in the Commission guidance manuals, environmental documents are required to describe the purpose and commercial need for the project, the transportation rate to be charged to customers, proposed project facilities, and how the company will comply with all applicable regulatory requirements.¹ The applicants must evaluate project alternatives, identify a preferred route, and complete a thorough environmental analysis – including consultation with appropriate regulatory agencies, data reviews, and field surveys. The Commission is required to analyze the information provided by Dominion to determine if the project serves the public convenience and necessity. The purpose of the Commission's review is to reduce overbuilding of pipeline capacity in order to protect consumers and property owners.

5. As part of its review process, the Commission prepares environmental documents, and in this case, a DEIS was prepared and released on December 30, 2016. As part of the release, the Commission provided a public comment period until April 6, 2017. Subsequently, the Commission scheduled "public

¹ Both the FERC Guidance Manual for Environmental Report Preparation (August 2002) and the Draft Guidance Manual for Environmental Report Preparation (December 2015) provide the minimum analysis required by the agency in preparing environmental documents. Neither guidance manual discusses the requirement to supplement environmental documents so the Commission must rely on NEPA guidance.

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CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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comment sessions" in ten locations along the ACP route to allow for public comments.

6. On January 11, 2017, Dominion filed an additional fourteen documents supplementing its original application.² This filing of new information contains thousands of new pages of information, voluminous appendices, and attachments on environmental issues directly relevant to the DEIS.³

ATTACHMENT A to this motion briefly summarizes the contents of the new documents including, but not limited to:

- historic properties in West Virginia, Virginia, and North Carolina;
- supplemental updates on compressor stations, metering and regulation stations, steep slopes in West Virginia and Virginia, archaeological sites, and impacts of forest fragmentation on bird species ;
- maps of non-jurisdictional facilities;
- engineering updates on horizontal directional drilling, river crossings, and hydrofracture risk;

² https://elibrary.ferc.gov/idmws/file_list.asp?accession_num=20170110-5142

³ On January 17, 2017, Dominion filed an additional 14 files of supplemental information and another seven files updating its visual impact assessment. On January 27, Dominion filed an additional 33 files of supplemental information. On February 24, Dominion filed 34 additional files of supplemental information. Although 3 of these files had been submitted previously, and 6 of these files are private filings that only agencies are able to review, none of the other were able to be reviewed at the release of the NOA and DEIS. The filing of new information requires the DEIS to be supplemented or revised and reissued.

http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170123-5110

http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170119-5180

http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170127-5202

http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170224-5149

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CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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- geological considerations in West Virginia;
- cultural resources in West Virginia, including cemeteries;
- restoration plans for wetlands;
- considerations of soil, erosion, and steep slopes; direct impacts on forested sites in West Virginia, Virginia, and North Carolina;
- impacts on streams and biotic resources;
- removal and relocation of aquatic species;
- correspondence with state agencies and between state and federal agencies on water quality, air quality, wildlife resources, threatened and endangered species, and mitigation.

This new information clearly supplements the information in the original application, the information supplied to FERC staff for their review, and the information provided to the public and other agencies in the DEIS for review under NEPA.

7. On January 17, 2017, Dominion filed an additional 12 files of supplemental information and another seven files updating its visual impact assessment.⁴ This new information clearly supplements the information in the original application, the information supplied to FERC staff for their review, and any information available to agencies, intervenors and the public.

⁴ http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170119-5180

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ATTACHMENT B to this supplemental motion briefly summarizes the contents of these newly submitted documents.

8. On January 27, 2017, Dominion filed additional 33 files of supplemental information, containing several thousand pages of information, voluminous appendices, and attachments on environmental issues directly relevant to the DEIS.⁵

ATTACHMENT C to this supplemental motion briefly summarizes the contents of this filing of new documents including, but not limited to:

- supplemental updates on compressor stations;
- steep slopes in West Virginia and Virginia;
- archaeological sites;
- draft construction, operations, and maintenance plan;
- wetland and waterbody delineation;
- migratory bird plans;
- restoration plans for wetlands;
- correspondence with state agencies and between state and federal; agencies on water quality, air quality, wildlife resources, threatened and endangered species, and mitigation.

Similar to the new information filed on January 11 and 17, 2017, this new

⁵ http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170127-5202

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CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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information clearly supplements the information in the original application, the information supplied to FERC staff for their review, and the information provided to the public and other agencies in the DEIS for review under NEPA..

9. On February 24, 2017, Dominion filed another additional 15 files of supplemental information containing hundreds of pages of information, maps and schematics on environmental issues directly relevant to the DEIS.⁶

ATTACHMENT D to this supplemental motion briefly summarizes the contents of these filings of new documents including, but not limited to:

- Wetlands crossings and crossing methods;
- Construction, operation and maintenance plans;
- Access Road Maps;
- Karst assessments and survey reports;
- Forest fragmentation analysis;
- Locally rare species;
- Myriapod/gastropod surveys;
- Study plan for Tiger Salamanders in Virginia;
- Biological survey reports;
- Archeological survey reports;
- Federal consistency information;
- Easement Terms and Conditions for Ward Burton Wildlife Foundation;

⁶ http://elibrary.FERC.gov/idmws/file_list.asp?accession_num=20170224-5149

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- Responses to the Fish and Wildlife Service;
- Agency correspondence for ACP and Supply Header projects.

Similar to the new information filed on January 11, 2017, January 17, 2017 and January 27, 2017, this new information clearly supplements the information in the original application, the information supplied to FERC staff for their review, and the information provided to the public and other agencies in the DEIS for review under NEPA..

10. Because this voluminous, newly-submitted information is critical to assessing and disclosing to the public the impacts of the proposed ACP, the Commission is required to revise and reissue the DEIS. Rules promulgated by the Council on Environmental Quality pursuant to NEPA provide mandatory guidance to all Federal agencies on the preparation of environmental statements. Pursuant to those rules, when an agency publishes a draft EIS, it “must fulfill and satisfy to the fullest extent possible the requirements established for final statements in section 102(2)(C) of the Act.” 40 C.F.R. § 1502.9(a). “If a draft statement is so inadequate as to preclude meaningful analysis, the agency *shall* prepare and circulate a revised draft of the appropriate portion.” *Id.* (emphasis added). “The agency shall make every effort to disclose and discuss at appropriate points in the draft statement all major points of view on the environmental impacts of the alternatives including the proposed action.” *Id.* The volume and importance of the environmental information that has been submitted to FERC after the release of the DEIS demonstrates that the DEIS as released

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lacked adequate information for FERC, other agencies, and the public to meaningfully analyze the impacts of the project. As such, FERC is required to rescind the DEIS, revise it, and release the revised DEIS for public comment.

11. If FERC refuses to revise and reissue the DEIS, it must at the very least issue a supplement to the DEIS that addresses the newly-submitted information and put that supplement out for public comment. 40 C.F.R. 1502.9(c)(1)(ii) specifically addresses the obligation of agencies to supplement environmental statements, stating:

(c) Agencies:

(1) **Shall** prepare supplements to either draft or final environmental impact statements if:

(i) The agency makes substantial changes in the proposed action that are relevant to environmental concerns; or

(ii) **There are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts.** (emphasis added).

As shown above, the new filings by Dominion on January 11, 17, 27 and February 24, 2017, are squarely within the requirements of this rule. The information is significant and directly relevant to environmental concerns and impacts addressed in the DEIS and, after review by the agency and public review, the information in the new filings is likely to have a bearing on the Commission's action.

12. The timing of Dominion's filing of the new information is suspect and appears to have been held until the agency had issued the DEIS. Much of the

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CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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information contained in these filings was generated and/or finalized before the issuance of the NOA and DEIS. However, all of the information in new filings is both substantive and relevant, fitting clearly under the provisions of 40 C.F.R. 1502.9(c)(1)(ii). Therefore, the public comment period on the DEIS should be held in abeyance until agency staff and the Commission review the new information and revise and reissue or, at the very least, supplement the DEIS.

13. Case law on the agency's requirement to revise an environmental document is clear. An EIS that fails to provide the public a meaningful opportunity to review and understand the agency's proposal, methodology, and analysis of potential environmental impacts violates NEPA. See e.g., *California ex rel. Lockyer v. U.S. Forest Service*, 465 F. Supp. 2d 942, 948-50 (N.D. Cal. 2006); see also *Idaho ex rel. Kempthorne v. U.S. Forest Service*, 142 F.Supp.2d 1248, 1261 (D. Idaho 2001) ("NEPA requires full disclosure of all relevant information before there is meaningful public debate and oversight.").

New information causes environmental documents to be supplemented, even after the environmental document has been completed and the agency action taken. In its review of one action, the Court found there "are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." *Norton v. Southern Utah Wilderness Alliance*, 542 U.S. 55 (2004) (new study of use of park lands). Of course, not all new information is significant or relevant; but the Commission is required to

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take a "hard look" at the new information and, after review, incorporate it into environmental documents. As discussed in *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989), "

The parties are in essential agreement concerning the standard that governs an agency's decision whether to prepare a supplemental EIS. They agree that an agency should apply a "rule of reason," and the cases they cite in support of this standard explicate this rule in the same basic terms. These cases make clear that an agency need not supplement an EIS every time new information comes to light after the EIS is finalized. To require otherwise would render agency decisionmaking intractable, always awaiting updated information only to find the new information outdated by the time a decision is made. On the other hand, and as the petitioners concede, NEPA does require that agencies take a "hard look" at the environmental effects of their planned action, even after a proposal has received initial approval.

The Court endorsed the "hard look" at new information even after a proposal had received its initial approval, and permit, from the agency. "When new information is presented, the agency is obligated to consider and evaluate it and to make a reasoned decision as to whether it shows that any proposed action will affect the environment in a significant manner not already considered." *Ibid.*, 490 U.S. at 374; also endorsed by the Court in *Arkansas Wildlife v. U.S. Army Corps*, 431 F.3d 1096 (Fed. 8th Cir., 2005).

14. Friends of Nelson, Wild Virginia and Heartwood believe that the mandate for a full analysis of the "public convenience and necessity" for pipelines involves more than responding to a professed need for capacity. The new, late-filed

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information from Dominion is relevant and significant, directly concerning many of the environmental issues the Commission is required to review and fully analyze. The burden is on the Commission to fully investigate the environmental risks and costs associated with the ACP, including all new and supplemental information.

RELIEF REQUESTED

Friends of Nelson, Wild Virginia and Heartwood respectfully request that the Commission grant their motion. In this matter, the Commission must take a "hard look" at the new information, review it in the context of the application and current public comments, and then revise the DEIS to incorporate the new information. At the same time, the Commission should rescind the DEIS and hold the public comment period in abeyance until it issues the revised DEIS. Lastly, the Commission should require Dominion to file all additional information that is vital to the NEPA environmental review before proceeding further.

Alternatively, FERC must issue a supplement to the DEIS that addresses all new information. FERC must not issue a certificate until the supplement fully incorporates all necessary information and is finalized following public notice and comment.

/s/ Ernest Reed

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Link to Document	FERC Document Number
PUBLIC_Cover Letter_1-10-17Suppl Info.PDF	30381
PUBLIC_Supplemental Filing_1-10-2017.PDF	315864
PUBLIC_Appendix A_NonJur Facilities.PDF	3553746
PUBLIC_Appendix B_HDD Design Report.PDF	12120999
PUBLIC_Appendix C_Site Specific Geo Design.PDF	3476698
PUBLIC_Appendix F Part 1_WV Structures Add4.PDF	8897021
PUBLIC_Appendix F Part 2a_VA Structures Add4.PDF	16268172
PUBLIC_Appendix F Part 2b_VA Structures Add4.PDF	36181750
PUBLIC_Appendix F Part 3_NC Structures Add3.PDF	8637095
PUBLIC_Appendix G_Restoration and Rehab Plan.PDF	2964624
PUBLIC_Appendix H_Forest Fragmentation Analysis.PDF	389979
PUBLIC_Appendix I_NC Aquatics Removal.PDF	609664
PUBLIC_Appendix J_ACP Agency Correspondence.PDF	47297233
PUBLIC_Appendix K_SHP Agency Correspondence.PDF	205894

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Document Name

Cover Letter-Supplemental Information

Supplemental Information

Appendix A - Nonjurisdictional Facilities Figures

Appendix B - HDD Design Report

Appendix C – Revised Site Specific Geohazard Mitigation Design Drawings

Appendix D – Revised Compressor Station Plot Plans (Contains Critical Energy Infrastructure Information – Do Not Release)

Appendix E – Archaeological Survey Reports (Contains Privileged Information – Do No Release)

Appendix F – Aboveground Structures Cultural Resources Survey Reports

Appendix G - Restoration and Rehabilitation Plan

Appendix H - Forest Fragmentation Analysis

Appendix I - North Carolina Fish and Non-Fish Aquatics Collection and Relocation Protocol for Instream Construction Activities

Appendix J -Correspondence for the Atlantic Coast Pipeline

Appendix K - Correspondence for the Supply Header Project

Content

Cover Letter

Allegheny Trail Reroute, HDD, USFS Steep Slope, Cultural Resource Surveys,

Pollinator Initiative, Forest Frag, NC Aquatic species removal

Compressor Station and Utilities Maps

12/14-19 HDD River and Stream Crossings and Schematics

12/22-Analysis and Mitigation

12/17-Sec 106 Cultural Resources Surveys -Cemetaries WV

1/17-Sec 106 Cultural Resources and Cemeteries VA

Sec 106 Cultural Resources references, photos and maps

12/17-Sec 106 Cultural Resources Surveys -Cemetaries NC

BMPs

NC WVA VA by county

Fish collection and relocating-NC

Correspondence, USFS, NOAA, USFW, VADEQ, VADIF, VADHR, NC Agencies

Section 106 Review-Archaeological Survey

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PUBLIC Cover Letter 1-19-17 Suppl Info.PDF	28916
PUBLIC Supplemental Filing 1-19-2017.PDF	912431
PUBLIC Appendix A Adjustment Maps.PDF	20118726
PUBLIC Appendix B Part 1 Contents.PDF	342350
PUBLIC Appendix B Part 2 AP-1 Part 1.PDF	41106769
PUBLIC Appendix B Part 3 AP-1 Part 2.PDF	34073005
PUBLIC Appendix B Part 4 AP-2 Part 1.PDF	43431240
PUBLIC Appendix B Part 5 AP-2 Part 2.PDF	36188858
PUBLIC Appendix B Part 6 AP-3.PDF	25203528
PUBLIC Appendix D Rt 58 HDD Crossing Plan.PDF	1226216
PUBLIC Appendix E Updated RR9 Tables.PDF	215208
PUBLIC Appendix F Aboveground Facility Wetlands.PDF	3320821

Document Name

Cover Letter - Supplemental Information
 Supplemental Information – January 19, 2017
 Appendix A – Minor Route Adjustment Maps
 Appendix B – Updated Alignment Sheets

Appendix C – Minor Route Adjustment Table (Contain
 Appendix D – Route 58 HDD Site-Specific Crossing Pla
 Appendix E – Updated Resource Report 9 Tables
 Appendix F – Wetland Impacts at Modified Abovegro
 ACP Landowner Lists (Contains Privileged Information

Content

Cover Letter
 Route Adjustments, project modifications, Rt58 HDD, permanent wetlands impacts
 30 route Adjustment Maps
 Alignment Sheets Contents
 Construction alignment maps and schematics.
 Construction alignment maps and schematics.
 Construction alignment maps and schematics.
 Construction alignment maps and schematics.
 Construction alignment maps and schematics.
 is Privileged Information – Do Not Release)
 Rt 58 HDD Crossing Schematics
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 Maps
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[PUBLIC Cover Letter 1-27-17 Suppl Info.PDF](#)

[PUBLIC Supplemental Filing 1-27-2017.PDF](#)

[PUBLIC Appendix A Cochrans Cave Report.PDF](#)

[PUBLIC Appendix B Karst Plan.PDF](#)

[PUBLIC Appendix C COM Plan.PDF](#)

[PUBLIC Appendix C Attachment A ROW Configurations.PDF](#)

[PUBLIC Appendix C Attachment B Alignment Sheets Pt 1.PDF](#)

[PUBLIC Appendix C Attachment B Alignment Sheets Pt 2.PDF](#)

[PUBLIC Appendix C Attachment B Alignment Sheets Pt 3.PDF](#)

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[PUBLIC Appendix C Attachment B Alignment Sheets Pt 7.PDF](#)

[PUBLIC Appendix C Attachment C Slope Stability.PDF](#)

[PUBLIC Appendix C Attachment D Winter Plan.PDF](#)

[PUBLIC Appendix C Attachment E Fire Prev.PDF](#)

[PUBLIC Appendix C Attachment F Access Road Maps.PDF](#)

[PUBLIC Appendix C Attachment G Soil Survey Pt1.PDF](#)

[PUBLIC Appendix C Attachment G Soil Survey Pt2.PDF](#)

[PUBLIC Appendix C Attachment G Soil Survey Pt3.PDF](#)

[PUBLIC Appendix C Attachment H Karst Plan.PDF](#)

[PUBLIC Appendix C Attachment I E&SC Details.PDF](#)

[PUBLIC Appendix C Attachment J Invasive Plant Table.PDF](#)

[PUBLIC Appendix C Attachment K Spill Report.PDF](#)

[PUBLIC Appendix C Attachment L GWNF Unanticip Finds Plan.PDF](#)

[PUBLIC Appendix C Attachment M MNF Unanticip Finds Plan.PDF](#)

[PUBLIC Appendix C Attachment N Permit List.PDF](#)

[PUBLIC Appendix C Attachment O ANST HDD Drawings.PDF](#)

[PUBLIC Appendix C Attachment P Contin Plan ANST and BRP.PDF](#)

[PUBLIC Appendix C Attachment Q MNF Timber Cruising Specs.PDF](#)

[PUBLIC Appendix E Migratory Bird Plan.PDF](#)

[PUBLIC Appendix H ACP Correspondence.PDF](#)

[PUBLIC Appendix J SHP Correspondence.PDF](#)

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Document Name

Cover Letter - January 27, 2017 - Supplemental Information
Supplemental Information - January 27, 2017
Appendix A - Cochran's Cave Conservation Area Investigation Update
Appendix B - Karst Terrain Assessment Construction, Monitoring,
and Mitigation Plan
Appendix C - Second Draft of the Construction, Operations, and Maintenance Plan
Attachment A - Right of Way Configurations

Attachment C - Slope Stability Policy and Procedure
Attachment D - Winter Construction Plan
Attachment E - Fire Prevention and Suppression
Attachment F - Access Road Improvement Plans
Attachment G - Soil Survey

Attachment H - Karst Terrain Assessment Construction, Monitoring and Mitigation
Attachment I - Typical Erosion & Sedimentation Control Details
Attachment J - Non Native Invasive Plant Species with Herbicide Treatment
Attachment K - Spill Report Form
Attachment L - George Washington National Forest Unanticipated Discovery Plan P
Attachment M - Monongahela National Forest Unanticipated Discovery Plan
Attachment N - Permit List
Attachment O - Appalachian National Scenic Trail HDD Plan and Profile Drawings
Attachment P - Contingency Plan for the Appalachian National Scenic Trail and the
Attachment Q - Specifications for Cruising Lumber, Marlinton Ranger District, Mo
Appendix E - Update to the Migratory Bird Plan
Appendix H - Agency Correspondence for the Atlantic Coast Pipeline
Appendix J - Agency Correspondence for the Supply Header Project – Public

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Content

Review of Contents of Submission

Update on Cochran's Cave Conservation Area, Karst Terrain Assessment, Construction, Mo
Cochrans Cave Report.

Randolph, Highland Pocahontas, Augusta and Nelson Counties

Timber Removal, Blasting, Trenching, Hydrostatic Testing, Fire, Erosion Control, Invasives, :

Previously filed with FERC on August 24, 2016

Construction Alignment Maps

Construction Alignment Maps

Construction Alignment Maps

Construction Alignment Maps

Construction Alignment Maps

Construction Alignment Maps

Construction Alignment Maps

Slope Failure, Landslides, Risk, 9/28/2016

Wetlands, waterbodies, hydrostatic testing, erosion control, Previously filed with FERC on

USFS Forest Management Standards, Previously filed with FERC on July 18, 2016

"To be provided at a later date"

Previously filed with FERC on August 2, 2016

Soil Survey Maps

June 2016 Soil Survey Sheets, Lab Results Sheets and Summary, Particle Size analysis, Soil t

Duplicate of Appendix B

Typical schematics-not site specific

Augusta, Bath, Highland, Pocahontas Counties

Previously filed with FERC on July 18, 2016 - (blank)

Cultural Resources and human remains- Previously filed with FERC on August 24, 2016

Cultural Resources and human remains- Previously filed with FERC on August 24, 2016

DOT, Floodplains (by county), Cultural Resources, Land Disturbances, Air Permit, Biological

HDD Schematics and assumed gravel, Reeds Gap, Previously filed with FERC on August 1, 2

HDD Contingency Plan and Map, Conventional Trenching and Direct Pipe, Previously filed

Trees species, evaluations, merchantability, 11/14/2016

Eagles, Migratory Birds, mitigation

USFS emails, Karst, more, USFW, WV agencies, , VGDIF-caves and karst, NC

USFW, Borland Farm, PA

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Monitoring and Mitigation Plan, Draft Biological Assessment, Migratory Bird Plan, Wetland and Wat

Spills, contamination, Water Quality, Visuals

July 18, 2016

Test sheets, July, 2016

Resources, WaterPermits, Special Use Permits
016
with FERC on August 4, 2016

Boundary Delineation, Phase II Archaeological Site Testing Reports, Mussel Species in WV Update, i

and Agency Correspondence

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COMPANIES/ORGANIZATIONS COMMENTS

CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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Link to Doc	FERC Document Number
PUBLIC Cover Letter 2-24-17 Suppl Info.PDF	30725
PUBLIC Supplemental Filing 2-24-2017.PDF	332942
PUBLIC Appendix A Karst Report Pt 1.PDF	35352713
PUBLIC Appendix A Karst Report Pt 2.PDF	47631729
PUBLIC Appendix A Karst Report Pt 3.PDF	45875029
PUBLIC Appendix B Comment Matrix COM Plan.PDF	1262509
PUBLIC Appendix C Access Road Maps Pt 1.PDF	26548534
PUBLIC Appendix C Access Road Maps Pt 2.PDF	29497328
PUBLIC Appendix C Access Road Maps Pt 3.PDF	32873981
PUBLIC Appendix C Access Road Maps Pt 4.PDF	26209456
PUBLIC Appendix D Updated Forest Frag Analysis.PDF	281684
PUBLIC Appendix G-I Tiger Salamander Study Plan.PDF	924456
PUBLIC Appendix J Fed Consistency Package Pt 1.PDF	33979939
PUBLIC Appendix J Fed Consistency Package Pt 2.PDF	34275691
PUBLIC Appendix J Fed Consistency Package Pt 3.PDF	40431482
PUBLIC Appendix J Fed Consistency Package Pt 4.PDF	45493252
PUBLIC Appendix J Fed Consistency Package Pt 5.PDF	45737377
PUBLIC Appendix J Fed Consistency Package Pt 6.PDF	40666038
PUBLIC Appendix J Fed Consistency Package Pt 7.PDF	43406810
PUBLIC Appendix J Fed Consistency Package Pt 8.PDF	42225107
PUBLIC Appendix J Fed Consistency Package Pt 9.PDF	48419703
PUBLIC Appendix J Fed Consistency Package Pt 10.PDF	48727885
PUBLIC Appendix J Fed Consistency Package Pt 11.PDF	49281276
PUBLIC Appendix L Response to FWS Letter.PDF	819370
PUBLIC Appendix M ACP Correspondence Pt 1.PDF	43727920
PUBLIC Appendix M ACP Correspondence Pt 2.PDF	19920361
PUBLIC Appendix O SHP Agency Correspondence.PDF	3910616

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COMPANIES/ORGANIZATIONS COMMENTS

CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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Document Name

Cover Letter - Supplemental Information - February 24, 2017

Supplemental Information - February 24, 2017

Appendix A - Update to the Karst Assessment and Survey Report

Appendix B – Annotated Comment Matrix for the Second Draft of the Construction, Operations, and M

Appendix C-Appendix F (Access Road Improvement Maps) of the Second Draft of the Construction, Ope

Appendix D - Revised Forest Fragmentation Analysis by County

Appendix E – Revised Locally Rare Species Report (Contains Privileged Information – Do Not Release)

Appendix F - Updated Myriapod/Gastropod Survey Report (Contains Privileged Information - Do Not Re

Appendix G-I - Study Plan for Tiger Salamander Survey in Virginia

Appendix G-II - Figure 2 of the Study Plan for the Tiger Salamander in Virginia (Contains Privileged Infor

Appendix H - Other Biological Survey Reports (Contains Privileged Information - Do Not Release)

Appendix I - Archaeological Survey Reports (Contains Privileged Information - Do Not Release)

Appendix J - Federal Consistency Information Package

Appendix 5 - Wetlands Crossed and Crossing Methods for the Atlantic Coast Pipeline Coastal Zone

Appendix K - Easement Terms and Conditions for Ward Burton Ewildlife Fopundation (Contains Privleg

Appendix L - Response to the Fish and Wildlife Service

Appendix M - Correspondence for the Atlantic Coast Pipeline

Appendix N - Agency Correspondence for the Atlantic Coast Pipeline - Privileged (Contains Privileged Inf

Appendix O - Agency Correspondence for the Supply Header Project - Public

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COMPANIES/ORGANIZATIONS COMMENTS

CO127 – Friends of Nelson, Wild Virginia, and Heartwood (cont'd)

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Content

Karst, Fragmentation Analysis, rare species, Myriapod/Gastropod Survey Report, red spruce, crayfis

USFS Comments and status

USFS lands

USFS Forest Road Access Maps

USFS Forest Road Access Maps

USFS Forest Road Access Maps

lease)

GWNF - Habitat Assessment and Trapping

mation - Do Not Release)

VA DEQ-Trenching Blasting Hydrostatic Testing Wetland sand Waterbody Crossing-Species

Waterbody data sheets and photos, includes 10/15-5/16 data

Waterbody data sheets and photos, includes 7/16-12/16 data

Wetland Determination data and photos including 12/14-10/15 data

Wetland Determination data and photos including 09/15-12/15 data

Waterbody data sheets and photos, includes 10/15-5/16 data

Wetland Determination data and photos including 07/15-8/16 data

Wetland Determination data and photos including 09/15-02/16 data

ed Information - Do Not Release)

Karst, Spineymussel, Bat Impacts, songbirds, eagle impacts, HDD crossings

Correspondence with Federal Agencies, USFS, USFW, Army Corps, Dept of Army

Includes U.S. Forest Service Coordination Meeting November 21, 2016, Powerpoint and Schematics

ormation - Do Not Release)

ih, archaeological

: including backfill and engineering and geohazard mitigation

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COMPANIES/ORGANIZATIONS COMMENTS

CO128 – Friends of the Central Shenandoah

Z-2759

UNITED STATES OF AMERICA
BEFORE THE FEDERAL ENERGY REGULATORY COMMISSION

_____)	
In the matter of:)	
Atlantic Coast Pipeline, LLC)	
Docket Nos. CP15-554-000)	
PF15-6-000)	
)	March 31, 2017
Dominion Transmission, Inc.)	
Docket Nos. CP15-555-000)	
PF15-5-000)	
)	
Atlantic Coast Pipeline, LLC and)	
Piedmont Natural Gas Company)	
Docket No. CP15-556-000)	
_____)	

MOTION TO RESCIND AND REVISE DEIS

CO128-1 | PURSUANT to FERC Rule 212 at 18 C.F.R. § 385.212, the National Environmental Policy Act (“NEPA”) at 42 U.S.C. § 4332, and 40 C.F.R. § 1502.9, Friends of the Central Shenandoah with a motion to the Commission to rescind or revise the Draft Environmental Impact Statement (“DEIS”) for the Atlantic Coast Pipeline (“ACP”) issued on December 30, 2016, in the above-captioned dockets.

CO128-1 See responses to comments CO6-1 and CO55-19.

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

MOTION

CO128-1
(cont'd)

Pursuant to NEPA Section 102, 42 U.S.C. § 4332, and its implementing rules, specifically 40 C.F.R. § 1502.9, Friends of the Central Shenandoah moves that the Commission rescind and revise the DEIS in this matter because the DEIS is "so inadequate as to preclude meaningful analysis," *id.*, § 1502.9(a), as demonstrated by the lack of information provided in order to complete a proper evaluation of the need for the project and a thorough assessment of its alternatives. A thorough assessment of the need for a project is fundamental to its evaluation. If a project does not serve a public purpose that is the most powerful factor in its approval, whatever the environmental consequences. Once the appropriate information about the need for the project is provided, the public must have an opportunity to review and comment on it. The present public comment period should be placed in abeyance until a revised DEIS is issued, at which time a new public comment period should be granted.

Alternatively, Friends of the Central Shenandoah moves that the Commission issue a supplemental DEIS that fully addresses and provides the public an opportunity to comment on the proper evaluation of the need for the project as required by NEPA. When the Commission staff provides the necessary information required by NEPA a supplement would be required because "[t]here are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." *id.*, §

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

CO128-1
(cont'd)

1502.9(c)(1)(ii). A new public comment period must be granted for the supplemental DEIS.

SUPPORTING FACTS AND LAW

1. Friends of the Central Shenandoah is an organization created to promote the best future energy system for the State of Virginia and to review how new natural gas pipelines might contribute to such a system. Friends of the Central Shenandoah is an intervenor in this proceeding as filed in a Motion to Intervene dated November 3, 2015. As an intervenor, Friends of the Central Shenandoah has the ability to make motions to the Commission pursuant to Commission Rule 212, 18 C.F.R. § 385.212. The interests of Friends of the Central Shenandoah will be significantly affected by the proposed ACP.

2. On September 18, 2015, the Atlantic Coast Pipeline, LLC (ACP), filed an application under section 7(c) of the Natural Gas Act, requesting authorization to construct, own, and operate the ACP, including three compressor stations and at least 564 miles of pipeline across West Virginia, Virginia, and North Carolina. The ACP is a joint venture of Dominion Resources, Inc., Duke Energy Corporation, Piedmont Natural Gas Company, Inc. (now a wholly-owned subsidiary of Duke Energy), and AGL Resources, Inc., a subsidiary of Southern Company (collectively, "ACP").

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

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CO128-1
(cont'd)

3. On October 2, 2015, the Commission filed its Notice of Application, providing additional details about the application and outlining the review process, and opportunities for public comment.

4. The Commission has authority under NGA Section 7 (Interstate Natural Gas Pipelines and Storage Facilities) to issue a Certificate of Public Convenience and Necessity ("certificate") to construct a natural gas pipeline. As described in the Commission guidance manuals, environmental documents are required to describe the purpose and commercial need for the project, the transportation rate to be charged to customers, proposed project facilities, and how the company will comply with all applicable regulatory requirements.¹ The applicants must evaluate project alternatives, identify a preferred route, and complete a thorough environmental analysis – including consultation with appropriate regulatory agencies, data reviews, and field surveys. The Commission is required to analyze the information provided by the ACP to determine if the project serves the public convenience and necessity. The purpose of the Commission's review is to avoid overbuilding of pipeline capacity in order to protect consumers and property owners.

5. As part of its review process, the Commission prepares environmental documents, and in this case, a Draft Environmental Impact Statement (DEIS)

¹ Both the FERC Guidance Manual for Environmental Report Preparation (August 2002) and the Draft Guidance Manual for Environmental Report Preparation (December 2015) provide the minimum analysis required by the agency in preparing environmental documents. Neither guidance manual discusses the requirement to supplement environmental documents so the Commission must rely on NEPA guidance.

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

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CO128-1
(cont'd)

was prepared and released on December 30, 2016. As part of the release, the Commission provided a public comment period until April 6, 2017. Subsequently, the Commission scheduled “public comment sessions” at ten locations along the ACP route to allow for public comments.

6. The Council on Environmental Quality has issued guidelines to federal agencies about how to prepare environmental statements for projects under their jurisdiction that will conform to NEPA requirements. In §1502.14 Alternatives including the proposed action, the NEPA guidelines state that “This section is the heart of the environmental impact statement.”² The NEPA instructions identify that the environmental impacts of the proposal and the alternatives must be presented in a comparative form, “thus sharply defining the issues and providing a clear basis for choice among options by the decisionmaker and the public.” The NEPA requirements specify that agencies preparing Environmental Impact Statements shall:³

- a. Rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated.
- b. Devote substantial treatment to each alternative, including the proposed action so that reviewers may evaluate their comparative merits.

² Department of Energy, National Environmental Policy Act Guidelines, http://energy.gov/sites/prod/files/NEPA-40CFR1500_1508.pdf

³ Ibid.

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

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CO128-1
(cont'd)

- c. Include reasonable alternatives, not within the jurisdiction of the lead agency.
- d. Include the no action alternative.
- e. Identify the agency's preferred alternative or alternatives.
- f. Include appropriate mitigation measures not already included in the proposed action or alternatives.

The DEIS claims that it was prepared in compliance with the requirements of NEPA, but that is not the case. There is no evidence of market demand included in the DEIS. Only precedence agreements with subscribers who are affiliates of the owners of the pipeline have been included. The Commission's own guidelines show that this is not an adequate indication of market demand for a project. In guidelines prepared in 1999, the Commission stated, "Rather than relying only on one test for need, the Commission will consider all relevant factors reflecting on the need for the project. These might include, but would not be limited to, precedent agreements, demand projections, potential cost savings to consumers, or a comparison of projected demand with the amount of capacity currently serving the market."⁴ In their Policy Statement issued in 2000, the Commission explained: "that as the natural gas marketplace has changed, the Commission's traditional factors for establishing the need for a project, such as

⁴ United States of America 88 FERC ¶61,227, Federal Energy Regulatory, Issued September 15, 1999

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

Z-2765

CO128-1
(cont'd)

contracts and precedent agreements, may no longer be a sufficient indicator that a project is in the public convenience and necessity.”⁵

7. We ask that the Commission follow its own directives and provide information in the DEIS that identifies demand projections, potential cost savings to consumers, and a comparison of projected demand with the amount of capacity currently serving the market, so that the public can understand the reasoning that the proposed action is considered to be in the public's interest (not just in the applicant's interest).

8. NEPA also requires that the DEIS include a discussion of reasonable related issues and alternatives not within the jurisdiction of the lead agency. The DEIS includes no mention of the higher cost to ratepayers to use new pipelines when adequate capacity is available in less expensive existing pipelines; no mention is made of the societal costs of accelerated climate change due to methane leaks along the natural gas supply chain; no mention has been made of the possibility and the existing occurrence of lower electricity demand, energy efficiency and lower cost renewables undercutting the cost of energy from new gas-fired power plants leading to stranded costs; and investments in the

⁵ Order Clarifying Statement of Policy, 90 FERC ¶ 61, 128 (2000); Certification of New Interstate Natural Gas Pipeline Facilities, Docket No. PL99-3-001, Issued February 9, 2000, p3

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

Z-2766

CO128-1
(cont'd)

accelerated development of natural gas infrastructure foreclosing investments in cleaner, lower-cost generation options. These are issues that should be considered when determining whether this project serves the public convenience and necessity and should be included in the DEIS which is a document that supports that determination.

9. Once the required information is provided, the case law on the agency's requirement to revise an environmental document is clear. An EIS that fails to provide the public a meaningful opportunity to review and understand the agency's proposal, methodology and analysis of the need for a project and its potential environmental impacts violates NEPA. See e.g., *California ex rel. Lockyer v. U.S. Forest Service*, 465 F. Supp. 2d 942, 948-50 (N.D. Cal. 2006); see also *Idaho ex rel. Kempthorne v. U.S. Forest Service*, 142 F.Supp.2d 1248, 1261 (D. Idaho 2001) ("NEPA requires full disclosure of all relevant information before there is meaningful public debate and oversight.").

New information causes environmental documents to be supplemented, even after the environmental document has been completed and the agency action taken. In its review of one action, the Court found there "are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." *Norton v. Southern Utah Wilderness Alliance*, 542 U.S. 55 (2004) (study of the use of park lands). Of course, not all new information is significant or relevant; but the Commission is required to take a "hard look" at the new information and, after review, incorporate it into

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

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CO128-1
(cont'd)

environmental documents. As discussed in *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 109 S.Ct. 1851, 104 L.Ed.2d 377 (1989), "

The parties are in essential agreement concerning the standard that governs an agency's decision whether to prepare a supplemental EIS. They agree that an agency should apply a "rule of reason," and the cases they cite in support of this standard explicate this rule in the same basic terms. These cases make clear that an agency need not supplement an EIS every time new information comes to light after the EIS is finalized. To require otherwise would render agency decisionmaking intractable, always awaiting updated information only to find the new information outdated by the time a decision is made. On the other hand, and as the petitioners concede, NEPA does require that agencies take a "hard look" at the environmental effects of their planned action, even after a proposal has received initial approval.

The Court endorsed the "hard look" at new information even after a proposal had received its initial approval, and permit, from the agency. "When new information is presented, the agency is obligated to consider and evaluate it and to make a reasoned decision as to whether it shows that any proposed action will affect the environment in a significant manner not already considered." *Ibid.*, 490 U.S. at 374; also endorsed by the Court in *Arkansas Wildlife v. U.S. Army Corps*, 431 F.3d 1096 (Fed. 8th Cir., 2005).

10. Friends of the Central Shenandoah believes that the mandate for a full analysis of the "public convenience and necessity" for pipelines involves more than a professed, but unsubstantiated, need for more pipeline capacity.

COMPANIES/ORGANIZATIONS COMMENTS

CO128 –Friends of the Central Shenandoah (cont'd)

RELIEF REQUESTED

CO128-1
(cont'd)

Friends of the Central Shenandoah respectfully requests that the Commission grants the motion. In this matter, the Commission must take a "hard look" at the new information, review it in the context of the application and current public comments, and then revise the DEIS to incorporate the new information. At the same time, the Commission should rescind the DEIS and hold the public comment period in abeyance until it issues the revised DEIS. Lastly, the Commission should require the ACP to file all additional information that is vital to the NEPA review before proceeding further.

Alternatively, FERC must issue a supplement to the DEIS that addresses all new information. FERC must not issue a certificate until the supplement fully incorporates all necessary information to justify that the project provides for the public convenience and necessity and is finalized following public notice and comment.

/s/ Thomas Hadwin

Thomas Hadwin
Friends of the Central Shenandoah
328 Walnut Avenue
Waynesboro, VA 22980
540 256-7474
tzhad13@gmail.com

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition

April 5, 2017

Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

Re: Comments on the Draft Environmental Impact Statement for the Atlantic Coast Pipeline

Docket No. CP15-554-000, CP-554-001

Dear Deputy Secretary Davis:

Please find attached my comments on the Draft Environmental Statement for the Atlantic Coast Pipeline involving geologic hazards as well as a revised compilation of major landslide events from 1949 to 2016 in the mountains of Virginia and West Virginia.

I find the DEIS to be incomplete and at times superficial in its coverage of landslide and slope stability hazards, acid producing bedrock and flooding hazards. On-site surveys are inadequate, relevant studies are overlooked and conclusions as to effective mitigation plans are not justified.

Sincerely,

Malcolm G. Cameron, Jr
Coordinator of Geohazards Analysis
Dominion Pipeline Monitoring Coalition
5653 Beards Ford Rd.
Mount Crawford, VA 22841

2 Attachments

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COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Z-2770

Docket No. CP15-554-000, CP15-554-001

Comments on ACP/ SHP DEIS by Malcolm Cameron, Coordinator of Geo-Hazards Analysis, Dominion Pipeline Monitoring Coalition, on Risks to the ACP and Environment from Landslides, Acid Producing Bedrock and Flooding Scour

Landslides and Slope Stability:

There is extensive documentation, even referred to by Dominion in their submittals, of high incidence and high probability of landslides in the mountainous region of West Virginia and Virginia through which the Atlantic Coast Pipeline (ACP) route is proposed. Since 1949 there have been over 11,000 documented landslides, mostly debris flows, during major rainfall events in just 6 of the counties along the ACP route. Along with these recent landslides, evidence on the ground of many more prehistoric landslides has been observed by USGS, Monongahela National Forest, Va. Division of Geology and Mineral Resources and others.

The USGS Historic Map MF 2329, sheet 2, shows that 4 of the USGS 7.5 minute topographic quadrangle maps in eastern West Va. and western Virginia along the ACP route have dozens to hundreds of landslides and debris flows on each map in addition to the Hurricane Camille sites of 3800 debris flows that occurred in Nelson County, Va. in 1969. Landslide mapping on a local scale is not available on the rest of the ACP route in West Va.

As noted in the DEIS, the pipeline route crosses 24.1 miles in of slopes steeper than 35 percent in West Va. and Virginia.

The U.S. Forest Service identified several landslide locations along forest roads that occurred during the severe flash flooding in June 2016. These were just a few of the hundreds of slope failures, some larger than one acre, which occurred as a result of that event which had rainfall amounts of 6 to 9 inches. With extreme rainfall events becoming more common and severe as a result of climate change, landslides in this region will become more common. An especially interesting point noted by the Forest Service was that the majority of the landslides occurred over bedrock formations not usually associated with landslides in the past. They concluded that the most significant factor in that event was the amount and intensity of rainfall.

The Virginia Division of Geology and Mineral Resources notes on their website that sites of previous landslide activity are more prone to slope failure.

CO129-1 The DEIS for the ACP does not take into account all the natural physical factors or construction specific impacts which can lead to slope failures, and the necessary and requested critical analysis for site specific hazard mitigation has not been provided by Dominion.

ACP field surveys have not been extensive enough to identify all problem soils such as silty clay soils, surface groundwater sites, bulges in colluvium and other previous slide evidence, site

CO129-1 Refer to section 4.1.4.2 for a discussion of the mitigation measures that would be utilized in steep slope areas.

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Z-2771

specific bedrock types, dip angles and fractures, and other factors critical to slope stability analysis.

More specifically regarding the DEIS:

CO129-2 - As noted on page ES-5, Dominion has not addressed the requested slope stability analysis and mitigation measures for all 10 of the high hazard locations identified on the Monongahela and George Washington National Forests by the Forest Service in their Oct. 24, 2016 letter. Only 3 sites have been addressed with the requested typical drawings, site specific designs and slope modification details. Will the remaining 7 site analyses be required prior to the Final EIS and will they be made available to the public?

CO129-3 - It is **not** clear if any slope stability analysis has been or will be done for the many miles of new or modified access roads on steep terrain. Many of these roads traverse steep side slopes, such as the new road on the west side of Little Mountain in Bath County, Va. Steep side slopes are avoided by the pipeline route due to the high risk of slope failure. These roads will cut into and steepen already steep slopes, change runoff of surface water and infiltration patterns, increase the weight of overburden on the downhill slopes and lead to differential compaction and vibration. All of these will increase the risk of slope failure.

These new and hybrid roads will impact over 75 acres of steep forested ridges, many on the national forests. Will any slope stability analysis be done on steep area access roads and will this be shared with the public?

CO129-4 - From page 4-24 it is not clear if Dominion flew any additional LiDAR surveillance of the GWNF-6 reroute on the 130 miles noted as not having LiDAR imagery available. This imagery is essential on detecting slide prone areas which may not be easily accessible for ground surveys.

- Pages 4-24 & 4-25 notes that "Natural landslides may occur during construction, operation and maintenance of the ACP and SHP", and that "...inadequately constructed.. fill slopes are a source of debris flows in mountainous terrain", referencing 5 scientific studies. Yet many steep ridgeline areas will require steepening of side slopes with fill. Several ridge sections, some over a half mile long, will require lowering the surface level up to 20 feet and the thousands of cubic yards of waste rock and soils will be placed on the side slope. Many of these slopes already exceed the 30 degree angle considered as the threshold for slope instability and will be greatly steepened by the waste materials.

One of these sites is a 0.7 mile section along the crest of Little Mountain in Bath County, Va. On the very steep east slope, just 500 feet down the slope, heavy rains in July 2015 caused a half acre rotational slip landslide which had a depth of 8 feet at the head scarp. This area had been disturbed by logging, even less of a disturbance than the proposed construction.

CO129-2 No. The remaining high hazard locations where the FS has requested site-specific designs would be submitted to, and approved by, the FS prior to construction at those locations.

CO129-3 Impacts related to slope stability and landslides, including access roads, are discussed in section 4.1.4.

CO129-4 Comment noted. LiDAR was available for all but 19.5 miles of the GWNF6 reroute.

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Z-2772

CO129-5	- <u>What is the status of the Best in Class Team analysis for all identified and suspect slope hazard areas?</u>
CO129-6	- Page 4-25: It is noted that Atlantic has not completed Phase 2 analysis on all of the locations with high and medium slope failure threat levels. <u>Will these analyses be completed prior to the Final EIS?</u>
CO129-7	- Page 4-26: Geosyntec identified 46 steep slope sites needing further analysis for slope hazard mitigation. <u>Where are these sites located and have specific mitigation plans been developed?</u>
CO129-8	- Page 4-28: FERC asks for geotechnical studies for 4 specific sites, such as SL024, etc., but the location of the sites is not identified. <u>Where are these sites located by milepost? Has this analysis been completed and has the Best in Class Team submitted detailed mitigation plans for the 7 categories of high hazard slope areas?</u>
CO129-9	- Little Valley in Bath County, Va. had at least 6 landslides in July 2015, ranging up to ½ acre in size, and several prehistoric landslides have been noted on 2 mountainsides there. (DPMC report ' The Proposed Atlantic Coast Pipeline Route through Little Valley in Bath County, Virginia, An Assessment of Landslide Risk and Slope Stability Factors', submitted to FERC on December 23, 2016) <u>Are any of the high risk slope locations identified by Geosyntec in the Little Valley area?</u>
	<p>Acid Forming Rock Formations</p> <p>- Page 4-31: The ACP passes through 9.6 miles of the Millboro Shale Formation, which has high levels of iron pyrite and can produce acid mine drainage.</p> <p>- Pages 4-31 and 4-32: The pipe coating with epoxy and cathodic protection only addresses protecting the pipe from acid leachate corrosion. This and soil separation measures noted do not address the potential serious impacts to surface and groundwater from acid leachate. In some areas, the Millboro Formation is adjacent to limestone karst areas which creates a serious potential threat to groundwater and nearby springs and wells.</p> <p>One proposed mitigation method for " backfill of the trench with acid-producing rock or soil first to a maximum of 12 inches below the surface" could make the accumulation of acid leachate worse.</p>
CO129-10	A highway fill with this Millboro shale beneath I-64 in Clifton Forge, Va. has caused a stream to be so acidic that it will not support life for ¼ mile downstream. <u>What precautions will be taken to prevent a similar situation from happening to surface or groundwater along the ACP?</u>
	<p>Flash Flooding- Channel Scour</p>

CO129-5 Data analysis for steep slope areas is ongoing and would continue into the design phase.

CO129-6 No. Analysis would continue into the design phase.

CO129-7 The steep slope sites are identified in the Geohazard Analysis Program Phase 2 Addendum Report.

CO129-8 The steep slope sites are identified in the Geohazard Analysis Program Phase 2 Addendum Report. Data analysis for steep slope areas is ongoing and would continue into the design phase. Mitigation plans for the categories of high hazard slope areas will be submitted with the E&SC Plans.

CO129-9 Yes.

CO129-10 Mitigation measures for areas with acid-producing rock are discussed in section 4.1.4.4.

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Z-2773

Page 4-29 notes that approximately 55.8 miles of the ACP will be located within the 100-year floodplain.

- This section on pages 4-29 to 4-30 does not fully address the potential impacts to the ACP from channel bed or floodplain scouring by major floods. Floods which produced scouring deep enough to expose the ACP occurred in this area in 1949, 1969, 1985, 1995, 1996 and 2016.

Rivers such as the Greenbrier, Jackson, Cowpasture, Calfpasture, Middle, South and others as well as smaller streams with steep gradients and high elevation watersheds such as Back Creek, Bolshers Run, Hamilton Draft, Ramseys Draft and others have the potential to create deep scour in both the main channels and in floodplain overflow channels where precautions are usually not taken. It is impossible to predict how flood-borne logs and debris and the resultant logjams may cause severe scouring as much as 75 feet or more away from the main channel.

Some older gas pipelines, such as the 20 inch Columbia Gas pipeline at Sawmill Run near Waynesboro, Virginia, have become exposed by channel scour and are vulnerable to further flood impacts.

CO129-11

Major stream and river crossings with a high flood scour risk need to be identified using hydraulic engineering analysis such the Army Corps of Engineers HEC-RAS software and mitigation measures must be addressed. These need to be included in the Final EIS.

CO129-11 Comment noted.

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Debris Flows, Landslides and Other Slope Failures in the Blue Ridge and Alleghenies of West Va. and Virginia from 1949 to 2016

A Compilation and Summary of Studies

Compiled by Malcolm Cameron
Revised April 4, 2017

Sources including: U.S. Geological Survey, Virginia Division of Geology and Mineral Resources,
West Va. University & others

Critical Factors Contributing to Slope Failures

1. **Excessive Rainfall:** High rates of rainfall (inches/hour) are more critical than total rainfall for the storm event. Debris flows often began during rapid increases in the rate of rainfall. The Blue Ridge area studies yielded critical rainfall rates ranging from 20mm (0.8 in.) per hour for 24 hours to 180mm (7.1 in.) per hour for 1 hour. Antecedent rainfall events, which brought the soils closer to saturation before the storms, were important factors in at least 2 localities. Rainfall data is often scattered, making detailed plots of slide concentrations vs. localized rainfall difficult. Other factors such as surface material and bedrock types and slopes yielded differing results for the same rainfall.
2. **Elevated Terrain with Steep Slopes:** Most slide events occurred near the head of higher elevation drainage hollows with concave cross sections and relatively steep(greater than 20 degree) slopes. The higher terrains were more conducive to heavier precipitation. Slopes averaged about 30 degrees, varying from 19 to 34 degrees.
3. **Supply of Susceptible Surface Material:** The bedrock type and degree of weathering are key. Certain sedimentary bedrock slopes, such as shales in Pendleton Co., W.Va. have failed in rainfall events with 300 mm.(11.8 in.) less rainfall than for similar events on the metagranitic rocks of the Virginia Blue Ridge. The depth and type of soils are a factor. Soils with high mica content and/or a higher percentage of large cobble-boulder cover from upslope sources are more susceptible to failure. Shales and intercalated thinly bedded shale and sandstones respond relatively easily to debris flow triggering. Quartzites and sandstones with a high degree of jointing were involved in a debris flow event in Buena Vista, Va. in 1995.

Z-2774

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Z-2775

4. Groundwater at or near the surface, i.e. permanent or seasonal seeps:

This impacts the pore pressure in the soils, decreasing shear strength of the soils by increasing buoyancy and capillary tension. It can also increase fracturing at the surface from repeated freeze/thaw cycles. Groundwater can lubricate the top of a buried impermeable clay layer, thus increasing the likelihood of rotational slip slope failures.

5. Bedding or Fracture Planes Parallel to the Slope Surface:

This is most likely in sedimentary and some metamorphic bedrock types. This condition can result in friction along a bedding or joint fracture plane becoming less than the force of gravity, usually when a new fracture across the slope opens up, or the base of the slope is undercut by a river or construction with removal of material or overloading the slope with too much extra weight.

Summary of Historical Events Studied

Virginia Blue Ridge

Hurricane Camille, Aug. 19-20, 1969; Nelson Co. Va.

Max. Total Rainfall: 800mm; 31.5 inches
Measured Rainfall Range: 710-800mm; 28- 31.5 in.; 25-27 in. several locations
Rate:(generally over 8 hrs.; 27/8 – nearly 3.4 in./hr.
Bedrock: metagranite and granitic gneiss
Slopes: Ave. elev. 550m. (1800ft.); 32 degree ave.
No. & Size of Debris Flows: 3793 flows; average size 2500 X 49 ft.

Thunderstorms, June 27, 1995; Madison Co., Va.

Max. Total Rainfall: 770 mm ; 30.3 in.
Measured Rainfall Range: not given, but antecedent rains, over 5 days preceding ranged from 75-170 mm ; 3-6.7 in.
Rate: 14 hr. at most severe site: 30.3/14=2.16 in./hr.
Bedrock: weathered granitic and gneissic rock
Slopes: Ave. 1140 ft. elev.; Slopes ave. 30+/- 3.7 degrees
No. & Size of Debris Flows: 629 flows;

Same Day, (June 27, 1995) different T-storm; Moorman's River area, Albemarle Co., Va.

Max Total Rainfall: 635mm (25 in. rain total)
Measured Range: 279-635 mm; 11 - 25 in.
Approx. Rate: 1.3 + in./hr.
Bedrock: metabasalt overlain by clay-rich saprolite
Slopes: 19 – 26 degrees
No. & Size of Debris Flows: 61 debris-slide scars, usually less than 300m long

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Z-2776

Thunderstorms, June 27, 1995; Buena Vista, Va. (same event as prev.)

Max. Total Rainfall: 213mm ; 8.4 in. estimate
Measured Rainfall Range: not given (Maury River had 3rd. largest flood of record since 1936)
Rate: not available
Bedrock: mainly Antietam quartzite, also conglomerate, phyllites, metasilstone
Slopes: mainly greater than 28 degrees; 50 km.2 area of steep rugged terrain
No. & Size of Debris Slides/ Flows: 53 failures, no sizes given

Allegheny Mountains; West Virginia and Virginia

1 Day Cloudburst, June 17-18, 1949; Augusta Co. Va. & Pendleton Co. W. Va., Little River (Augusta & Rockingham Co.) ; North Fork Mtn. area Pendleton Co.

Max. Total Rainfall: 400mm; 15.75 in. N. Fork Mtn.
Measured Rainfall Range: not given (4.6 in. from 2 to 8 PM, June 17 at Petersburg, WV.)
Rate: 15.75/24hr. = 0.65 in./hr. ave.
Bedrock: Tuscarora sandstone
Slopes: steep upper slopes, angles up to 26 degrees
No. of Slides/Flows: 466 total; N. Fk. Mtn. ; **largest began 160 ft. below ridge crest & traveled 2.5 km.**, narrow: 12m wide at beginning; 43m wide at base

Hurricane Camille, August 19-20, 1969; Spring Creek, Greenbrier Co. W.Va.

Max Total Rainfall: 635mm; 25 in. over approx. 58km.\2
Measured Rainfall Range:
Rate: 25/8hr. = 3.12 in./hr.
Bedrock: sedimentary
Slopes: 35degree Ave.; min.: 17deg.-timbered; 19deg. – cleared /
No. of Slides: 1584, Range: 2 m.\3 to 24,369m.\3 removed

Remnants Hurricane Juan, 3-5 Nov. 1985; North Fork Mtn., Pendleton Co. W.Va. & Highland Co. Va.

Max. Total Rainfall: 240mm.; 7.9in. in 48 hr.+; 10-15+ in. over 3 days, mostly late on Nov. 3 & during the 4th
Measured Rainfall Range: 170-240mm. 6.7-9.5 in.; 100 yr. plus flood event in Potomac and Shenandoah Basins.
Rate: 6in./hr. during intense period
Bedrock: Various sedimentary, sandstone residuum & colluvium
Slope: not given
No. & size of slides: 3000+ slides, slide flows, or slump flows, **max. 2m. deep**

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Z-2777

Hurricane Fran, September 6-7, 1996; Pendleton, Pocahontas counties, West Va. and Highland County, Va.

Max. Total Rainfall: Estimate up to 14 inches in 12 hours
Measured Rainfall Range: 6 to 11 inches, Pendleton Co. WV
Rate: 1.2 up to 2.5 inches/hr.
Bedrock: Hampshire, Juniata and Pocono mudstones and sandstones
Slopes: 28 to 37 degrees
No. of Slides: More than 3 dozen, small to moderate

Hurricane Isabel, Sept 18-19, 2003; Shenandoah Valley, VA, no counties specified

Max. Total Rainfall: 513mm; 20.2 in.
Measured Rainfall Range:
Rate: 1 day; approx. 1 to 1.8 inch/hr. ?
Bedrock: Various
Slopes: 25 to 38 degrees ?
No. & Size of Slides: 6

Thunderstorm, July, 2015; Little Valley, Bath County, Va.

Maximum Total Rainfall: 4.2 inches
Rate: 2.1 inches/hr.
Bedrock: Juniata mudstone & sandstone and Reedsville shales
Slopes: 24 to 35 degrees
No. and Size of Slides: 9 documented; up to ½ acre. Estimates of up to 10 to 15 additional slides. Depth to 8 ft. for ½ acre slide.

Thunderstorm System; June 23-24, 2016; Pocahontas, Randolph, Greenbrier, Nicolas and other Counties, West Va. and Alleghany County, Va.

Rainfall Range: 3.6 to 9.7 inches, estimates of 11 inches max. The time period was 12 hours with periods of rain from various thunderstorms.
Rate: 1.5 to 3 inches/hr.
Bedrock: Hampshire, Brallier and Mauch Chunk Fms.; Shales, mudstone and Sandstones
Slopes: 17 to 38 degrees
No. and Size of Slides: 48 slides studied in Monongahela National Forest, many more estimated there. Estimates of over 300 slides of 1/10 acre up to 1 ¼ acre

NOTE: In some locations, the National Weather Service estimated this to be a once in 1000 years event.

COMPANIES/ORGANIZATIONS COMMENTS

CO129 – Dominion Pipeline Monitoring Coalition (cont'd)

Z-2778

References

- Wieczorek, G F; Eaton, L S; Morgan, B A; Wooten, R M; Morrissey, M. 2009. *An Examination of Selected Historical Rainfall Induced Debris-Flow Events within the Central and Southern Appalachian Mountains of the Eastern U.S.*; US Geological Survey, Report Series 2009-1155
- Ritter, Dale F. 1978. Mass Movements of Slope Material, in Chapter 4; *Process Geomorphology*; Dubuque, Iowa: Wm. C. Brown Company
- David Spears, State Geologist; Matthew Heller, Geologist Manager, and Anne Carter Witt, Geologist Specialist, Va. Division of Geology & Mineral Resources. Personal communication, January 2015
- J. Steven Kite; Chair, Department of Geology & Geography, West Virginia University. Personal communication, January 2015
- L. Scott Eaton, Department of Geology, James Madison University. Personal communication, February 2015
- Cameron, Malcolm G.; *The Proposed Atlantic Coast Pipeline Route through Little Valley in Bath County, Virginia, An Assessment of Landslide Risk and Slope Stability Factors* Dominion Pipeline Monitoring Coalition, December 23, 2016
- Letter to FERC from Clyde Thompson, Monongahela National Forest; December 23, 2016, with a detailed report on landslides studied on the Forest that occurred as a result of the June 23, 2016 flood event.

LANDOWNERS COMMENTS

LO1 – Sylvester Fretwell

Sylvester Fretwell, Elkins, WV.
January 6, 2017

The Honorable Norman C. Bay
Federal Energy Regulatory Commission
888 First Street, N. E.
Washington, DC 29426

Re: Docket #CP15-554-000 (Atlantic Coast Pipeline)

Dear Chairman Bay and Commissioners:

Thank you for providing a copy of the Draft Environmental Impact Statement for the proposed Atlantic Coast Pipeline. After reading it and ACP's "Karst Monitoring and Mitigation Plan", we are left with a concern that one major problem has not been addressed. Our concern is the possibility of diversion of an existing surface stream into an underlying cave. This possibility, in our estimation, exists with a high degree of probability in the proposed crossing of the pipeline under Mingo Run in southern Randolph County, WV.

A limestone formation runs the entire north-south length of Randolph County along the west side of the Elkins Valley Anticline. The formation is 1000 to 2000 feet wide for most of its length, but expands to about a mile wide immediately south of Mingo. The formation ranges from 100 feet thick in northern Randolph County to 350 feet thick in the south. Caves dot the entire length. The pipeline is planned to cross this formation south of Mingo.

Unfortunately, Mingo Run, a tributary of the Tygart Valley River, crosses the limestone formation in the same area. At the point where the pipeline will go under Mingo Run and the adjacent Mingo Run Road, the limestone formation lies very near the surface and will probably be fractured by construction. This will set up a pathway for part or all of the flow of water in Mingo Run to be lost into the underlying Simmons-Mingo Cave.

The Simmons-Mingo Cave is the largest known cave in Randolph County. Almost 7 miles of passages have been mapped. It runs north-south with the limestone formation. There are two known entrances a short distance south of the planned pipeline Mingo Run crossing. Another cave, Simmons Pit, has an entrance between the two. There are three other smaller caves closer to the Mingo Run crossing – Simmons Cave #2, Simmons Cave #3 and Simmons Cave #4.

LO1-1

Based on dye testing information, it appears likely that the project would intercept underground conduits that could affect the flow of Mingo Run. Electric resistivity studies will be conducted to verify if conduits could be intercepted.

Z-2779

LANDOWNERS COMMENTS

LO1 – Sylvester Fretwell (cont'd)

Z-2780

LO1-1
(cont'd)

Before the Simmons-Mingo Cave connects with another large cave, My Cave, in Pocahontas County, it pirates the entire flow of two streams, Dry Branch Run and Elk River. In addition, at the known northern end close to the pipeline crossing, there is already a significant subterranean stream flowing north to south in the lowest cave segment.

These features lead us to believe that the Simmons-Mingo Cave extends further north than has been explored, into the area where the pipeline will cross Mingo Run; and that the limestone formation is so close to the surface at that point that pipeline construction will penetrate it. This could lead to Mingo Run flowing into the Simmons-Mingo Cave. This could happen immediately during construction or at some later time because of water infiltration around the pipeline.

Loss of Mingo Run would impact our farm directly, because Mingo Run is the only reliable source of water for cattle on some of our pastures. Besides, it would divert water flow from the Tygart Valley-Monongahela River basin to the Elk-Kanawha River basin, which would impact numerous farms and communities which draw water from the Tygart Valley River.

The construction plan for the ACP includes plans for some specific stream crossings and plans for karst areas. However, there is no plan which incorporates the two – a stream crossing in a karst area. This is exactly what exists at the Mingo Run crossing. Because of the potentially serious consequences of losing Mingo Run during or after construction, this crossing should be included in the ones for which a specific plan is developed before construction or, preferably, before the final environmental impact assessment.

The plan should include an electrical resistivity investigation; but this should not be considered conclusive. Core drillings should be conducted at and near the planned crossing to find a location where there is sufficient overburden above the limestone to prevent escape of Mingo Run into the underlying cave. Even if the pipeline route is relocated, steps should be employed to ensure that construction of the pipeline crossing will not penetrate or fracture the limestone formation under Mingo Run. Furthermore, flow above and below the pipeline crossing should be monitored frequently during pipeline operation to detect any loss of flow, and a response plan should be prepared to mitigate loss should it occur.

Respectfully,

Sylvester and Carol Fretwell
RR1, Box 330-3
Elkins, WV 26241
sfretwell@cebridge.net
304-637-5385

LANDOWNERS COMMENTS

LO2 – Stuart Matthews

20170106-0011 FERC PDF (Unofficial) 01/06/2017

UNITED STATES FERC
Kimberly D. BOSE, SECRETARY
FEDERAL ENERGY REGULATORY COMMISSION
888 FIRST STREET NE, ROOM 2A
WASHINGTON, DC 20426 DOCKET# CP15-554-00

DEAR SEC. BOSE : ORIGINAL DEC. 30, 2016
This project has created a nightmare for me, my brother and our extended families - This proposed gas pipeline is dissecting our homplace that has been in our family since 1886. The actual pipeline is coming within 150 feet of the main dwelling that was built prior to 1900 and renovated several times over the years. It is also right beside our family cemetery. Our children and grandchildren plan to build their homes on this land. But as parents and grandparents we cannot live with the idea of our children and grandchildren going to bed at night within the blast zone of this pipeline. Ms. BOSE we will not accept anything short of this project being removed from our land and put in a safe location. The affected parcels are 20-240, 20-241, JOHNSTON COUNTY, NORTH CAROLINA.

- STUART L. MATTHEWS

P.S. I attempted several times to e-mail this but your website would not accept it.

FILED
SECRETARY OF THE
FEDERAL ENERGY
REGULATORY COMMISSION
JAN 6 A 8:51

- LO2-1 Based on a review of recent aerial photography and the pipeline alignment sheets, the project would intersect this property where the land is agricultural and be over 100 feet from a residence. Section 4.8.4 describes the project-related impacts on and mitigation measures that would be implemented at residential areas.
- LO2-2 State laws prohibit the disturbance of buried human remains. Atlantic has committed to protecting cemeteries during project activities. A treatment plan detailing the proposed procedures to protect each cemetery must be submitted to the FERC and to the SHPO. Cemeteries are discussed throughout section 4.10.1 of the EIS.
- LO2-3 Comment noted.

Z-2781

LO2-1
LO2-2
LO2-3

LANDOWNERS COMMENTS

LO3 – Frank Perry Hill and Family

CP15-554

ORIGINAL

December 30, 2016

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington DC 20426

RE: Dominion Power and Duke Energy Pipeline
Thru Virginia and North Carolina

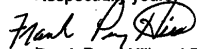
Dear Ms. Bose:

My family and I are property owners in direct line of the Dominion Power and Duke Energy proposed Pipeline announced back around 2014 to come thru our State of NC. I obtained your address recently in one of the information meetings and have been led by my heart to send this "letter of opposition" against the pipeline coming on my property. I have been researching and realizing the effects of this to my family and am devastated at the prospects of what is to come. Farmland that has been in my family for generations will be effected as well and the monetary issues this poses for my family. My understanding that now I will most likely not be able to sell this property for any value, build a home on this property for my son and his future generation, health issues, and especially now to pay taxes on property that I cannot use is **extremely unsettling**. The environmental issues and potential for catastrophe harming my family and neighbors alone is overwhelming; not to mention the harmful effects during implementation of the pipeline with harmful gases and leaks and the violation of privacy from unknown careless workers surrounding my home.

This purpose of this letter is to express to FERC that my family and I are **totally opposed to this pipeline** passing thru our Great State of North Carolina and especially opposed to the taking of our property for practically nothing monetarily with us left with the residue and bills of paying for this the rest of my life, and my grandchildren's lives, with fear of exposure to hazardous effects. I had even asked that they move the pipeline to the western end of our property instead of the middle and was told that could not happen, meaning to me that Dominion Power is uncooperative and not willing to respect my wishes and input.

I thank you for your time in reading this letter and ask that you take this into consideration while doing your job representing the citizens making this Country an amazing place to live!

Respectfully yours,



Frank Perry Hill and Family
3805 Brogden Road
Smithfield NC 27577

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SECRETARY OF THE
2017 JAN -9 P 4: 12
FEDERAL ENERGY
REGULATORY COMMISSION

LO3-1

LO3-2

LO3-3

Z-2782

LO3-1

Regarding future development of land, landowners can request that site-specific factors and/or development plans for their property be considered during easement negotiations, and that specific measures be taken into account.

Section 4.9.7 addresses property values, insurance, and property taxes.

See also the response to comment LA15-2.

LO3-2

Comment noted. See the response to comment LA15-2.

LO3-3

Comment noted.

LANDOWNERS COMMENTS

LO4 – Peggy Quarles

Peggy Quarles
1280 Inglecress Drive
Charlottesville, VA 22901

January 11, 2017

Ms. Stephanie Ridder, Chairperson
Ms. Brett Glymph, Executive Director
Virginia Outdoors Foundation
39 Garrett Street, Suite 200
Warrenton, VA 20186

Electronic Delivery

Dear Ms. Glymph and Ms. Ridder:

I am writing to you regarding the draft Environmental Impact Statement (DEIS) for the Atlantic Coast Pipeline (ACP) which FERC released for public comment on December 30, 2016 and in advance of your consideration of Atlantic's Section 1704 conversion applications on February 9, 2017. FERC addressed the crossing of 10 easements held by the Virginia Outdoor Foundation (VOF) in Section 4.8.5.2 of the DEIS found on pages 4-324 and 4-325. In the DEIS, FERC fails to acknowledge the VOF position that the pipeline would be incompatible with the conservation values of these properties and ignores the record of VOF correspondence with the Agency.

I urge you to inform FERC that these deficiencies and omissions are unacceptable and ask FERC to address fully the impacts of the pipeline on the conservation easements and VOF program. I am also asking that you reject the Section 1704 applications in February.

FERC's analysis and conclusions about the VOF easements are incorrect and contrary to VOF's stated position in several important respects.

LO4-1

1. FERC statement: *Specific to the [Scott Timberland] easement, the VOF determined that the proposed project includes all reasonable actions to minimize harm to the property and its conservation values, and that the provisions of the easement do not prohibit Atlantic from acquiring a 75 foot permanent easement.* Without explanation, FERC implies that the VOF action in regard to the Scott Timberland action is relevant to the 10 existing easements for which Atlantic has filed applications for conversion under Section 1704. The Scott Timberland easement was negotiated and accepted after the pipeline was proposed and under the assumption that the pipeline easement would be in place. This action is easily distinguished from the impacts on long-standing, existing easements.

LO4-1

The EIS does not state that the determination specific to the VOF Scott Timberland easement is relevant to other VOF easements. Each easement would be subject to review and approval by the VOF.

Z-2783

LANDOWNERS COMMENTS

LO4 – Peggy Quarles (cont'd)

Z-2784

Letter to VOF re ACP Draft EIS
January 11, 2017
Page 2

LO4-2 | 2. FERC statement: *While recreational uses of the easements would be allowed to continue throughout project operation, Atlantic and DTI are currently evaluating route variations or adjustments to avoid or minimize impacts on the remaining easements.* Does FERC really believe that the primary use and value of these lands are “recreational”? The easements in question have environmental values and provide environmental services which will be impaired by the pipeline. It is also questionable that Atlantic is still looking to adjust the route, particularly since they represented in their applications to VOF that they had fully evaluated and rejected all alternatives.

LO4-3 | 3. FERC statement: *For easements that cannot be avoided, as appropriate, Atlantic would compensate the landowner for the right-of-way easement and losses and penalties, if any, related to the conservation easement.* That Atlantic would compensate the landowners for an easement across their land is a given, whether negotiated or through eminent domain. That Atlantic would compensate specifically for “losses and penalties” related to the conservation easement is an interesting idea. Do you know what types of losses and penalties these may be? Could the anticipated penalties be federal or state tax penalties associated with the loss of the permanent easement? If so, what impact would this have on the IRS view of the VOF program and the availability of federal tax benefits for future easement holders?

What terms and level of financial compensation has Atlantic offered to landowners in advance of a VOF or FERC decision? Are you aware of excessive offers that would compromise a landowner’s interest in protecting their land?

LO4-4 | 4. FERC statement: *Atlantic is working with VOF to develop plans to minimize and mitigate construction and operation impacts of the project.* Many involved with land conservation and protection, including The Nature Conservancy and the US Forest Service, believe that the discussion of mitigation should be deferred until all attempts at avoidance are exhausted. This would include both discussions about mitigation relating to pipeline construction and operation as well as compensatory mitigation (such as the Hayfield/Rockfish Valley property offer). All mitigation discussions and decisions should await a clear indication that the pipeline is “unavoidable” – which would be when FERC, the Forest Service and other State and federal agencies have issued the required permits. In the September 6 letter to FERC, VOF asserted strongly its position that “the ACP should avoid crossing or intersection VOF open space easements.” I urge you to hold fast to this goal and defer any discussion of mitigation until the appropriate time has arrived.

LO4-5 | 5. FERC statement: *Based on a review of the regulations pertaining to VOF easements, it is believed that the project would not be precluded from establishing an easement on each VOF easement crossed.* FERC’s final paragraph about the status of the easements and VOF actions is weak and unsubstantiated. Apparently, their “review of the regulations” took precedent over multiple

LO4-2 | Section 4.8.5.2 acknowledges impacts on other factors associated with VOF easements, such as vegetation and wildlife. Also see the response to comment CO3-1.

LO4-3 | The easement agreement between Atlantic and the landowner or agency would specify compensation. This may include damage to property during construction, loss of use during construction, loss of renewable and nonrenewable or other resources, and allowable uses of the permanent right-of-way after construction. The FERC does not engage in monetary negotiations between the company and the landowner or land-managing agency.

LO4-4 | Comment noted.

LO4-5 | See the response to comment CO10-3.

LANDOWNERS COMMENTS

LO4 – Peggy Quarles (cont'd)

Z-2785

Letter to VOF re ACP Draft EIS
January 11, 2017
Page 3

LO4-5
(cont'd)

letters submitted by VOF stating that the properties could not be crossed and questioning the validity of Atlantic's proposal. A finding that the VOF easements can be crossed should not be based on FERC speculation or "belief" – it is clear what the law requires. A review of Section 1704 should have led FERC to conclude that a conversion must be in accordance with the localities' comprehensive plans and essential to the orderly growth and development of those localities. Atlantic's application does not meet these requirements. FERC is aware that VOF may deny the applications, and that this would "preclude" the crossing of the easements – at least until FERC issues a certificate and Atlantic exercises eminent domain. Since VOF has not weighed in on the Section 1704 applications, FERC appears to rely solely on Atlantic's judgement about the adequacy and legality of the offer. It is VOF's responsibility (not FERC's) to determine, at the appropriate time, whether or not an application meets their requirements.

LO4-6

6. FERC conclusion statement: *Atlantic submitted applications for each easement for minor conversions, and along with the VOF, agreed to defer VOF consideration of Atlantic's conversion applications until after publication of the draft EIS.* In this sentence, FERC all but endorses Atlantic's long winded response on November 9, 2016 to FERC's October 26, 2016 short question #66 about whether the crossing of the easements would be precluded. And FERC implies that VOF and Atlantic are working hand in hand to process the applications. In this response Atlantic describes the conversion applications as "minor". In a December 5, 2016 letter to FERC, VOF rightfully objected, noting that the impacts would impair the protected conservation values and are not minor. FERC appears to have ignored this clear statement by VOF.

LO4-7

In addition to the misguided logic and assumptions throughout FERC's discussion of the VOF easements in the Draft EIS, there is no hint of what FERC will do if VOF denies the applications. The analysis by FERC is shallow and presumes that they can bluff their way to a result which avoids confronting the impacts on the VOF program, its credibility, and its obligations to property owners who have entrusted VOF with their property. I urge you to call their bluff, deny the applications and insist that FERC conduct a thoughtful and thorough assessment of the issues at hand.

Sincerely,



Peggy Quarles

cc: FERC Docket 15-554

LO4-6

See the response to comment CO10-3.

LO4-7

See the response to comments CO3-1 and CO10-3.

LANDOWNERS COMMENTS

LO5 – Tyler Bird Paul

To: Kimberly Bose
At: FERC
From: Tyler Bird Paul, Highland County,
Virginia
Date: January 24, 2017

LO5-1

It has come to our attention, and we wish to bring it to your attention, that the Rusty Patched Bumble Bee has been added to the Endangered Species List as of January 11, 2017. You may see on the map at xerces.org that the Rusty Patched Bumble Bee habitat is in Virginia, including Bath, Augusta and Highland Counties.

According to the Endangered Species Act, nothing is allowed to “knowingly destroy their habitat.” I wish it added to the record that construction of the Atlantic Coast Pipeline will no doubt be knowingly destroying the habitat of the Rusty Patched Bumble Bee in Highland County, Bath County and Augusta County, Virginia.

<https://www.fws.gov/midwest/endangered/insects/rpbb/index.html>
<http://abnews.go.com/US/wireStory/apnewsbreak-rusty-patched-bumblebee-declared-endangered-44677209>
http://www.xerces.org/wp-content/uploads/2008/06/affinis_range.png
<https://news.virginia.edu/content/uva-researcher-smithsonian-team-find-rare-bee-feared-headed-extinction>

LO5-1

Section 4.7.1.16 provides an updated discussion of the rusty patched bumble bee, including potential impacts and avoidance, mitigation and conservation measures.

Z-2786

LANDOWNERS COMMENTS

LO6 – David Cowden

Z-2787

David Cowden, Millboro, VA.
Comments submitted to Forest Service Chief, Thomas Tidwell, ttidwell@fs.fed.us, and
Regional Foresters, Kathleen Atkinson, katkinson@fs.fed.us, and Tony Tooke,
ttooke@fs.fed.us.

Forest Service,

I would like to thank the entire Forest Service staff for being the only agency to hold Dominion accountable for many major issues surrounding the ACP that have not been sufficiently addressed or resolved, specifically karst topography, slope steepness and threats to endangered species. I am intimately aware of these issues, as I live at Fort Lewis in Bath County VA, which borders the GWNF and sits in the direct path of the ACP.

I submitted a letter March 20, 2016 (attached) which highlights some of the issues that are specific to this area. I was disheartened and disturbed to find that the Draft Environmental Impact Statement lacked analysis on two of these issues that we in this area are most concerned about - karst topography and slope steepness. There is no possible way that Dominion can fully mitigate these risks, despite their hollow claims to the contrary. I can point out a large cave (Jewel Box) that sits on Fort Lewis merely 200ft from the current alignment. I can show you the steepness of the slopes just below the cave and their vulnerability to erosion. This missing analysis is fundamental to the overall project and in my opinion renders the DEIS incomplete.

LO6-1

The Visual Impact Assessment Report lists 4 KOPs (ID #61-64) in or near Fort Lewis and GWNF, however the routing changed since these KOPs were identified and they no longer have potential views of the ACP. The VIA document simply concludes that no further analysis is necessary given that potential views no longer exist. Obviously this conclusion is irrelevant since the routing changed. The Forest Service should demand identification of new KOPs that sit within the actual path of the ACP, particularly given that Fort Lewis borders GWNF and the Southern terminus of the Shenandoah Mountain Trail.

LO6-2

LO6-1

FS response: This is not a comment for the FS. However, the final EIS states "the VDCR-DNH and the Virginia Cave Board have endorsed the revised Karst Mitigation Plan (appendix I) as comprehensive and indicate the measures included would reduce the potential risk posed by Atlantic to karst resources."

LO6-2

FS response: Section 4.8.9.1 discusses impacts on scenery viewed from the Shenandoah Mountain Trail (FST 447). Due to thick vegetation, the only section of the trail with potential views to the pipeline would be at the crossing itself. Atlantic's route runs along the trail for 200 to 225 feet. This would impact the scenery in immediate foreground and foreground with views in both directions along the right-of-way. Even with the revegetation measures in place that would create more of a transitional effect between the maintained 10-foot herbaceous cover over the pipeline toward the edge of the operational corridor with shrubs and shallow-rooted trees, the SIO at this crossing would not be met and would be considered "Low."

LANDOWNERS COMMENTS

LO6 – David Cowden (cont'd)

I do not have the power or authority to challenge FERC and Dominion on these issues, but I sincerely hope that the Forest Service will continue doing it's duty by conducting a complete and thorough review of the pending application for special use. In doing so, I believe you will find these glaring deficiencies in the analysis. In my view Dominion is trying to either skirt or outright avoid the issues because they see them as potential road blocks. This is deceitful and unacceptable.

I can only imagine the amount of pressure your team is under right now. The ACP project has introduced me to the dark side of special interest groups and has somewhat shaken my faith in government. However, the Forest Service has consistently reminded me that there are good people who are dutifully doing their jobs and protecting the lands they pledged to protect. I applaud you for that.

If it would help to assist your team in its evaluation then I would be happy to offer Fort Lewis as a property representative of other private lands that will suffer from the most damaging side effects of the ACP. If we can serve as a case study or poster child then we are more than willing to do so. We are fighting to protect the same land as you.

Regards,
David Cowden
603 Old Plantation Way
Millboro, VA 24460

Z-2788

LANDOWNERS COMMENTS

LO7 – Tyler Bird Paul

20170130-0030_FERC PDF (Unofficial) 01/30/2017

CC: NATHANIEL J. DAVIS
FERC

CP15-554

Honorable Forest Service Leadership,

ORIGINAL
FILED
SECRETARY OF THE
STATE

2017 JAN 30 P 3:13

RECEIVED
ENERGY
REGULATION DIVISION

Z-2789

LO7-1

Thank you for your service to our country. We applaud your efforts and we encourage you to take a slow, careful, thoughtful, thorough review of the Atlantic Coast Pipeline application. What will the implications be on communities, landowners? What will the whole project look like? How much mountaintop removal will there be? What are the remaining scars to our great land for all of eternity?

Above all, do not let yourselves be rushed or pushed around by the powers at Dominion. Remember, you are more powerful because you have been empowered by the public to protect the citizens, forests, water and land of our country.

LO7-1

The steep slopes and karst terrain that the ACP will barrel through are recipes for disasters, floods, erosion, destruction of forest. The Forest Service is our Commonwealth's last hold-out. The danger of landslides is very real. The utter irresponsibility of flat-topping God's green mountains is shameful.

LO7-3

Please take all the time and thought you can to imagine the horrors and protect the citizens of the state and your own families. This pipeline threatens communities, neighborhoods, puts people inside blast zones, devalues property and puts people's health at risk from contaminated groundwater. More threats include erosion, degradation of waterways and stream

1-27-2017

LO7-1

FS response: The comment is noted. The purpose of the final EIS is to identify and address issues of concern for this project, seeking to avoid, minimize, and where necessary mitigate likely negative impacts. Section 4 of the EIS discusses the environmental consequences of the proposed ACP, including those involving vegetation, geology, numerous species, water and soil issues, forest fragmentation, visual and cultural resources, air quality and noise, and reliability and safety, as well as special interest areas and socioeconomics impacts.

LO7-2

FS response: The potential effects on steep slopes and karst terrain are identified in the EIS, Section 4.1. Mitigation measures and monitoring procedures are described in the draft COM Plan (appendix G).

LO7-3

See response to comment LO7-1.

LANDOWNERS COMMENTS

LO7 – Tyler Bird Paul (cont'd)

20170130-0030 FERC PDF (Unofficial) 01/30/2017

LO7-3
(cont'd)

habitat, endangered species and the susceptibility of this region's porous karst terrain to irremediable water pollution.

Thank you for listening to your constituents. You shoulder a huge responsibility, and we appreciate your taking your time to consider the irredeemable harm this pipeline will do to our Commonwealth.

Sincerely,

Tyler Bird Paul
Highland County, Virginia, landowner

cc: FERC

27 January 2017

Tyler Bird Paul
804.857.5796
tylerbirdpaul@gmail.com

Z-2790

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul

20170202-5056 FERC PDF (Unofficial) 2/2/2017 9:09:15 AM

To: Kimberly Bose, Director of FERC

From: Tyler Bird Paul, Valley Home Farm, 2028 Valley Center Road, Valley Center, Highland County, Virginia

Date: 2 February 2017

Re: Numerous High Risk Karst features in Valley Center and Mill Gap, Highland County, Virginia

LO8-1

It is totally irresponsible of FERC to so blithely ignore the numerous high-risk karst features *identified by Dominion's own contractors* in the pipeline's path through the more densely populated neighborhoods of Valley Center and Mill Gap in Highland County, Virginia. We hate to think of the disruptions, dangers and disasters that loom ahead for our own families, our dear neighbors, and Dominion's own workers on the ground. In my mind's eye, I hear and see: Blasting, trees falling, roads caving in, sudden sinkholes sinking, unsuspected caves caving, disruption and contamination of water supplies for neighboring families and livestock, and distressing environmental impacts heretofore unimagined in this bucolic neighborhood.

I submit for the record the following article from *The Recorder* (representing Highland and Bath Counties, Virginia), dated 2 February 2017, featuring expert testimony concerning the extremely delicate karst terrain in

LO8-1

FS response: The potential effects on steep slopes and karst terrain are identified in the EIS, Section 4.1. Mitigation measures and monitoring procedures are described in the draft COM Plan (appendix G) and/or FS SUP, if issued.

Z-2791

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul (cont'd)

20170202-5056 FERC PDF (Unofficial) 2/2/2017 9:09:15 AM

LO8-1
(cont'd)

Highland County, especially in the neighborhood of Valley Center:

Expert says pipeline karst plan bogus

MONTEREY — Toothless. A “feels-good” document. Virginia Speleological Society president [Rick Lambert](#) made those assessments concerning a new karst mitigation plan Dominion released to the [Federal Energy Regulatory Commission](#) for the proposed [Atlantic Coast Pipeline](#).

Lambert blasted Dominion’s final Karst Terrain Assessment Construction, Monitoring and [Mitigation Plan](#), describing it as “a feels good document” that could only protect karst in a perfect world. The pipeline company and FERC are both apathetic when it comes to karst and landowners, he said.

“The problem is, [Highland County](#) is not in a perfect world,” he said. One example is that Dominion’s karst contractor identified 23 high-risk karst features in the pipeline’s path, in Highland County, which should have a minimum 300-foot buffer around each of them, he noted. “A cluster of these are in [Valley Center](#). The plan calls for narrowing the workspace ‘if practicable’ when these buffers are encountered. In effect, it will probably never be practicable, or it will be impossible, and they will try to squeeze between these high-risk karst features.

“There is a reason Dominion’s own contractor labeled these karst features high risk,” he continued. “Yet, Dominion seems set on a route lined with guaranteed construction problems. Sure, the plan provides the steps to be taken if a (catastrophe) happens, but at that point, the damage will have been done. Some things can’t be fixed and mitigated back to the way they were before the damage was done.

Z-2792

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul (cont'd)

20170202-5056 FERC PDF (Unofficial) 2/2/2017 9:09:15 AM

LO8-1
(cont'd)

“We are dealing with two organizations, Dominion and FERC, who don’t care. The damage done to these karst systems and families will be a line or a paragraph in a report, which no one outside of Highland County will remember. If FERC accepts this document and the route as-is, they are basically allowing Dominion to set good guidelines aside as needed and place the karst systems they are supposed to protect at risk. This plan lacks the impartiality and the teeth needed to protect karst and the families who own that karst.”

The ACP, he noted, is a large project. “On this scale, there is going to be damage to the interconnected karst environment. This is a FERC term which appeared 412 pages into the draft [Environmental Impact Statement](#). Somewhere within the FERC organization is a writer who possibly understands karst. FERC recognized this in the DEIS when it said there would be possible population impacts on cave species, adverse effects to karst, and potentially adverse effects on subterranean habitats. This is after earlier comments said the plan would be sufficient, and the ACP would not result in significant impact,” Lambert said.

“It seems that even within FERC, there is a disagreement or confusion on the issue of how much damage will be done to the karst systems crossed by the ACP. Are they only going to damage half the karst systems crossed? A quarter? What percentage is acceptable? What do they say to the affected families whose lives have been disrupted and changed? We have people who know nothing about karst making decisions about karst. They (FERC) seem to be swayed by both sides to the point they cannot make a firm assessment. As a result, FERC has asked for and received reporting procedures in the event of a karst incident. The problem is, reporting procedures aren’t going to fix an interconnected karst system (to) which Dominion has no access. Dominion and FERC need to slow down and take another look at the right of way through the karst areas and not just look for the shortest distance between two points,” he said.

“This whole issue still boils down to a conflict of values. Dominion does not value the hopes and dreams of families with small farms whose lives are going to be turned upside down by this proposed project. Dominion only values the potential of making billions of dollars with this pipeline. As a result, they are unwilling to do the right thing by adjusting this route to avoid karst and the challenges it is going to present,” Lambert said.

Z-2793

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul (cont'd)

20170202-5056 FERC PDF (Unofficial) 2/2/2017 9:09:15 AM

LO8-1
(cont'd)

[Dominion Pipeline Monitoring Coalition](#) coordinator [Rick Webb](#) agreed. “Dominion’s analysis of karst related risk is predominantly about threats to the integrity of the pipeline during and after construction,” he said. “Very little attention is given to the very significant environmental and water-supply risks. There are tools for investigating the risk, but Dominion has chosen not to use them. For example, Dominion could conduct dye-tracing studies to examine hydrologic connectivity in the karst system. This has been recommended by multiple experts. Dominion has evidently made the calculation that it would be better to accept the risk than the delay and the exposure to the liability that objective assessment would entail. FERC, for its part, is committed to its permitting schedule above all else.”

Of the 32-page plan, three pages are devoted to karst mitigation specifically, while most of the document addresses monitoring, inspection and reporting. Mitigation measures are listed as follows.

- Protect known and/or future mapped recharge areas of cave streams and other karst features by following relevant conservation standards, specifically the FERC 2013 Upland [Erosion Control](#), [Revegetation and Maintenance Plan](#), the FERC 2013 Wetland and Waterbody Construction and Mitigation Procedures, and the ACP Spill Prevention, Containment, and Control plan.
- Buffers of 300 feet around karst features in all work areas (within and off-right of way, including discharge areas) must be clearly marked in the field with signs and/ or highly visible flagging until construction related ground disturbing activities are completed. If a karst feature or its 300- foot buffer falls within the 125-foot wide workspace, the following steps should be taken: The workspace should be narrowed (if practicable) to impact as little of the buffer as possible. No spraying of insecticides or herbicides shall be allowed within the 300-foot buffer. No refueling, repair or maintenance of vehicle or equipment shall be allowed within the 300-foot buffer. Soil disturbance within the buffer (i.e. trenching) shall be performed in a manner which prevents sediment from entering the subsurface through the use of carefully designed and continuously maintained sediment and erosion control measures, and shall follow the procedures and BMPs specified in the FERC plans and procedures ... If the karst feature is located down-gradient from the area of soil disturbance, drainage shall be directed away from the karst feature and its 300-foot buffer through the use of diversion trenches, water breaks, or other engineered methods. This shall apply even if the feature itself is located outside of the 125-foot workspace, but the workspace

Z-2794

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul (cont'd)

20170202-5056 FERC PDF (Unofficial) 2/2/2017 9:09:15 AM

intercepts the 300-ft buffer. f. No activity of any kind shall be allowed within the parapet of a sinkhole or within a 25-foot buffer around the parapet, which should remain in an undisturbed, natural state. The sinkhole and the 25-foot parapet buffer should be delineated using temporary fencing.

- Earth disturbing activities will be conducted in a manner that minimizes alteration of existing grade and hydrology of existing surficial karst features. Pre-existing flow channels will be stabilized but will not otherwise be altered. Concentrated flow caused by construction activities will be dispersed with a suitable spreading or diversion technique. Surface water flow volume will be maintained at historic (or pre-development) levels as changes to the volume of surface water flow can disturb the subsurface hydrology.

- Any open-throat sinkholes and cave entrances within 300 feet of the workspace, located down-gradient from the centerline which receives drainage from the workspace will be carefully protected using silt fences, diversion trenches, constructed temporary berms around the parapet, or water breaks. If the feature receives flow via a discreet drainage channel, the channel will be equipped with absorptive boom and a double row of silt fences.

In addition, the following will be implemented in construction workspace areas:

- If a new open throat, cover-collapse sinkhole forms within the right of way or construction work space, work in that area will stop and the sinkhole will be isolated from the rest of the work area with sandbags or other suitable materials. The sinkhole will be inspected ... appropriate action taken (e.g., pipeline relocated, sinkhole remediated, etc., to ensure pipeline integrity and protection of the aquatic resource and subterranean habitat.

The preferred method for remediation will be the graded/inverted filter method ... This technique involves excavation and cleaning out collapsed, soft soils in the weakened zone to limit further soil raveling, and placing rocks or boulders large enough to bridge the bedrock conduit or “throat” at the bottom of the excavation. Progressively finer rock and gravel are then placed and compacted above the base course, above which is placed a layer of permeable geotextile fabric and soil to the final grade which is then

Z-2795

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul (cont'd)

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seeded. The advantage of this method is that it allows surface water to continue to infiltrate into the subsurface, but prevents further soil raveling (which is the root cause of cover-collapse sinkholes). The vegetated soil stratum and underlying gravel acts as a natural filter for the water infiltrating to the underlying solution enlarged conduits and fracture system.

- If a subsurface void or conduit should open or be intersected in the process of excavation and/or trenching, work in that area will stop and the void will be isolated from the rest of the work area with sandbags or other suitable materials. The void will be inspected ... and the most appropriate remedial method will be determined on a case-by-case basis. Soil voids will be backfilled using the graded filter method ... Small conduits (less than one foot in diameter) may be closed with low mobility grout and/ or flowable fill. Large conduits (greater than one foot in diameter) will require specific remedial actions (capping, void bridging, or plugging) based on the location and geometry of the conduit (i.e. whether the conduit is located at the bottom, one side, or both sides of the trench).

- If a subsurface void or conduit should open or be intersected in the process of excavation and/or trenching through which water is flowing (i.e. an underground stream) work in that area will stop, and the void will be isolated ... and the most appropriate remedial method will be determined on a case-by-case basis. All efforts will be made to ensure that the existing flow path is not interrupted by isolating the stream using trench breakers, and backfilling the location of the saturated karst feature or stream with permeable material such as well-graded stone or other material which will not interfere with the continued flow of water from one side of the trench to the other.

- In linear excavations adjacent to karst features, spoils will be placed on the upgradient side of the excavation so that if any erosion takes place, the stockpiled soil will flow back into the excavation and not down-gradient towards the karst feature.

- Surface water control measures, including, but not limited to: diversion (direct water flow into trench or off right-of-way areas past the area of concern), detention or collection and transportation, will be utilized to prevent construction-influenced surface water from free flowing into open throated surface karst features, and eventually into the subsurface.

Z-2796

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul (cont'd)

20170202-5056 FERC PDF (Unofficial) 2/2/2017 9:09:15 AM

- Open throat surface karst features will not be utilized for the disposal of water. This shall include, but not be limited to: hydrostatic test water, water from trench dewatering, or any other water generated by, or utilized in, construction activities.

Blasting will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of known or inferred subsurface karst structures. If blasting or hammering is deemed necessary then the following parameters will be adhered to:

- The excavation will be carefully inspected for any voids, openings or other telltale signs of solution activity.
- If the rock removal intercepts an open void, channel, or cave, the work in that area will be stopped until a remedial assessment can be carried out by a qualified geologist or engineer with experience in karst terrain.
- All use of explosives will be limited to low-force charges that are designed to transfer the explosive force only to the rock which is designated for removal (e.g., maximum charge of two inches per second ground acceleration).
- If the track drill used to prepare the hole(s) for the explosive charge(s) encounters a subsurface void larger than six inches within the first 10 feet of bedrock, or a group of voids totaling more than six inches within the first 10 feet of bedrock, then explosives should not be used (or) a subsurface exploration should be conducted to determine if the voids have connectivity with a deeper structure. The subsurface exploration can be carried out with track drill probes, coring drill, electrical resistivity, or other techniques capable of resolving open voids in the underlying bedrock. If a track drill or coring rig is used, then all open holes will be grouted shut after the completion of the investigation.

Horizontal Directional Drilling will not be used in karst terrain.

If authorized by the landowner, block (e.g. gate) all access roads and ROWs leading to cave entrances or open throat sinkhole structures to prevent unauthorized access.

Z-2797

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul (cont'd)

20170202-5056 FERC PDF (Unofficial) 2/2/2017 9:09:15 AM

A Spill Prevention, Control, and Countermeasures Plan has been developed for the proposed ACP/SHP which will further avoid and minimize potential impact of spills by implementing the following measures:

- Equipment refueling will not be performed within flagged or marked buffer areas of streambeds, sinkholes, fissures, or areas draining into these or other karst features, except by hand-carried cans (5 gallon maximum capacity) when necessary;
- Equipment servicing and maintenance areas will be sited outside of flagged or marked buffer areas of streambeds, sinkholes, fissures, or areas draining into these or other karst features;
- Prevent runoff resulting from construction equipment washing operations to directly enter any karst feature by locating these operations outside of the buffer area;
- Construction equipment vehicles, materials, hazardous materials, chemicals, fuels, lubricating oils, and petroleum products will not be parked, stored, or serviced within 300 feet of any karst feature;
- All equipment will be checked by a construction inspector daily for leaks prior to beginning work in karst areas; damaged or defective equipment will be removed or repaired; and if a reportable spill has impacted a karst feature: follow the SPCC Plan and call the National Response Center (800-424-8802) and the [Virginia Department of Environmental Quality](#) (800-469-8892) or the [West Virginia Department of Environmental Protection](#) (304-558-5938), as appropriate.

Hydrostatic test water will not be obtained from karst features (only free-flowing streams).

Hydrostatic testing water from new pipe installations shall not be discharged into flagged or marked buffer areas of sinkholes, fissures, or other karst features or channels or surface features that flow towards those features. Discharging of hydrostatic testing water shall be performed in the following manner (in order of priority and preference):

- Discharge hydrostatic test water down-gradient of flagged or marked buffer areas of sinkholes, fissures, or other karst features unless on-the-

Z-2798

LANDOWNERS COMMENTS

LO8 – Tyler Bird Paul (cont'd)

20170202-5056 FERC PDF (Unofficial) 2/2/2017 9:09:15 AM

ground circumstances (e.g., man-made structures, terrain, or other sensitive resources) prevent such discharge.

- If water cannot be discharged down-gradient ... discharge water into uplands greater than 300 feet from flagged or marked buffer areas of sinkholes, fissures, or other karst features unless on-the-ground circumstances (e.g. man-made structures, terrain, other sensitive resources) prevent such discharge.

- If the conditions listed ... are not practicable, discharge water as far from flagged or marked sinkholes, fissures, or other karst features as is practical and utilize additional sediment and water flow control devices to minimize effects.

Z-2799

LANDOWNERS COMMENTS

LO9 – Tyler Bird Paul

To: Kimberly Bose, Director of FEREC

From: Tyler Bird Paul, for Valley Home Farm, 2028 Valley Center Road,
Valley Center, Highland County, Virginia

Date: 4 February 2017

Re: Ensuring water supplies for several of our neighbors

LO9-1

The proposed route of the Atlantic Coast Pipeline through our family's farm at 2028 Valley Center Road and 2275 Valley Center Road, in Highland County, Virginia, threatens to cut off or contaminate water supplies to several of our neighbors' homes in Valley Center, as well as water supplies to their watering troughs for livestock. Our neighbors depend on clean mountain springs that originate on our own property. We fear that the miles of 4-foot round pipeline proposed to cut through our family farm will divert water flowing from our springs to their homes and watering troughs.

Dominion has not addressed these important issues with any of our neighbors along Routes 600 and 604. We all need to know how Dominion plans to ensure that our neighbors continue to have clean, fresh water for their homes, their families, and their livestock. This is a very serious issue, with lives of neighbors, livestock and livelihoods at stake.

Cc: Thomas J. Farrell

Cc: Mary Doswell

LO9-1 Comment noted.

Z-2800

LANDOWNERS COMMENTS

LO10 – Dawn Averitt

20170208-5010 FERC PDF (Unofficial) 2/7/2017 9:53:16 PM

Dawn Averitt
330 Grace Glen
Nellysford, VA 22958

February 1, 2017

Kimberly D. Bose
Federal Energy Regulatory Commission
888 First Street, NE - Room 1A
Washington, DC 20426

Re: Atlantic Coast Pipeline, LLC (Docket #CP15-554-000)

Dear Secretary Bose,

LO10-1 | I am writing you as a homeowner who stands to suffer significant financial and personal loss in order to enable private shareholder gain for Dominion Power, Duke Energy and Southern Gas. You see, I built a home on a beautiful piece of land in Nelson County, Virginia more than a decade ago. I lovingly designed and built the house to provide my daughters with security and an inheritance they could count on. This was particularly important to me as I have a life-threatening disease that prevents me from getting life insurance, so this land, in addition to being our home, was the best way for me to invest in their future.

We, like so many other families along the proposed route for the Atlantic Coast Pipeline, have been fighting for our property rights, our security and to protect the fragile environment unique to our region. I had high hopes that the professionals who prepared the Environmental Impact Statement (EIS) would provide a fair and impartial assessment of the impacts and challenges that a pipeline built through Nelson County will create, including safety issues. Unfortunately, that is not the case. The EIS in no way fairly delineates or accurately describes the magnitude of impact of the proposed 42" pipeline through our county. This is not simply about churning up dirt or chopping down a few trees. This is about systematically trampling on the rights of citizens, endangering the natural ecosystem, risking a contaminated water supply, obliterating cultural artifacts, eliminating tourism and agricultural jobs, stifling our communities, and putting families and homes at significant risk.

LO10-3 | Madam Secretary, do you have children? Would you, in good conscious, put your children to bed 300 feet (in the heart of the "incineration zone") from a 42" natural gas pipeline? I hope not.

LO10-4 | Would you allow them to drink from a well that pulls water out of an aquifer breached by the construction process for a fossil fuel pipeline? I doubt it.

LO10-5 | There are countless existing utility corridors and pathways for pipelines that do not require excessive environmental destruction, negative impact on community economies or damage to citizens lives. We, in the United States, are better than this. Property rights matter. Communities matter. Our kids matter.

Think, for a moment, of some place you love, someplace that you spend time with your family. Imagine someone telling you they are taking this place, which you own after buying it with your

LO10-1 | Comment noted

LO10-2 | We disagree. The EIS discloses the potential impacts on environmental resources resulting from construction and operation of the project. The EIS was prepared in accordance with NEPA, CEQ guidelines, and other applicable requirements. The EIS includes sufficient detail to enable the reader to understand and consider the issues raised by the proposed project and addresses a reasonable range of alternatives. The EIS is consistent with FERC style, formatting, and policy regarding NEPA evaluation of alternatives and different types of impacts, including cumulative impacts. Duration and significance of impacts are discussed throughout the various EIS resource sections. The EIS is comprehensive and thorough in its identification and evaluation of feasible mitigation measures to reduce those effects whenever possible. Atlantic's and DETI's construction and restoration plans contain numerous mitigation measures to avoid or reduce project-related impacts.

LO10-3 | Sections 4.12.2 and 4.12.3 of the EIS address the historic incident data for natural gas transmission pipelines, including injuries and fatalities. We acknowledge the very small potential risk associated with operation of ACP and SHP, as discussed in section 4.12.3. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation.

LO10-4 | Section 4.3 includes our analysis of impacts on wells.

LO10-5 | Comment noted.

Z-2801

LANDOWNERS COMMENTS

LO10 – Dawn Averitt (cont'd)

20170208-5010 FERC PDF (Unofficial) 2/7/2017 9:53:16 PM

hard won dollars, for a private company that wants to make a profit. Imagine that the qualities you love about this place are put at risk, for this company's sole gain. Imagine that the safety you have always felt there is gone.

Please act responsibly as our Federal Energy Regulatory Commission and answer the questions we have raised, examine the facts, and do the right thing. Require that Dominion use an existing right of way. Dominion has plenty of alternatives. We do not.

Sincerely,

Dawn Averitt

Z-2802

LANDOWNERS COMMENTS

LO11 – Paul Grove

Z-2803

LO11-1

Paul Grove, Stuarts Draft, VA.

As a future neighbor of the proposed pipeline, several questions come to mind. How many families will reside within the blast zones? How many families will reside within the evacuation zones? What is the process for the affected families to receive evacuation protocol? In the event evacuation is mandated, is the local governments responsible for funding and administering said process? What entity is responsible for compensation in the event there is damage to neighboring properties if there is a pipeline leak? Will the government represent the affected property owner or will the cost of litigation fall to each individual against corporate lawyers?

LO11-1

See the responses to comments CO67-14 and CO48-2.

LANDOWNERS COMMENTS

LO12 – Caroline Smith

Z-2804

To: Kimberly Bose
RE: Docket #CP15-554

The following was written by Caroline Smith, proprietor of the "Healing Farm" in Highland County, Virginia.

She rents her land from the [Bird Family's Valley Home Farm](#), 2028 Valley Center Road, Highland County, Virginia 24465, where the ACP pipeline route crosses 2 miles of valuable grazing land and meadows for hay production. She stands to lose a great deal, financially, should the pipeline disrupt her farming operations.

LO12-1 | I rent the Bird family farm to raise Angus cattle and have done so for many years. The land that is scheduled to be crossed by the Atlantic Coast pipeline is the most productive on the farm.

We grow all of our own hay to use over the winter. We count on making bales on the long, narrow pastures that lie beside Back Creek. One-hundred percent of this land is going to be crossed.

LO12-2 | As the pipeline crosses over the mountain from west to east, it is scheduled to cut right over Lloyd and Kim Bird's main water supply, which also provides water for the large, verdant pasture that surrounds the spring.

LO12-3 | In addition to our hay crop, we count on these protected pastures to winter our cattle. If we did not have hay production, we would have to purchase hay for our cattle. We make over 600 large round bales off Valley Home Farm. To replace them would cost between \$21,000 and \$36,000 depending on the weather for other people making hay and availability of hay to buy. I truly don't know what we would do. It would devastate us.

Depending on when the work starts and how long it lasts, we could lose a year or two of land that is the heart of Healing Farm. We call our farm that because I strongly believe that good farming heals land and protects wildlife, as well as providing a living for us.

— *Caroline B. Smith, owner*

LO12-1 As discussed in section 4.8.1.1, agricultural areas consisting of cultivated crops and pasture would experience short-term impacts such as the disruption of farming operations for the growing season during the year of construction and interruptions to irrigation systems affected by pipeline construction activities. Farmers would experience some loss of crop production in areas directly disturbed by construction-related activities. Compensation for losses resulting from construction, which may include losses of non-renewable and other resources, damages to property during construction, and restrictions on existing uses that would not be permitted on the permanent right-of-way after construction, would be determined during the easement negotiation process discussed in section 4.8.2.

Following construction, Atlantic and DETI would restore all disturbed agricultural areas associated with construction in accordance with their respective Plans, and agricultural practices for cultivated crops and pasture land within the pipeline right-of-way would be allowed to resume. Further, Atlantic and DETI would develop grazing deferment plans with willing landowners, grazing permittees, and land-managing agencies. Pasture land and grazing practices would be allowed to continue during project operation and landowners would have use of the permanent right-of-way.

LO12-2 Comment noted.

LO12-3 As discussed in section 4.8.2, pipeline operators must obtain easements from landowners and land-managing agencies to construct and operate natural gas facilities, or acquire the land on which the facilities would be located. As such, Atlantic and DETI would need to acquire long-term easements from the landowner and/or land-managing agency to construct and operate the new project facilities. These negotiations are between the landowner and/or land-managing agency and Atlantic Coast and DETI, and are not subject to review by the FERC. Landowners have the opportunity to request that site-specific factors and/or development plans for their property be considered during easement negotiations, and that specific measures be taken into account.

LANDOWNERS COMMENTS

LO13 – Victor Baum

Z-2805

LO13-1

Victor Baum, Charlottesville, VA.

The backers of the Atlantic Coast Pipeline (ACP) have made more than a few claims that stretch one's credulity and should stretch yours. I am writing to challenge one that is so blatantly outrageous that it calls into question anything they claim. I am referring to their claim that real estate values will be unaffected. I am sure others will reply and supply aggregate data, so let me tell you about our circumstances and let you decide if their claim is valid.

We have a c.1860 log home in Little Valley, Bath County, Virginia that was reconstructed in 2006 with all new infrastructure – wiring, appliances etc. It was sited specifically to take advantage of a magnificent view down a meadow and across Big Valley to the mountains beyond. It is truly wonderful. Even locals who visit remark on it. We recently built a stone patio to look out on that view. Even several people working for ACP have commented on the beauty of the view when they have come by, apparently oblivious to the fact they are among the very people working to destroy it.

The pipeline will bisect this meadow. Our house will be within 100 yards of the pipeline, well within the immolation zone in case of an accident. There will be a wide scar across the meadow and the woods on either side. An above ground valve access site will be on our property. This house was built as a weekend/vacation home. Much of our retirement savings was spent buying it. As a weekend/vacation home don't talk to me about not lowering the value of the property. I sincerely doubt we could even give it away. How can you believe these people? Please step back and do what's right. That is your obligation. Rolling over in front of big money is not doing what's right.

LO13-1 Comment noted.

LANDOWNERS COMMENTS

LO14 – Tyler Bird Paul

20170216-5051 FERC PDF (Unofficial) 2/16/2017 9:41:54 AM

To: Kimberly Bose, FERC
From: Tyler Bird Paul, Highland County Landowner
Date: 16 February 2017
RE: CP15-554
Cc: Joe Lovett, Appalmad, jlovett@appalmad.org
Cc: Thomas J. Farrell, CEO, Dominion
Cc: Greg Park, Brittany Moody, Emmett Toms
Dominion

We continue to worry about the negative impacts of the pipeline project on our property and on the historic neighborhood of Valley Center in Highland County, Virginia. The proposed pipeline route, absurdly and irresponsibly, passes through our yards and close to front doors and close to livestock watering troughs and close to neighboring houses in one of the more densely populated neighborhoods of Highland County.

The historic neighborhood actually sprang up here centuries ago specifically because of the flowing underground springs and naturally crisp, clean, abundant mountain water supply. No wells were needed here; the mountain with its delicate, intricate mountain springs are our oasis.

We in this neighborhood all depend on underground springs and delicate water-carrying limestone channels for water supplies for our families and livestock.

LO14-1 Section 4.8.3 describes the potential impacts on residences resulting from construction and operation of the project.

Sections 4.5.5 and 4.8.1.1 describe the potential impacts on agricultural land and wildlife, including livestock, resulting from construction and operation of the project.

Section 4.12.2 discloses pipeline incident data, and section 4.12.3 describes potential impacts on public safety. See also response to comment LA15-2.

LO14-2 See the response to comment SA8-144.

Z-2806

LANDOWNERS COMMENTS

LO14 – Tyler Bird Paul (cont'd)

20170216-5051 FERC PDF (Unofficial) 2/16/2017 9:41:54 AM

LO14-2
(cont'd)

Several neighbors depend on water supplies that originate on our property, right where the trench will be dug for the pipeline to be sunk. As a result, everyone downstream from the project is likely to suffer from water supplies being cut off and/or contaminated.

No hydrologic connectivity studies have been done on our property by DEQ, FERC or Dominion to address this issue.

Moreover, our neighbors – near and far -- have not been offered adequate warning or recourse from Dominion should they lose their water supplies from the pipeline cutting straight through the mountain ridge and straight through our property.

Entire livelihoods and the lives of human beings, livestock and wild animals are at stake in the historic neighborhood of Valley Center.

The Bird Family
Valley Home Farm
2028 Valley Center Road
Monterey, Virginia 24465

Z-2807

LANDOWNERS COMMENTS

LO15 – John McKinnon

20170228-0008 FERC PDF (Unofficial) 02/27/2017

CP15-554

JOHN B MCKINNON
PO BOX 571, NELLYSFORD, VA 22958

FILED
SECRETARY OF THE
COMMISSION

2017 FEB 27 P 4:43

February 17, 2017

FEDERAL ENERGY
REGULATORY COMMISSION

Atlantic Coast Pipeline, LLC (ACP)
c/o Dominion Resources, Inc.
701 E. Cary Street
Richmond, VA 23219

ORIGINAL

Dear Sir or Madam:

This letter is a follow-up to my attached letter of July 2016. I am also sending a copy to FERC (Docket # CP15 554 000).

- Z-2808
- LO15-1 | First, I want to correct an assumption you have about the part of Winery Lane, Nelson County, from 664 to the bridge over the South Fork of the Rockfish River, being a public road. One of your maps suggests that incorrect assumption. All of Winery Lane (15 lots) is owned individually by the 14 property owners, whose property lines meet at the middle of the Lane's right of way.
 - LO15-2 | In my letter of July 2016, I failed to mention that electric power lines, telephone lines, and cable internet lines are buried under Winery Lane for at least two thirds of its length. ACP's modification or use Winery Lane could easily damage these lines. Breakage could cause significant cost and inconvenience to those of us who have homes on Winery Lane.
 - LO15-3 | In my July 2016 letter, I described the problems of using our bridge across the South Fork of the Rockfish River. Before ACP's

- LO15-1 | Appendix E has been revised to identify ownership at each road.
- LO15-2 | Section 2.3.3.9 describes the construction procedures at utility crossings.
- LO15-3 | Comment noted. Conservation easements crossed by the project are described in sections 4.4.2 and 4.8.5.

LANDOWNERS COMMENTS

LO15 – John McKinnon (cont'd)

20170228-0008 FERC PDF (Unofficial) 02/27/2017

LO15-3
(cont'd)

heavy equipment uses the low-water ford or builds a new bridge across the River there would have to be a study of the impact on the fish, wildlife and cattle that may use the River.

LO15-4

The State of Virginia, through VDOT, owns a conservation easement on our property along the west bank of the River from the middle of the bridge downstream for at least ½ a mile. This includes the area of the low-water ford. The easement prohibits any changes to the River bank including cutting trees. VDOT has similar easements all along the River's banks.

LO15-5

The 14 landowners of the 15 lots who individually own the one half of Winery Lane that borders their property have committed that individually they will not give ACP permission to use, or sell their share(s) of Winery Lane to ACP unless required by ACP's exercising eminent domain. The value we would expect for ACP's use or ownership of each of our sections of Winery Lane would not just be the land value of the road but the decrease in the value of each of our total land and homes. The value would include the inconvenience or reduced use of land and homes caused by ACP's use of the road. Also, included would be the reduction in value from the pipeline installation and existence at end of the Winery Lane. The cidery on one of the lots has already lost at 2017 wedding event because of the possible pipeline.

For your information, my wife and I own two lots and a home with 7 buildings.

Yours truly,


John B. McKinnon

CC: Cheryl LaFeur, FERC (#CP15 554 000)

Greg Park, Construction Manager,

Ramona Kanouff, Manager of Land Lease and Right of Way

LO15-4

Section 4.8.5.2 discusses conservation easements in Virginia affected by construction and operation of the project.

LO15-5

See the response to comment LO12-3.

Z-2809

LANDOWNERS COMMENTS

LO15 – John McKinnon (cont'd)

20170228-0009 FERC PDF (Unofficial) 02/27/2017

CP15-554
JULY, 2016
Feb 27, 2017

JOHN B. MCKINNON
PO 571 NELLYSFORD, VA 22958
(336 926 2055)

ORIGINAL

Atlantic Coast Pipeline, LLC
Greg Park, Construction Manager, ACP
Ramona Kanouff, Manager Land lease and Right of Way, ACP
Jamie Burton, Doyle Land Services

Dear Madam or Sir:

Atlantic Coast Pipeline (ACP) Previously received a letter (copy attached) from the Mill Hill Homeowners Association denying permission to ACP or it representatives to use Winery Lane in Nelson County for any purpose.

This letter is to inform ACP, its employees and contractors, that as a landowner on Winery Lane my land and the property of other Mill Hill landowners are now clearly marked with No Trespassing signs. There are 15 lots in Mill Hill Properties. Winery Lane is a boundary line of each lot. One of my two lots crosses Winery Lane. Any employees or contractors of ACP or Dominion Power on my land or other posted Mill Hill land without written permission by the landowner will be prosecuted for trespassing. At this time, I do not plan to give permission.

My information on why ACP wants to access to Winery Lane and has asked for permission to survey, that were denied by two Mill Hill landowners, is all second hand. Below are some of the reasons I believe using Winery Lane or any Mill Hill property for laying a gas pipeline would be difficult, expensive, disruptive and even dangerous:

1. Winery Lane is a 1.8 mile long, dead end, road owned by adjoining property owners and maintained by the Mill Hill Homeowners Association. It is the only access road to 12 of the 15 lots and to 5 homes. It ends on Mill Hill Properties where Dominion/ACP has shown on maps it would lay its pipeline. Making Winery Lane usable for construction type equipment and

Z-2810

LANDOWNERS COMMENTS

LO15 – John McKinnon (cont'd)

20170228-0009 FERC PDF (Unofficial) 02/27/2017

using it for access to lay the pipeline would severely interfere with owners' access to their land and homes.

2. The first third of Winery Lane, going north from Rt. 664 to the South Fork of the Rockfish River, is relatively flat and 25-30 feet wide. Crossing the River is a single lane bridge owned and maintained by the Mill Hill Homeowners Association. A sign shows the bridge usage is limited to vehicles weighing 8000 pounds or less. Some construction equipment could not use the bridge because of weight or width.
3. About 100 yards east of the bridge is a low water ford across the River. It is used by overweight vehicles. In rainy season the water gets too high for overweight vehicles to cross the River.
4. The second third of Winery Lane, north of the bridge, is 20 to 25 feet wide and begins to climb. Expanding the width of this section could damage fences and driveways of property owners, including mine.
5. The last third of Winery Lane climbs in altitude about 1000 feet. It is very winding and narrow. In places, it is only 12 feet wide. It would likely be impossible for large equipment or vehicles to use this part of Winery Lane. Much of this section has a steep drop off on one side (mostly left or west side) and mountain, with rock outcropping, on the other side. Widening this section would be difficult, expensive and damaging to the land and property values.
6. The final issue is less tangible than the others. It has to do with the Purpose of Mill Hill Properties as defined in Section 1. of the Protective Covenants that are part of each of our deeds. "The purpose--- is to establish a subdivision of residential homesites for family living in a protected rural environment." "The covenants are to protect and promote privacy, property value, a peaceful lifestyle and an environment of harmony among the proposed homesites and the present forest and river ecosystem." The extended use of Winery Lane for access to lay the pipeline and laying the of the pipeline on Mill Hill Properties land could easily ruin the Purpose planned for the subdivision. This would significantly reduce the enjoyment and value of each of the owners' property.

Yours truly,


John B. McKinnon

Cc: Kimberly Bose, FERC

Z-2811

LANDOWNERS COMMENTS

LO16 – Georgian M and Lyle C Hull

CP15-554

Mr. Boe,

ORIGINAL

- LO16-1 | **I do not support an unnecessary pipeline that will inevitably increase electric bills. Why destroy homes, farms, water quality,**
 - LO16-2 | **and forest land for an expensive pipeline that benefits private stockholders and not rate payers?**
- The Department of Energy stated in 2015 that Virginia citizens do not need additional pipelines.

Sincerely,

Georgian M. Hull
Lyle C. Hull

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 SECRETARY OF THE
 COMMISSION
 2011 FEB 21 P 4:46
 REGULATION COMMISSION

- LO16-1 | See the response to comment CO85-7.
- LO16-2 | The Commission's goal is to give appropriate consideration to the enhancement of competitive transportation alternatives, the possibility of overbuilding, subsidization by existing customers, the applicant's responsibility for unsubscribed capacity, avoiding the unnecessary exercise of eminent domain, and disruptions of the environment. See also response to comment CO46-1.
- LO16-3 | Comment noted.
- LO16-4 | Comment noted.
- LO16-5 | Comment noted. The EIS discloses the potential impacts on environmental resources resulting from construction and operation of the project.

Z-2812

THE TRUTH: The Atlantic Coast Pipeline has NEVER Been Needed.

- LO16-3 | **FACT:** Several of the existing pipelines in the Transco corridor are available to bring natural gas from the Marcellus fields to Virginia and the Carolinas. **A 2015 report by the Department of Energy states that adequate capacity exists in the existing pipeline system to serve Virginia.** The ACP is not needed for Virginians.
- LO16-4 | **FACT:** The cost of transporting natural gas in the new ACP will run as much as 3 times more than the cost of transporting gas in the Transco pipeline. That cost will, in turn, be added to our utility bills as part of the fuel adjustment charge. This added charge could increase the **cost of electricity by hundreds of millions of dollars** per year for Dominion customers.
- LO16-6 | **FACT:** The proposed ACP will provide few, if any, permanent local jobs. Pipeline construction workers are hired from highly-specialized professional unions, not from local communities. **When completed, the pipeline will provide only 39 permanent jobs for the entire state.** Sensors, monitors, and other technologies will make a human work force unnecessary. Compare that meager gain to the number of homes and properties that will be permanently condemned in order to build a pipeline. Property owners will be compensated poorly for their losses.
- LO16-6 | **FACT:** The ACP is welcomed by Dominion's shareholders and officers **who will reap astronomical profits while increasing utility rates for millions of paying customers.** It will compromise water quality all over the region, condemn private property, ruin working farms, and fragment our national forest. Citizens will then be left with higher property taxes to make up for lower property values along the ACP route.

LANDOWNERS COMMENTS

LO17 – Peggy Quarles

20170302-5055 FERC PDF (Unofficial) 3/2/2017 8:40:47 AM

Peggy Quarles
1280 Inglecress Drive
Charlottesville, VA 22901

March 2, 2017

Cheryl LaFleur, Acting Chairman
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

ATTN: Atlantic Coast Pipeline Comments
FERC Docket 15-554

Dear Ms. LaFleur:

We are writing to submit and to bring your attention to a document that Dominion submitted via email to the US Forest Service on December 12, 2016. Kathryn Parker received this document from the US Forest Service in response to a Freedom of Information Act request.

In this document Dominion proposes to the Forest Service an accelerated schedule for USFS reviews of the Atlantic Coast Pipeline. The US Forest Service has not publicly responded to this proposal, except by submitting the November 18 letter to FERC to the FERC Docket on December 13, 2016.

LO17-1

Dominion's proposal has numerous weaknesses.

- (1) Assumption that Final EIS will satisfy USFS NEPA Requirements. Based on the poor quality and incompleteness of the draft EIS, it is far from clear that FERC will release a Final EIS of the breadth and quality necessary to meet Forest Service standards.
- (2) Adequacy of Public Comment. Submissions from Dominion or others after December 30, 2016 are not reflected in the draft EIS and to the extent they are used in the Final EIS have not been subject to public comment.
- (3) Assumption that USFS will use Dominion's third party contractor. This would be inconsistent with Forest Service practice for the ACP and other pipeline applications. Given the quality of the draft EIS and the Forest Service's dedication to conducting thorough review and analysis to date, it would be surprising if the Forest Service elects to rely on this expertise.

LO17-1

FS response: Since the draft EIS, the FS has received additional information and analyses that the agency has requested. The FS will use the objection process for the administrative review of its draft decision for the plan amendments and the authorization. The FS expects to issue a draft ROD at the time the final EIS is issued, and release of this draft ROD will begin the 45-day objection period. The final ROD will not be issued until objections received during the objection period are resolved. The draft ROD will address resource issues and mitigation measures.

Z-2813

LANDOWNERS COMMENTS

LO17 – Peggy Quarles (cont'd)

20170302-5055 FERC PDF (Unofficial) 3/2/2017 8:40:47 AM

Letter to FERC
February 27, 2017
Page 2

LO17-1
(cont'd)

- (4) Assumption that USFS can forego 30-day waiting period between Final EIS and Final Decision. It is not clear that NEPA requirements in 40 CFR § 1506.10 (b) apply to the FERC/FS decision making that will occur, as Dominion claims. Under 36 CFR § 219.59 the Forest Service can elect to waive their objection process and adopt the administrative review process of another agency, but this was clearly NOT done at the time that was appropriate. In fact, FERC made it clear in the announcement of the draft EIS schedule that the Forest Service would use their own objection process.
- (5) Assumption that Objection Process can be initiated for a "draft" decision. A draft is a draft. There are many outstanding issues about impacts and mitigation that could change the FERC Certificate or USFS Record of Decision.

It is presumptuous of Dominion to ask or expect the Forest Service to accelerate its timeline as a convenience to Dominion. In other filings, the USFS has made it clear that the review process will require that all essential information has been received and has been determined to support the application adequately. Dominion has not yet submitted adequate information relating to steep slopes, slippage potential and sedimentation. To presume that the Forest Service will approve the application is a significant assumption. To request an expedited review, as a convenience to Dominion and contrary to Forest Service's regulatory process, is perilous and unacceptable.

Sincerely,



Peggy Quarles
And for Kathryn Parker

cc: Clyde Thompson, Supervisor, Monongahela National Forest
Joby Timm, Supervisor, George Washington and Jefferson National Forests
Jennifer Adams, US Forest Service
Kevin Bowman, FERC

Z-2814

LANDOWNERS COMMENTS

LO17 – Peggy Quarles (cont'd)

20170302-5055 FERC PDF (Unofficial) 3/2/2017 8:40:47 AM



United States
Department of
Agriculture

Forest
Service

Monongahela National Forest

200 Sycamore Street
Elkins, WV 26241
304-636-1800

File Code: 6270
Case Number: 2017-FS-R9-02139-F
Date: February 16, 2017

Kathryn Parker
433 Edam Drive
Charlottesville, VA 22903

Dear Ms. Parker:

Enclosed is the final response to your FOIA request sent via email to the Monongahela and George Washington National Forests on February 12, 2017, and received on February 13, 2017 regarding the Atlantic Coast Pipeline project. Specifically, you requested the following from the Monongahela National Forest and George Washington National Forest "a copy of the proposed timeline emailed to Jennifer Adams and Clyde Thompson by Dominion Resources regarding the Atlantic Coast Pipeline."

Enclosed in entirety is the schedule for the Atlantic Coast Pipeline [3 pages] prepared by Dominion and sent via email to Jennifer Adams and Clyde Thompson on December 12, 2016. This document is Dominion's perspective and may not accurately reflect Forest Service regulations and directives.

Pursuant to 7 C.F.R. Subtitle A, Part 1, Subpart A, Appendix A, there is no charge for the records enclosed as the amount falls below the minimum amount required for the Forest Service to collect fees.

I believe this fully satisfies your FOIA request. Your FOIA request has been processed in accordance with the rules and regulations of the FOIA, 5 U.S.C. 522(b) and the Privacy Act (PA), 5 U.S.C. 522(a). If you have any questions, please contact Karen Stevens at 304-636-1800 x 233.

Sincerely,

CLYDE THOMPSON
Forest Supervisor

Enclosure



Caring for the Land and Serving People

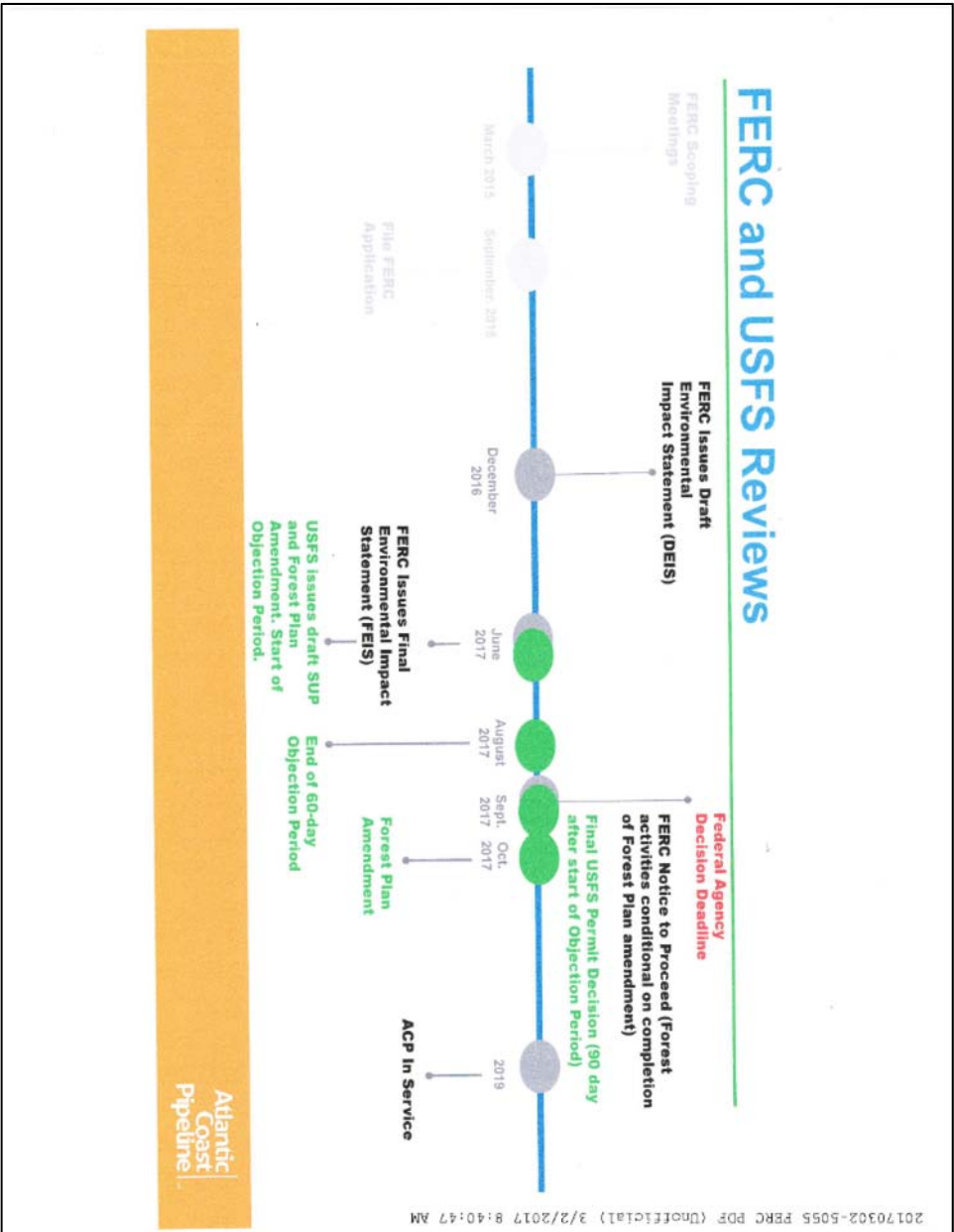
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Z-2815

LANDOWNERS COMMENTS

LO17 – Peggy Quarles (cont'd)

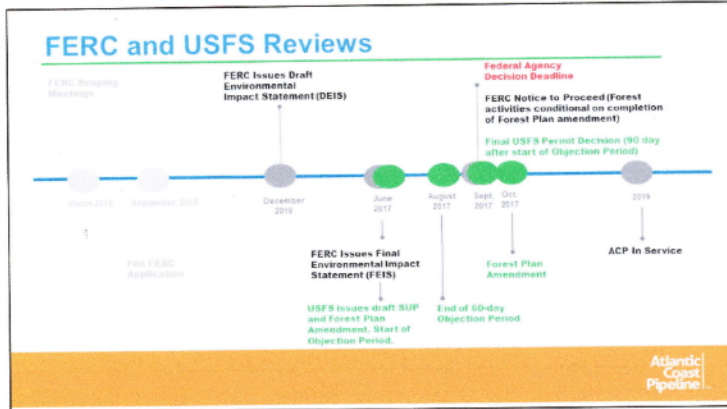


Z-2816

LANDOWNERS COMMENTS

LO17 – Peggy Quarles (cont'd)

20170302-5055 FERC PDF (Unofficial) 3/2/2017 8:40:47 AM



Basis for Schedule Dates

- **June 2017: Draft SUP and Forest Plan Issued.** USFS can issue the draft decision package at the same time or shortly after the publication of the final EIS.

 - NEPA regulations and guidance provide that a cooperating agency may adopt a lead agency's EIS without recirculating it if it concludes that its NEPA requirements and its comments and suggestions have been satisfied. CEQ NEPA Regulations, 40 C.F.R. § 1506.3(a), (c); CEQ NEPA 40 Questions, Question 30.
 - As a cooperating agency, USFS will receive administrative drafts of the EIS and have the opportunity to comment and participate in the analysis and the selection of the preferred alternative. USFS will likely also receive the final EIS before it is published and have the opportunity to evaluate whether its comments have been incorporated in advance of the FEIS publication date. Based on this information, USFS will be in a position to simultaneously prepare a draft decision package. The third-party contractor made available exclusively for the ACP project can supplement USFS resources to facilitate completing this work on a timely basis.
 - NEPA regulations typically require a 30-day waiting period between the issuance of the final EIS and the agency's final decision on the proposed action, but this waiting period does not apply if the agency couples the 30 days with a formal internal appeals process

Z-2817

LANDOWNERS COMMENTS

LO17 – Peggy Quarles (cont'd)

20170302-5055 FERC PDF (Unofficial) 3/2/2017 8:40:47 AM

(such as the USFS objection process in this case). CEQ NEPA Regulations, 40 C.F.R. § 1506.10; *see also* CEQ, A Citizen's Guide to NEPA at 18. Therefore, USFS can combine the 30-day waiting period with the objection periods required before USFS finalizes its decision on a SUP application and any associated Forest Plan amendments.

- There is nothing preventing USFS from issuing its *draft* decision prior to the final FERC Order. While the FERC order may modify the preferred alternative and change the project route, changes to the portions of the route crossing USFS-managed lands are unlikely, unless specifically requested from USFS.
- **August 2017: End of 60-Day Objection Period for Forest Plan Amendment.** Forest Service regulations require a 60-day comment period for the Forest Plan Amendment following the publication of the final EIS and draft Forest Plan Amendment documents. 36 C.F.R. § 219.
 - The objection period for the Special Use Permit will expire 45 days after the issuance of the draft decision. Forest Service regulations provide that when a plan amendment applies to all future projects, the 60-day objection period applies only to the plan-amendment decision, and the review process outlined in 36 C.F.R. § 218, subpart A (which requires a 45-day objection period) applies to the project or activity part of the decision. *See* 36 C.F.R. § 219.59(b).
- **September 2017: Final USFS Permit Decision.** Forest Service regulations provide that the final project-specific decision is issued within 45 days after the objection period deadline (and 90 days after the start of the objection period). In this case, the Forest Service would finalize its SUP decision by September 2017. This is true even where USFS is preparing a Forest Plan amendment that applies to all future projects, per 36 C.F.R. § 219.59(b).
- **October 2017: Forest Plan Amendment Decision Finalized.** The Forest Service regulations allow for a 90-day period to review and respond to objections. However, there is nothing preventing the Forest Service from issuing a final plan amendment decision before the expiration of this 90-day period. In this case, where ACP has provided a third-party consultant to supplement Forest Service resources, the review period should be shortened to 45 days (or less). This would allow for a publication of the final plan amendment in October 2017. The amendment would then become effective in mid-November, following the 30-day post-publication period required under 36 C.F.R. § 219.17.

Z-2818

LANDOWNERS COMMENTS

LO18 – Tyler Bird Paul

20170306-5035 FERC PDF (Unofficial) 3/4/2017 9:19:02 AM

To: FERC
From: Tyler Bird Paul
Date: March 4, 2017
RE: Atlantic Coast Pipeline, Valley Center, Highland County, Virginia

Cc: Tom Farrell, Terry McAuliffe, Bob Goodlatte, Tim Kaine, Mark Warner, Dickie Bell, Creigh Deeds, Ben Cline, Lew Freeman, ABRA, the Highland County Board of Supervisors, Brittany Moody, Greg Park, Emmett Toms, Paige Mudd, Anne Adams, Donald Trump

Dear all,

With all my heart, I urge you all to seriously consider and address the following direct, succinct and accurate quote from the Dominion Pipeline Monitoring Coalition, concerning the Atlantic Coast Pipeline and its serious threats to our beautiful Highland and Bath Counties, the eastern United States, our country, our environment:

“The environmental cost of Dominion’s proposed Atlantic Coast Pipeline is unacceptable.

The proposed pipeline will cross the central Allegheny Highlands, the Blue Ride Mountains, and the adjacent valleys. It will cut through miles of national forest and cross numerous rivers, streams, and wetlands. This area represents the heart of the remaining wild landscape in the eastern United States, and it is a major biodiversity refuge that can only increase in rarity and importance.

The proposed pipeline will be 42 inches in diameter, requiring excavation of an 8 to 12-foot-deep trench and bulldozing of a 125-foot-wide construction corridor straight up and down multiple steep-sided forested mountains. It will require construction of heavy-duty transport roads and staging areas for large earth-moving equipment and pipeline assembly. It will require blasting through bedrock, and excavation through streams and wetlands. It will require construction across unstable and hydrologically sensitive karst terrain.

Z-2819

LANDOWNERS COMMENTS

LO18 – Tyler Bird Paul (cont'd)

20170306-5035 FERC PDF (Unofficial) 3/4/2017 9:19:02 AM

LO18-1

Pipeline construction on this scale, across this type of steep, well-watered, forested mountain landscape, is unprecedented.

It will be impossible to avoid degradation of water resources, including heavy sedimentation of streams, alteration of runoff patterns and stream channels, disturbance of groundwater flow, and damage to springs and water supplies.

It will be impossible to avoid fragmentation and degradation of intact, high-integrity forests, including habitat for threatened and endangered species and ecosystem restoration areas.”

Thank you all very much for taking the pipeline and its irreversible effects on the future of Virginia into your powerful consideration and onto your discerning hearts,

Tyler Bird Paul
tylerbirdpaul@gmail.com

Valley Home Farm
2028 Valley Center Road
Monterey, Virginia 24465bbr

LO18-1

Comments noted. The EIS acknowledges potential impacts on environmental resources, and identifies the measures that Atlantic and DETI would implement, as well as our additional recommended measures to further reduce impacts. The EIS is comprehensive and thorough in its identification and evaluation of feasible mitigation measures to reduce effects whenever possible. Atlantic’s and DETI’s construction and restoration plans also contain numerous mitigation measures to avoid or reduce project-related impacts.

Z-2820

LANDOWNERS COMMENTS

LO19 – Tyler Bird Paul

To: FERC
From: Tyler Bird Paul for “Valley Home Farm”
Date: 6 March 2017
RE: Atlantic Coast Pipeline, Valley Center,
Highland County, Virginia

LO19-1

On behalf of our family farm and all of our neighbors in Highland County who will be adversely impacted by construction of the Atlantic Coast Pipeline, I am writing to you once again to object to Dominion’s large scale excavation on high-hazard areas without giving us detailed plans for prevention of erosion, alteration of runoff, and landslides; to voice our concern for damage to our water supplies for our families, homes and livestock; to urge FERC to prevent Dominion’s damage to our high quality headwater streams, including the endangered native brook trout streams; to point out that the Dominion project includes fragmentation of high-integrity core forests that are home to many rare and sensitive species, causing loss of habitat that cannot be mitigated; to remind FERC that Dominion will be crossing the Appalachian Trail corridor using a high risk and environmentally damaging plan; and to express our deepest dismay for the utter degradation of scenic and recreation values in our once beautiful counties of Highland and Bath.

LO19-1 Comments noted.

Z-2821

LANDOWNERS COMMENTS

LO20 – Rhonda Bridgeman

FEDERAL ENERGY REGULATORY COMMISSION
ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Comments can be: (1) left with a FERC representative; (2) mailed to the addresses below; or (3) electronically filed¹

For Official Mail Filing, Send To:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

As applicable, please indicate project(s) you are commenting on:

- Atlantic Coast Pipeline: Docket No. CP15-554
 Supply Header Project: Docket No. CP15-555
 All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

Mrs. Rhonda Bridgeman
4116 South Military Highway
Chesapeake, VA 23321

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

I am in support of the construction of the Atlantic Coast Pipeline. The ACP brings a cost effective clean energy source to our region with significant consumer savings advantages (\$377 million). A major benefit of the project is the creation of over 8,000 jobs during construction and thousands more once the ACP is operational. Local tax revenues to support

¹ The Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account by clicking on "Login to File" and then "New User Account".

LO20-1 Comment noted.

Z-2822

LANDOWNERS COMMENTS

LO20 – Rhonda Bridgeman (cont'd)

LO20-1
(cont'd)

education, public safety and other local needs will exceed \$30 million annually.
(FERC) I support the findings of the Draft Environmental Impact Statement that the ACP can be operated safely. The groundwater will be safe and there is minimal impact on local public safety. Economic growth will be positively impacted. The Draft States that "There will be no "significant cumulative impact on the environment."

Z-2823

LANDOWNERS COMMENTS

LO21 – Mike Craig

**FEDERAL ENERGY REGULATORY COMMISSION
ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS**

Comments can be: (1) left with a FERC representative; (2) mailed to the addresses below; or (3) electronically filed.¹

For Official Mail Filing, Send To:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

ORIGINAL

As applicable, please indicate project(s) you are commenting on:

- Atlantic Coast Pipeline: Docket No. CP15-554
- Supply Header Project: Docket No. CP15-555
- All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

MIKE CRAIG
WILLOW CREEK 5604 WHEELERS COURT
SHIPMAN VA 22977

2011 MAR - 7 P 1: 36
SECRETARIES OFFICE
FEDERAL ENERGY REGULATORY COMMISSION

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

- LO21-1 ROCKSMARTER THEN US, INCLUDING FERC, ARE TELLING
- LO21-2 US THERE'S NO NEED FOR THE ACP. THERE'S ENOUGH
- LO21-3 NATURAL GAS FOR ROCKS THAT USE IT TILL 2030 +
- LO21-4 SOME SAY 2050. THEY WILL CLEAN CUT THE TREES
- ON THE ROUTE AND NEVER LET THEM COME BACK
- WE'LL ALWAYS SEE WHERE THE PIPELINE IS.
- LIME STONE + EROSION ARE GOING TO BE PROBLEMS
- NO TELLING WHAT THE CREEKS + RIVERS ARE
- GOING TO BE LIKE AFTER DOMINION MESSSES
- WITH THEM. THERE'S NOTHING ABOUT THAT
- DOESN'T HURT THE NATURAL ENVIRONMENT! ->

¹ The Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account by clicking on "Login to File" and then "New User Account".

- LO21-1 See the response to comment CO46-1.
- LO21-2 Section 4.8.1.1 describes the impacts on forest land resulting from construction and operation of the project.
- LO21-3 Section 4.1 includes our analysis of impacts on steep slopes and karst terrain.
- LO21-4 See response to comment LO18-1.

Z-2824

LANDOWNERS COMMENTS

LO21 – Mike Craig (cont'd)

LO21-5

I LIVE ON THE ROUTE. I'LL EXPERIENCE
EVERYTHING THEY DO IF YALL APPROVE
THIS. I DON'T MY TREES CUT DOWN ON
THE CREEK RUNNING THRU MY LAND BLOWED
UP OR CHANGED ANY KIND OF WAY.

LO21-6

THIS IS ALL ABOUT DOMINION'S PROFIT
LO21-7 THEY DON'T CARE WHAT THEY DO TO THE
FORESTS ON THE MOUNTAINS AND IT WOULD
BE ASHAME IF REAL DIDN'T CARE ABOUT
THE EFFECT THIS WILL HAVE ON NATURE

LO21-7

IT WILL ONLY OWN WATER & AIR MORE
LO21-8 AND IT TAKES THE PROPERTY RIGHTS
FROM THE LAND OWNERS
DON'T APPROVE THIS.

LO21-8

LO21-5 Comment noted.

LO21-6 See the response to comment CO46-1.

LO21-7 See the response to comment LO21-4.

LO21-8 Comment noted.

Z-2825

LANDOWNERS COMMENTS

LO22 – Roberta Koontz

Z-2826

LO22-1	<p>Date: 2/23/17 To: FERC From: Roberta K Koontz Docket: CP15-554-000 ACP Subject: THE TRUTH - Property values & ability to sell property destroyed by the ACP</p> <p>We own a very historic 1000-acre farm in Bath County with an 1797 brick dwelling which is our home. We placed two conservation easements with the Virginia Outdoors Foundation (VOF) years ago. We are now unable to adequately care for the 1000 acres and want people with similar goals of preserving the land & making it their home to purchase acreage from us. We have listed property for the past 18 months with Old Dominion Realty in Fishersville, VA. For more than one year, we have had three parcels listed for sale for a total of about 740 acres. These parcels include very nice farm land, forests, an orchard, wonderful views, great water resources, recreational areas and more. It is very desirable, beautiful and unspoiled property. Initially, when we listed the property, the ACP was not planned to cross our property but was close although there was uncertainty as to the route. Potential buyers would not even come to look at our property. Since around March 2016, the route for the ACP is planned to cross our property. This is in spite of the two VOF conservation easements we hold. Dominion is attempting to get around this with a "land swap" which is illegal according to our attorneys. Dominion with support from FERC (apparently) continues to claim that the ACP will not lower property values at all. And Dominion continues to claim that it is fair to offer to purchase of a few acres for the ACP at the market price. So for our 1000-acre farm, Dominion might only need to purchase 30 or so acres. The price for 30 acres does not begin to compensate for the fact that the ACP destroys the property value. Especially Dominion is routing the ACP and an access road through our prime areas of development and building sites. Dominion has refused to compromise with us at all despite us having hired an attorney to negotiate with them. And despite Dominion's widely publicized claims that they are "working closely with land owners and compromising", etc., Dominion has done nothing to compromise with us. We have just retained litigation attorneys to represent us and attempt to negotiate with Dominion. While we do not want to litigate, we have been left with no other option by VOF and Dominion. I am attaching a letter from our two real estate agents at Old Dominion Realty (Cathy Ward and Charlie Ward). They are documenting the VERY NEGATIVE IMPACT on sale of our property due to the ACP.</p>
LO22-2	
LO22-3	
LO22-4	

- LO22-1 Comment noted.
- LO22-2 See the responses to comments CO3-1 and CO10-3.
- LO22-3 Comment noted.
- LO22-4 See the response to comment CO8-1.

LANDOWNERS COMMENTS

LO22 – Roberta Koontz (cont'd)

Z-2827

LO22-5 No buyer wants land anywhere close to the ACP and certainly not live & farm on land that has the ACP running across the middle along with a permanent access road. We will be living in the BLAST ZONE. How easy will it be for us to sell our historic home that is within the ACP blast zone. How could we possibly recover our investments. And certainly we could never realize a profit from our investment of 13 years to date. We feel it is absurd, outrageous and deceptive for Dominion to claim that property values are not negatively impacted by a gas pipeline. Who would want property with a gas pipeline running through it when they can easily buy property without a gas pipeline. Who would have their family live in a pipeline BLAST zone.

LO22-6 And that is not to mention the unknown future with Dominion having 24x7 access to enter and use of your property. And Dominion can always take more property & rights away due to "eminent domain".

LO22-7 And then there are the horrible access roads on private property that will have traffic 24x7 with no notice or accountability from Dominion.

LO22-8 In our case, the access road proposed by Dominion to cross our property will destroy the historic entrance to the farm and run within feet of our historic home, destroying our one-lane gravel driveway & significant improvements. It will destroy our safe access to and from the barns. If the access road is built as proposed by Dominion, we would have to abandon the property and spend significant resources to be able to return for our farming operations and home. We have 1.64 miles of road frontage on Highway 629 and yet Dominion wants to build a access road for the ACP on top of the heart of our farm & home. This is vindictive and harmful to all that we possess. And this is not going to have a negative impact on the value of our property? Not to mention our livelihood, quality of life, safety, destruction of our improvements, view, peace & quiet, etc.

LO22-9 We have a great immediate need to sell our property but are unable to do so because of the ACP for the past 18+ months. I almost died in 2016 and my husband is in poor health. We do not have much longer to

LO22-5 We acknowledge the potential risk associated with operation of ACP and SHP. As discussed in section 4.12, Atlantic and DETI have stated that the project facilities would be designed, constructed, operated, and maintained in accordance with DOT Minimum Federal Safety Standards in 49 CFR 192. The regulations are intended to ensure adequate protection for the public and to prevent natural gas facility accidents and failures. The DOT specifies material selection and qualification; minimum design requirements; and protection from internal, external, and atmospheric corrosion. In addition, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation. Section 4.9.7 addresses property values, insurance, and property taxes.

LO22-6 Comment noted.

LO22-7 Section 4.8.1.4 summarizes the impacts on land use associated with proposed access roads. In response to comments on the draft EIS, appendix E, which lists proposed access roads, their location, road type, land uses affected, and construction and operation impacts, has been updated to list the improvements needed for each road.

LO22-8 Section 4.10.1.1 has been updated to address this question. The landowner's driveway would not be used by the project.

LO22-9 See the response to comment CO8-1.

LANDOWNERS COMMENTS

LO22 – Roberta Koontz (cont'd)

enjoy our lives. We are unable to utilize assets we worked for 40+ years to accumulate. And we have the cost of fighting the ACP. We have the stress of FERC filings, reviewing documents, opposing Dominion, etc. How is this fair. How can the US government do this to hard-working and law-abiding citizens. If eminent domain is to be given to Dominion, then property owners should be well compensated but they are not. To summarize, the ACP will destroy the value of our property forever. We have been unable to sell property that we need to sell in order to live quite modestly & maintain the farm. What is now worth millions of dollars probably cannot be sold at a fraction of the value before the ACP. And the pristine, historic property that was to be preserved will be lost forever.

Force Dominion to admit and state the truth about damaging property values due to the ACP. Force Dominion to compensate land owners for the destruction of the property & property values forever.

The letter from our real estate agents follows:

Z-2828

LANDOWNERS COMMENTS

LO22 – Roberta Koontz (cont'd)



Old Dominion Realty 1750 Jefferson Hwy Fishersville VA 22939 Office (540) 943-0085

Cell (540) 480-7912

Roberta Koontz
The Wilderness 13954 Deerfield Road Deerfield, VA 24432

Dear Roberta,

Sorry this has taken so long for us to get back to you. We were waiting and hoping that more properties would have gone under contract. However, we are not finding any properties in your area that have been recently sold.

We feel due to the fact the Gas Line is having such an impact on the properties in Bath and Western Augusta County, buyers are afraid to purchase in the event, that the gas line will go through their property making it such undesirable for farming and building their dream homes.

Your property has been on the market over a year and we have only a handful of interested buyers. We have to disclose that the gas line is coming through this area, whether it is located on the acreage or not. It still has an impact on the value.

Buyers do not want to be anywhere close to the gas line. We know there are many safety precautions that will be in place, it doesn't seem to change buyers minds.

Unfortunately, we can advertise and spend lots of money, it won't change people's minds about the gas line.

Sincerely,

Cathy Ward
Charlie Ward

Z-2829

LANDOWNERS COMMENTS

LO23 – Sandra Clark

Z-2830

FERC Atlantic Coast Pipeline Docket # CP15-554
 Federal Energy Regulatory Commission
 888 First Street, NE
 Washington, DC, 20426

My name is Sandra Clark I live at ⁴⁶⁴³6343 Goldsboro Rd. It was last year around March 14th 2016 that Atlantic Coast Pipeline entered our life. As a retired teacher of 33 years. I have actually taught science lessons that dispels the jargon the Dominion and Duke energy make up about the safety of Fracking and the effects of the Atlantic Coast Pipeline will bring to our community.

I have a Granddaughter that I would like to tell her its safe for her to live on our land- in the future- but if Atlantic Coast Pipeline comes it will bring disaster to many landowners and neighbors. We own livestock and animals that I am concerned for them as well as ground water and soil pollution. I have been taught that being healthy consist of clean air, clean water and soil that produces clean food.

My Areas of concerns are:

LO23-1

*Environment- High risk of releasing gas or hazardous liquids in our drinking water.

LO23-2

*Methane leaks

*Compressor station will realize large amounts of air pollution including sulfur dioxide

*Nitrogen oxides, violate soils, carbon monoxide .

LO23-3

Human Health & Life-

*Noisy polluting infrastructure such as compressor station, metering stations

*Pipelines carry Radon, a radioactive gas

*Potential for explosions, fires, and gas spills in our community..

LO23-4

Property

*Decreased property value

*Disruption of property

*Inability to get mortgage or re-finance

*Restricted use of property with pipeline

*Minimal compensation

*Construction hassles

*Pay taxes on land with limited use

*Forces to surrender property via eminent domain and violation of property rights.

LO23-5

Jobs and Economy

- Majority of jobs created are temp during construction

- Many of which are skilled labor jobs often hired from outside local Community

- 20 permanent jobs may be created.

LO23-6

Fracking infrastructure

*Supports the destructive and dirty method of extracting natural gas

*Supports large amounts of natural gas fro the fracking site

*Gas and utility companies benefit at the cost to landowners and Environment

I say NO Pipeline NO Disaster- We want to protect our community.

You need to ask yourself are you going to be a rubber stamp for

Dominion and Duke and allow Atlantic Coast Pipeline to be built?Do we have value or are we insignificant.....do you have

integrity to do the right thing or are we truly insignificant.

LO23-1

Section 4.3 includes our analysis of impacts on wells and drinking water.

LO23-2

Section 4.11.1 includes our analysis of air quality.

LO23-3

Section 4.11.1 and 4.11.2 includes our analyses of air quality and noise, respectively. Radon is addressed in section 4.11.1.4

LO23-4

Comment noted.

LO23-5

Comment noted.

LO23-6

See the response to comments CO48-10 and CO50-2.

LANDOWNERS COMMENTS

LO23 – Sandra Clark (cont'd)

No Pipeline No Disaster for the safety of my Granddaughter, Family Neighbors, Friends, Church and Community.

Sandra Clark

Z-2831

LANDOWNERS COMMENTS

LO24 – Tom Clark

Tom Clark
 4643 Goldsboro Road
 Wade N.C. 28395
 Blue Ridge Environmental Defense League

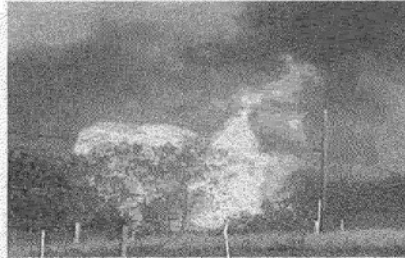
CP15-554

www.BREDL.org PO Box 88 Glendale Springs, North Carolina 28629 BREDL@bkybest.com (336) 983-2691

PIPELINE DANGERS

PIPELINES EXPLODE

These photos show the fire and damage from the Williams-Transco gas pipeline explosion in Appomattox, VA in 2008. The flames were 300 feet tall. The blast zone had a 1,125 foot radius. The pipeline, installed in 1955, was 30 inches in diameter and operated at 800 psi. Two homes were destroyed. Five people were injured, and another 100 homes suffered damage. Corrosion of the pipe caused the explosion. Williams was ultimately fined \$1 million for improper pipeline maintenance. Is that enough?



Blast Radius

Today we face much greater threats by the industry's rush to build larger diameter pipelines operating at higher pressures. The proposed Atlantic Coast Pipeline (ACP) and Mountain Valley Pipeline (MVP) would be 42 inches in diameter, operating at 1400 psi. The chart below shows the blast radius of a 42 inch pipeline operating at 1400 psi at 1100 feet. Data from actual blasts indicate the blast radius estimates are off by as much as 50% as indicated by the blast radius of the Appomattox explosion.

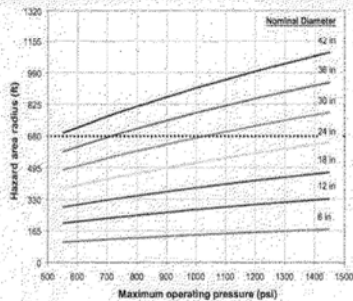


Figure 2.4 Proposed hazard area radius as a function of line diameter and pressure.

Sacrifice Zones

Pipelines are often constructed within a few hundred feet of existing homes, placing families in the blast zones. This seems to be acceptable to industry and government. Rural areas with lower population density, farming communities, and those with a majority of minority populations are consistently chosen for these projects. Why? These communities have fewer resources with which to fight back. Regulations are designed to make construction less expensive for industry to build in rural areas. Land is cheaper. The companies can construct their pipelines with thinner walled pipe and without certain safety features, saving them millions of dollars. Construction standards should not be lowered in rural areas simply because there are fewer people who would lose their lives or whose property would be devastated.

LO24-1

LO24-1 See the responses to comments CO67-14 and CO67-15.

Z-2832

LANDOWNERS COMMENTS

LO24 – Tom Clark (cont'd)

LO24-3

pipe Bombs 36 in. diameter pipeline has an initial daily capacity of 1.5 Billion cubic ft. of gas coming to our region. alarms do not sound unless you have a leak larger than 2%.

LO24-4

Jobs → an economic consulting group (CHMURA) commissioned by Dominion Resources, states in it report "The Economic Impact of ACP in West Va, Va + N.C." that this pipeline would only provide 18 permanent jobs for our state.
- the permanent construction jobs are actually highly specialized jobs for workers with experience in constructing industrial sized pipelines in other states.

Z-2834

LO24-3 Section 4.12.1 discusses the emergency plans Atlantic and DETI would implement during operation of the projects, which would include establishing and maintaining communications with local fire, police, and public officials, and coordinating emergency response; and emergency system shutdown.

LO24-4 Comment noted.

LANDOWNERS COMMENTS

LO25 – Stuart Lee Matthews and Jeffrey H Matthews

CP15-554

FEB 14, 2017

DEAR SECRETARY ROSE + FERC OFFICIALS :

LO25-1

This project has created A NIGHTMARE for me, my brother AND OUR EXTENDED FAMILIES. This proposed gas pipeline is dissecting our homeplace that has BEEN IN OUR FAMILY SINCE 1886. The actual pipeline is coming within 120 feet of the main dwelling that WAS built prior to 1900 and RENOVATED SEVERAL TIMES OVER THE YEARS. Our children AND grand children plan to build their homes ON THIS LAND. BUT AS PARENTS AND GRAND-PARENTS WE CANNOT live with the idea of our children AND grand children going to bed at night within the blast ZONE of this pipeline. WE ALSO HAVE sensitive wetlands that flow directly into the NEUSE RIVER BASIN. WE will NOT accept ANYTHING short of this project being removed from our land AND our community. THE AFFECTED PARCELS ARE 20-240, 20-241, Johnston County, NORTH CAROLINA. This site is less than 1 mile from MEADOW ELEMENTARY school.

LO25-2

LO25-3

STUART LEE MATTHEWS
JEFFREY H. MATTHEWS
- OWNERS
P.O. BOX 1360
ANGIER, N.C. 27501
919-639-4449

LO25-1

See the responses to comment letter LO2.

LO25-2

Comment noted.

LO25-3

Section 4.9.4 includes our analysis of impacts on public services, including schools. Additionally, section 4.12 includes discussion of construction, operation, maintenance, and inspection protocols used by Atlantic and DETI to meet or exceed DOT's PHMSA safety requirements.

Z-2835

LANDOWNERS COMMENTS

LO26 – Rob Boyette

CPIS-SSY



Rob Boyette <boyetterob@gmail.com>

Fwd: ACP Comment Sessions

1 message

Rob Boyette <rboyette@wilson-co.com>
To: Rob Boyette <boyetterob@gmail.com>

Tue, Feb 14, 2017 at 1:05 PM

Sent from my iPhone

Begin forwarded message:

From: Kim Bissette Farris <kfarris@wilsonedc.com>
Date: February 8, 2017 at 11:45:05 AM EST
To: Kim Bissette Farris <kfarris@wilsonedc.com>
Subject: FW: ACP Comment Sessions

Please see the message below concerning the Atlantic Coast Pipeline.

Begin forwarded message:

From: Rosemary Wyche <rosemary@eandvgroup.com>
Subject: ACP Comment Sessions
Date: February 8, 2017 at 10:05:48 AM EST
To: Jennifer Lantz <jlantz@wilsonedc.com>

Z-2836

LANDOWNERS COMMENTS

LO26 – Rob Boyette (cont'd)

Hello Jennifer

I hope you are well. Could you please help get the word out about the FERC sessions. If you have questions, please do not hesitate to contact me.

Rosemary

The Federal Energy Regulatory Commission (FERC) will be holding a series of meetings to take public comment in North Carolina. Please plan to attend a meeting near you to show your support for the Atlantic Coast Pipeline.

The process to submit a comment is very simple and should not take much time.

You will come into the room and will be assigned a number. You will sit until his/her number is called. Then, you will go into a room with a court reporter and FERC representative and provide his/her statement (it can be prepared or off the cuff). The statement is recorded then posted to the FERC docket.

Monday, February 13

5:00 - 9:00 p.m. Doubletree Hotel 1965 Cedar Creek Rd
Fayetteville, NC

Tuesday, February 14

5:00 - 9:00 p.m.
Forest Hills Middle School 1210 Forest Hills Rd Wilson, NC

Wednesday, February 15

5:00 - 9:00 p.m.
Hilton Garden Inn
111 Carolina Crossroads Pkwy Roanoke Rapids, NC

Z-2837

LANDOWNERS COMMENTS

LO26 – Rob Boyette (cont'd)

Z-2838

LO26-1

Sample Comments:

1) I support FERC's draft Environmental Impact Statement on the Atlantic Coast Pipeline project (Docket #CP15-554) and appreciate the agency's thorough review. The draft reaffirms that the the Atlantic Coast Pipeline can safely and reliably provide our region with clean, American fuel sources to meet our energy needs today.

I urge FERC to approve the project. North Carolina's need for clean, reliable American energy should not wait any longer to be met.

2) I support the Atlantic Coast Pipeline because we must find clean, reliable American fuel sources to meet our energy needs today.

I support FERC's draft Environmental Impact Statement on the Atlantic Coast Pipeline (Docket #CP15-554). I urge FERC to approve the project and reject efforts to slow this project. North Carolina's need for clean, reliable American fuel is real and should not wait longer to be met.

LO26-1 The submitted documents related to comment PM2-62 are noted.

LANDOWNERS COMMENTS

LO27 – Teresa Arthur

Z-2839

FEDERAL ENERGY REGULATORY COMMISSION
ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

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Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

As applicable, please indicate project(s) you are commenting on:

- Atlantic Coast Pipeline: Docket No. CP15-554
 Supply Header Project: Docket No. CP15-555
 All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

Teresa C. Arthur
P.O. Box 554
Pine Level, N.C. 27568

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

I am against the pipeline.
If it comes through it will affect
6 or more family farms. The ^{proposed} pipeline
route does not follow any utility corridor
but randomly crisscross over family
farmland. Many times the proposed
route will split the family farmland
right down the middle. Some of
this family farmland has belonged
to us for over 80 years - My family
has worked hard to keep this land -
to pay taxes on it and keep ~~it~~ →

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LO27-1 See the response to comment CO68-12.

LANDOWNERS COMMENTS

LO27 – Teresa Arthur (cont'd)

Z-2840

LO27-2 | it in our family. The pipeline
would directly affect 300 acres
of our land. Indirectly more –
LO27-3 | Unfortunately, we have been
affected by prior pipelines – They
did not do what they said – They did not
treat us with respect. The land
was damaged and will take years
to recover. We were not able
to ~~contact~~ anyone we needed to
ask them to follow thru + do as
they were suppose to, to repair the land.
The land values will depreciate.
The pipelines would impact property
values, crops, habitats. We would
be deprived of future potential
for our land, if we or our
children or grandchildren would
like to develop + this would be
taken away from us – The
potential gone –
LO27-4 | Savannah, Georgia just received
a license (2016) to export natural
gas. Dominion has bought up
pipelines in South Carolina and
Georgia. Gas will be exported.
No advantage for North Carolina –
No jobs, No tax value, No benefits –
Johnston County, N.C. is in the Top
10 countries to boom and grow
LO27-5 | now – Please stop pipeline –
Water contamination is #1.

LO27-2 | Section 2.5.6 describes restoration measures Atlantic and DETI would be required to conduct following construction.
LO27-3 | Comment noted
LO27-4 | See the response to comment CO46-1.
LO27-5 | Comment noted.

LANDOWNERS COMMENTS

LO28 – Larry M. Capps

FEDERAL ENERGY REGULATORY COMMISSION
ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

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- Supply Header Project: Docket No. CP15-555
- All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

Larry M. Capps
634 Hill Road
Smithfield, N.C. 27577

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

Z-2841

LO28-1

The proposed pipeline is going through my property and I don't want it. They went through the property to start with, without permission and I want to know why - if they are going to take my land - why don't I get paid forever -

LO28-2

My property is wet lands thru the woods, and I will never have energy

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LO28-1

Regardless of whether the pipeline easement is obtained voluntarily or via eminent domain, the company would still be required to compensate the landowner for the right-of-way and for any damages incurred during construction. In the case of easements obtained via eminent domain, the level of compensation would be determined by a court.

See also response to comment CO8-1.

LO28-2

See the response to comment LO12-3.

LANDOWNERS COMMENTS

LO28 – Larry M. Capps (cont'd)

LO28-2
(cont'd)

income again.

LO28-3

I am concerned about
the safety of the pipeline -
Explosions - water contamination -
endangered wildlife -

LO28-4

I am very concerned I
will never be able to
get to the bed side of
my property again - to
sell my timber -

LO28-3

Section 4.12 discusses reliability and safety during construction and operation of the projects.

LO28-4

See the response to comments CO8-1 and LO28-1.

Z-2842

LANDOWNERS COMMENTS

IND29 – W.K. Neal Jr.

20170310-0100 FERC PDF (Unofficial) 03/10/2017

FEDERAL ENERGY REGULATORY COMMISSION ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

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Washington, DC 20426

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- Atlantic Coast Pipeline: Docket No. CP15-554
 Supply Header Project: Docket No. CP15-555
 All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

W.K. Neal, Jr. 2/15/17
301 E. Dogwood Trail
Littleton, NC 27850

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

I understand the draft EIS concludes that the ACP can safely and reliably provide our region with clean fuel to meet future energy needs. Part of providing fuel to this region is to provide taps at strategic locations for future growth areas and opportunities. Taps are expensive with equipment & substation but they are essential for any future developments. I know much of the fuel is pre-sold or allocated, but what is not allocated needs to be planned for with potential large customer sites for manufacturing/power/etc. to allow communities to create jobs in return for supporting & granting easements through rural counties. I'm making this statement as a property owner affected by the ACP and a board member of Halifax Economic Development in N.C. I'd like a follow up on the cost of

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LO29-1 See the response to comment CO46-1.

Z-2843

IND29-1

LANDOWNERS COMMENTS

IND29 – W.K. Neal Jr. (cont'd)

20170310-0100 FERC PDF (Unofficial) 03/10/2017

IND29-1
(cont'd)

a substation / tap and a follow up to know what fuel
is already planned / allocated. Are there any taps being
constructed that are not for a known industry, for future
development? If so, how frequently do they occur in miles?
Thank you for having this public comment period.

Sincerely,

W.K.

Z-2844

LANDOWNERS COMMENTS

LO30 – Glenda Taylor

20170310-0101 FERC PDF (Unofficial) 03/10/2017

FEDERAL ENERGY REGULATORY COMMISSION
ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Comments can be: (1) left with a FERC representative; (2) mailed to the addresses below; or (3) electronically filed.¹

For Official Mail Filing, Send To:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

As applicable, please indicate project(s) you are commenting on:

- Atlantic Coast Pipeline: Docket No. CP15-554
 Supply Header Project: Docket No. CP15-555
 All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

Glenda Taylor
517 Lummis Rd.
Suffolk, VA 23434

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

LO30-1

This pipeline ~~will~~ would come across my property and cause ~~loss of~~ significant ~~loss of value and~~ ~~environmental~~ damage and pose dangerous health risks to me and my family. I ~~do not~~ believe the pipeline is entirely unnecessary and that it's purpose is for profit. Eminent domain should not be used for corporations to profit from the taking of private property!

LO30-2

Although they claim the gas will not be exported, I don't believe it. The pipeline ~~is~~ is spurring off in the vicinity of ports ~~at the coast~~ in VA for the purpose of exporting gas! Our precious

over →

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LO30-1 Comment noted.

LO30-2 See the response to comment CO46-1.

Z-2845

LANDOWNERS COMMENTS

LO30 – Glenda Taylor (cont'd)

20170310-0101 FERC PDF (Unofficial) 03/10/2017

LO30-2
(cont'd)

natural resources should not be destroyed for the purpose of transporting gas which is not needed. There is no shortage of natural gas in this area.

LO30-3

Government officials of the state of VA should not put the citizens at risk for the sake of bringing ~~bringing~~ temporary jobs to the state. This is very short sighted! Once

LO30-4

the pipeline is built all that will remain are the damaged property, damaged natural resources, considerable risk of a catastrophic explosion, risk of contamination of our water, and considerable loss of value of the real estate of everyone along the pipeline.

It seems that all those who make the decisions that is a good thing are those who will benefit from it directly.

Only you (FERC) can be the voice of reason in this entire process.

You are the neutral party who looks at all sides. This can't be a good thing. The risks heavily outweigh the benefits.

Don't be influenced by huge corporations and government officials who want to bring money & jobs to their jurisdictions. Please do what is best for the people, and for the environment.

DO NOT APPROVE THIS PIPELINE!

The damage it will cause can NEVER be fixed.

The natural resources once gone cannot be recovered.

This is a monumental decision. Please decide against the pipeline and for the people and the environment!

LO30-3

Comment noted

LO30-4

Comments noted. FERC's mission statement, as stated on its website, is the following: "Assist consumers in obtaining reliable, efficient and sustainable energy services at a reasonable cost through appropriate regulatory and market means."

When a federal action is triggered – in this case, a permit application is submitted to the FERC – the agency must fulfill the requirements of NEPA. The CEQ and FERC have developed regulations that guide how NEPA is fulfilled. One such requirement is disclosing the impacts associated with a proposed action. Another aspect of CEQ's NEPA-implementing regulations is mitigation, which in summary is defined as avoiding or minimizing an impact, or compensating for the impact. FERC is not charged with protecting lands or resources but instead, through NEPA, to disclose the impacts associated with proposed action and, as necessary, recommending alternatives or measures to avoid, minimize, or mitigate for an impact.

Z-2846

LANDOWNERS COMMENTS

LO31 – Allen Taylor

20170310-0101 FERC PDF (Unofficial) 03/10/2017

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 All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

Allen Taylor
517 Lummis Rd.
Suffolk VA 23434

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

LO31-1

The pipeline, if built, will be coming across my property and will be running along a high power transmission line. This is part of the Franklin Alternative Route. This would be a very dangerous situation. If there was an explosion, it would not only be devastating to all surrounding property and the people who live there, but it would knock out power to a huge number of people as well. This would NOT be a safe or feasible route for the pipeline. Please keep this in mind when making your decision. over →

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LO31-1 See the response to comment LO10-3.

Z-2847

LANDOWNERS COMMENTS

LO31 – Allen Taylor (cont'd)

20170310-0101 FERC PDF (Unofficial) 03/10/2017

LO31-1
(cont'd)

I sincerely hope that you do not approve
the pipeline, but if so, the Franklin
Alternative Route ~~would be~~ should not
be used. It would be a very
dangerous situation!

Z-2848

LANDOWNERS COMMENTS

LO32 – Charnell Blair

20170310-0101 FERC PDF (Unofficial) 03/10/2017

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- Supply Header Project: Docket No. CP15-555
- All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

CHARNELL BLAIR
4124 MOCKINGBIRD LANE
SUFFOLK, VA 23434

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

LO32-1

THE PIPELINE PROPOSED ROUTE WILL
GO THROUGH - UNDER - THE WATER SUPPLY
FOR NORFOLK AND VIRGINIA BEACH. THE
LAKE'S ARE HIGHLY REGULATED - NO LARGE
BOATS - NO SWIMMING BUT A PIPELINE
WITH GAS UNDER PRESSURE IS SUPPOSEDLY
ACCEPTABLE. WHY? LEAKS DO HAPPEN.
I KNOW BECAUSE I HAVE SEEN IT!
THOUSANDS OF PEOPLE COULD BE OUT OF
WATER FOR AN UNLIMITED AMOUNT

over ->

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LO32-1 Comment noted.

e

Z-2849

LANDOWNERS COMMENTS

LO32 – Charnell Blair (cont'd)

20170310-0101 FERC PDF (Unofficial) 03/10/2017

LO32-1
(cont'd)

OF TIME. WILL THIS AREA POTENTIALLY
BE THE FLINT, MICHIGAN OF THE EAST
COAST? I HOPE NOT!

LO32-2

HOW WILL I KNOW THIS HAS BEEN READ
AND DOCUMENTED?

LO32-2 Comments received on the draft EIS and responses are provided in appendix Z.

Z-2850

LANDOWNERS COMMENTS

LO33 – Sally Kirk Adkins

Z-2851

My comments will be in the form of highlighting some of former FERC chair Norman Bay's parting recommendations to FERC. The comments below are from someone, who as the chair, has been watching this process very closely and changing his mind about the process and issues. It would behoove the new commission to take his comments to the table and consider his suggestions.

LO33-1

In his written statement, Bay **suggested the commission, he had chaired for nearly two years, ought to revisit how it weighs the pros and cons of pipeline projects.** He made recommendations that pipeline project watchdogs have pitched for years.

Included among other recommendations in his statement, Bay said **FERC ought to consider refining and expanding its evaluation of the need for new natural gas pipelines to guard against overbuilding.**

Bay observed, **"The development of natural gas pipeline infrastructure has become increasingly controversial."** And he cited one especially hot-button reality: **Pipeline companies whose projects receive FERC approval have access to federal eminent domain to acquire easements across private property. Private property advocates have alleged, Bay said, that land is being taken by for-profit companies for projects that do not serve a public use.**

In addition, Bay referenced FERC's approach to conducting environmental reviews of natural gas pipeline projects. **He suggested broadening the focus — echoing fervent calls, voiced for years by environmental and conservation groups, for a wide-ranging environmental impact statement designed to collectively assess the effects of numerous projects.**

Bay wrote, **"Despite the growing importance of Marcellus and Utica gas production — it was 22.5 billion cubic feet per day in 2016 and is projected to surpass 44 billion cubic feet per day by 2050 — the commission has NEVER conducted a comprehensive study of the environmental consequences of increased production from that region."**

In November 2015, Bay himself rejected conducting a programmatic environmental impact statement for the Mountain Valley Pipeline and other proposed interstate natural gas pipelines affecting Virginia and West Virginia, including the Atlantic Coast Pipeline.

But in a change of opinion he states, **"Even if not required by NEPA, in light of the heightened public interest and in the interests of good government, I believe the commission SHOULD analyze the environmental effects of increased regional gas production from the Marcellus and Utica".**

LO33-1

Comment noted. The decision to complete a programmatic EIS or one that evaluates energy planning on a regional scale is a policy decision and can not be made through this EIS.

LANDOWNERS COMMENTS

LO33 – Sally Kirk Adkins

Bay's comments noted that *"increased use of natural gas as a fuel to generate electricity has helped cut emissions of carbon, a greenhouse gas associated with coal and climate change, but he also suggested FERC ought to consider more comprehensively the effects of other greenhouse gas emissions."*

A comment about Bay, "he thinks for himself" and was "going to try to do what he thinks is right, at least as a commissioner."

HEED the comments of someone who has been there studying the issue every day and now advocates for the public to be heard, that environmental issues should be addressed, that there should be fairness in all considerations especially eminent domain, and that the need for these new pipelines should be seriously evaluated for overbuilding. Additionally, he even suggests that the commission should "revisit how it weighs the pros and cons of pipeline projects."

What stronger words do you need?!

FERC hearing – Elkins, WV March 1, 2017
Submitted by: Sally Kirk Adkins

Z-2852

LANDOWNERS COMMENTS

LO34 – Pendleton Goodall

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- Supply Header Project: Docket No. CP15-555
- All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

Pendleton Goodall
936 Collins Run Lane
Montgomery, VA 24465

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

LO34-1

My concern is the water, if a pipeline goes thru, what promise will Dominion do, if water is lost!

LO34-2

And my friend and land will be lost in value, line stock will be sold. A landowner will have to sell, because of no water. But no one will buy. A total lost highland, bath, & west Virginia

WE ARE THE HEADWATER TO MANY RIVERS
Pendleton Goodall

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LO34-1 Atlantic has stated it would provide an alternate water supply. The company would be required to mitigate the loss.

LO34-2 Comment noted.

Z-2853

LANDOWNERS COMMENTS

LO35 – Lewis Freeman

Lewis Freeman

72 Upper Back Creek Rd. Monterey, VA 24465
540-468-2769 (h) 703-298-8107 (c) lewfreeman@gmail.com

2/28/2017

Comments to the Federal Energy Regulatory Commission Concerning the Draft Environmental Impact Statement For the Atlantic Coast Pipeline

My name is Lewis Freeman. I am a resident of Highland County, Virginia. I am President of Highlanders for Responsible Development, a local organization concerned with the integrity of our county's natural resources. I am also Chairman and Executive Director of the Allegheny-Blue Ridge Alliance, a coalition of 51 organizations in Virginia and West Virginia in opposition to the proposed Atlantic Coast Pipeline (ACP).

In general, I believe that the Draft Environmental Impact Statement (DEIS) is seriously flawed in concluding that there would be no long-term impacts to the environment and the economic well-being of affected landowners and communities. I site two prime examples.

LO35-1

1. The DEIS concludes that impacts on outdoor recreational opportunities in affected counties would be temporary. This is incorrect and such a judgment reflects a lack of understanding of tourism. Tourism in Pocahontas, Highland and Bath Counties, which is the most significant sector in the economy of our area, is strongly geared to the outdoors. The very construction of the pipeline will seriously disrupt and dampen tourism in our area. In many cases, through scars to the landscape that will not return to normal, as well as damage to the habitat of trout and other relevant species that are assets to our tourism, the attractiveness of our area will be permanently diminished. The presumption in the DEIS that previous levels of tourism will return, and are mitigatable if they do not, is simply wrong!

LO35-1

Comment noted. Section 4.9.7 includes our analysis of impacts on tourism/ecotourism. Our analysis concluded that tourists would experience temporary visual and noise impacts associated with construction. We found no evidence that short-term effects of pipeline construction have long-term significant impacts on the tourism industry during pipeline operation. Therefore we conclude tourism activities would not be affected long-term by operation of the project.

Z-2854

LANDOWNERS COMMENTS

LO35 – Lewis Freeman (cont'd)

LO35-2

2. The DEIS virtually ignores the magnitude of the serious and permanent damage that would be done to the higher elevations of the ACP's route through Pocahontas, Highland and Bath Counties. The pipeline construction plan calls for removing the tops of several mountain ridges and adjoining slopes, thus diminishing the attractiveness of many scenic vistas. Moreover, there is currently absent in the DEIS an environmentally satisfactory plan to safely dispose of the extensive volume of rubble resulting from the removal of mountain ridge tops and steep slopes. This absence conflicts with the requirements of the National Environmental Policy Act. This concern was amplified in a recent communication to the U.S. Forest Service from one of its consultants, James A. Thompson of West Virginia University (filed with the FERC docket for the ACP on February 24), in which he decried the failure of the Atlantic Coast Pipeline, LLC. to provide needed information for proper geohazard analysis regarding the impact of the pipeline on steep slopes.

LO35-3

In conclusion, the Draft Environmental Impact Statement for the Atlantic Coast Pipeline is deficient in major ways. FERC's consideration of this project should not continue as presently scheduled given these significant shortcomings. A project that would have such a devastating impact on the environment of the Allegheny-Blue Ridge region cannot be responsibly evaluated with a "wink and a nod" approach, which what the DEIS implies.

LO35-2 Section 4.8.8 has been updated with additional information regarding impacts on visual resources.

LO35-3 See the response to comment CO86-21.

Z-2855

LANDOWNERS COMMENTS

LO36 – Russell Holland

Russell Holland
2445 Manakintown
Fung Rd
Midlothian, VA 23113

Justin

Subject: Signage

LO36-1

Last Friday I met with a Conservation Police Officer in Greensville and Brunswick Counties for the primary purpose of ascertaining if Dominion Power Property was adequately posted to support the issuance of certain citations, posting was woefully inadequate, can I reasonably expect Atlantic Coast Pipeline (ACP) to do a better job? After having spent a day afield earlier this year with Dominion Security Officer, Mike Elliott, phone 804 775-5357, email michael.c.elliott@dom.com, I was disappointed to say the least.

The first time we met I inquired about Atlantic Coast Pipeline (ACP) policies for dealing with trespassers and received the flippant answer that you did not care what I did to scare them off. Thereafter I unsuccessfully tried to address signage with you.

For your consideration I am a graduate of the Department of Defense (DOD) Industrial Security Course and have been the lead inspector during inspections of large corporations doing business with DOD. I am a graduate of the Department of Defense Program Management Functions Manager Course.

For a period of time in my military career I was responsible for the security of three of our nation's chemical storage areas. One tour of duty I served as the S-3 operations and planning officer for the unit responsible for daylight security of the United States outposts in the Demilitarized Zone adjoining North Korea. Signage both in the Continental United States and abroad is an important aspect of problem prevention as concerns personnel control of any real estate.

No good physical security program exists without signage that provides adequate notices to people and supports prosecution of those unlawfully entering restricted areas.

At the time of my retirement from the U.S. Army, I had attended multiple DOD counter terrorism courses. The enemies of our country would like to disrupt our infrastructure and a 42" gas pipeline may well be an attractive future target. Reasonable signage requirements should be established and implemented as an aid to discourage the presence of and the prosecution of trespassers.

LO36-1 See the response to comment CO55-52.

Z-2856

LANDOWNERS COMMENTS

LO36 – Russell Holland (cont'd)

LO36-1
(cont'd)

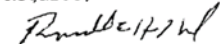
Gas pipelines, and other linear openings are attractive nuisances. Be it someone who wishes to demonstrate against ACP or someone who desires to play in the mud with four wheel drive vehicles or other all-terrain vehicles, culprits stealing equipment or components of equipment such as batteries, unauthorized hunters, or vandals simply looking for something to damage, signage is often an important requirement for successful prosecution.

It is in the best interests of both landowner and ACP to minimize the presence of unauthorized individuals on pipeline easements and the roads that provide ingress and egress to pipeline.

I reiterate signage is an important part of deterring the unauthorized access to certain areas or the successful prosecution of criminal trespass cases. If you are not the person to address signage, please forward email to appropriate parties. At your earliest convenience I would like to see clauses Doyle and/or ACP proposes to use in both temporary and permanent easements. **Signage is an important issue.** Do not put off until tomorrow what should have been done yesterday. After all these months further postponement of addressing signage for security is unacceptable. I will not sign documents that continue to gloss over or delay security considerations.

I have provided Peter Nguyen with a photo of signage provided by Carla Picard when she was employed by Dominion Power. One might consider a modification thereof. Please provide visuals (pictures or signs) of signage used or proposed to be used by ACP at entrance points to pipelines.

Regards,


Russ

* Trespassers transport invasive species.

Z-2857

LANDOWNERS COMMENTS

LO37 – R. Carlton Ballowe

R. Carlton Ballowe

19218 Thomas Nelson Highway
Faber, Virginia 22938

Cell: 434-996-7796
Email: catbalu1@aol.com

FERC notes 2-22-17

I am a Native of Nelson County. I've owned land and a business here for 40 years. I'm on the Chamber of Commerce's Board of Directors, and have twice served as that groups President. I am President of a local property rights advocacy group called Real Nelson. I am Vice-Chair of the county's Economic Development Authority. I am Chairman of the Nelson County Republican Party. I am a member of the Nelson County Home Builders Association. I am a member of the Nelson County Chapter of ABATE, a motorcyclist advocacy group. I do not speak for any of those groups today. I mention those affiliations only to suggest that I should have some sense of the community; and my sense of the community is that, despite Nelson's claim to be the epicenter of the opposition, most Nelsonians, including myself, support the ACP. It is easy to get a different impression because the opponents, just like the NIMBYS at any Planning Commission or Board of Supervisor's meeting, compensate for their lack of numbers, with passion, volume, hyperbole, and scare tactics.

LO37-1

I pray that FERC will look past the hyperbole of the opponents and recognize the indisputable fact that our economy, national security and standard of living all depend on an abundant supply of affordable energy. Energy fuels our economy. A strong economy is how we afford the necessary national security apparatus. And, since the cost of energy affects the price of every necessity we purchase, our standard of living is diminished when we fail to take advantage of every opportunity to add to the supply and reduce the cost. Please do not allow this opportunity to pass.

As a nation, we are on the cusp of achieving energy independence, a national goal that was set four decades ago. The potential benefits are impossible to overstate. Not having to depend on sometimes hostile nations for the fuel that drives our economy would be very liberating. It is impossible to be completely free and yet dependent.

Opponents suggest the pipeline will result in environmental degradation and pose a danger of explosion. I don't dismiss their concerns out of hand; but I recall a time, not too long ago, when the same people were advocating the kind of greenspace the pipeline will provide and even demanding it in the form of proffers for building permits. I acknowledge that some older, less sophisticated pipelines have been known to explode, so I must concede that is a future possibility. Even so, I feel certain that a person could live on top of this pipeline and still have a better chance of being struck by lightning. I would also note that no aspect of life or any advance in history ever occurred without risk. Risk is something we can minimize, not something we can avoid.

I appreciate the opportunity to share my support for the record and respectfully ask FERC to approve this project.

Sincerely,



R. Carlton Ballowe

LO37-1 Comment noted.

Z-2858

LANDOWNERS COMMENTS

LO38 – Dan Lysy

Atlantic Coast Pipeline (ACP)
Draft EIS

2/22/17 Comment Session
Nelson County High School

Comments prepared and submitted by Dan Lysy
Property located at 726 Glass Hollow Rd., Hutton, VA
22920

LO38-1

1. I have reviewed the draft EIS document, ACP Volume 1: AP-1 Construction Alignment Map book; panels 198 and 199. The two profile views on these pages show the ACP running along the top of the land at ground level. My understanding is that the pipeline will tunnel through the mountain at this location, but you wouldn't know that from looking at these two pages. The two maps for panels 198 and 199 show a permanent right-of-way going over the mountain and causing a break in the Appalachian Trail and Blue Ridge Parkway. If the pipeline goes through a tunnel at this location, why is a permanent right-of-way needed? Will Congress grant the necessary approval for this break in the Appalachian Trail and Blue Ridge Parkway? Or is this just another mistake in the draft EIS, of which I have heard there are many?

LO38-1

The project facility maps provided in appendix B of the EIS are intended to show the route of the pipeline, not the construction methods (e.g., HDD) that would be used to install the pipe. Section 4.8.9.2 discusses management of the BRP and ANST.

Z-2859

LANDOWNERS COMMENTS

LO38 – Dan Lysy (cont'd)

Z-2860

⑤ ACP Draft EIS Comments
2/27/17 Comment Session; Nelson Co. R3.
Dan Lysy

LO38-2

2

I don't believe that the draft EIS process has fully explored all available options for co-location of the ACP. One unexplored option is the use of existing rail lines; CSX and Norfolk Southern, for co-location. If the ACP is going to infringe upon the property rights of private property owners, it may as well be on another corporation that already has an environmentally disruptive use in place, and not create a new disturbance and disruptive land-use that is not in compliance with local government land use plans.

LO38-2

3

FERC should expand the scope of its review process to consider existing gas pipeline infrastructure; such as Transco and Columbia Gas, as well as the proposed Mountain Valley pipeline, to meet the future needs of utility customers. In other words, FERC should have conducted a programmatic EIS process that covers both the ACP and the Mountain Valley pipeline. ~~It~~

LO38-4

FERC has also not taken into full consideration the future impact of solar, wind, geothermal, and other ~~new~~ renewable energy sources, as well as improved conservation. These new, environmental

LO38-2 See the response to comment SA15-3.

LO38-3 See the response to comment CO55-6.

LO38-4 See the response to comment CO66-2.

LANDOWNERS COMMENTS

LO38 - Dan Lysy (cont'd)

③ ACP Draft EIS Comments
2/22/17 Comment Session; Nelson Co. H.S.
Dan Lysy

LO38-4
(cont'd)

friendly energy sources and measures will have a big impact on future energy supply and demand, and I question the need for both the ACP and the Mountain Valley Pipeline, with all of this existing and new energy supply, and ~~not~~ less than expected demand.

LO38-5

This expensive new infrastructure will be passed along to utility customers; that is homeowners, businesses and industries. If FERC still does choose to grant authorization for the ACP, it must not grant a lucrative ~~rate~~ 15% rate of return ~~profit~~, which will be on top of other costs passed along to customers. Dominion will pass along all of these costs, maximize its profits, and executive bonuses, because it can and knows there is nothing we can do about it.

DNL/

LO38-5 See the response to comment CO85-7.

Z-2861

LANDOWNERS COMMENTS

LO39 – Todd Rath

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 All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

TODD M. RATH
161 Wood House Ln
Nellysford, VA 22958

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

LO39-1

1) How does a company that is for profit get to steal ones land for private gain... especially when its for Export!!!

2) This is violating our American Rights and our constitution

LO39-2

3) There are many other established paths for this pipeline. Dominion just paid off politicians to create area to lease to future utilities for more profit!

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LO39-1 See the response to comment CO50-2.

LO39-2 See the response to comment SA15-3.

Z-2862

LANDOWNERS COMMENTS

LO40 -Mike Craig

Z-2863

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- All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

MIKE CRAIG
WILLOW CREEK 3464 WILLOW CREEK
STAMPON VA 22971

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

- LO40-1 | DONT THINK THIS PIPELINE IS NEEDED I DONT
- LO40-2 | EVERYTHING ABOUT THIS IS BAD FOR NATURE CLEAR CUTTING
- LO40-3 | THE TREES WITHIN THE PIPELINE IS GOING AND NOT LETTING
THEM COME BACK I BELIEVE THE CASCADAS + MOUNTAINS WOULD
BE THE SAME I DONT THINK ITS SAFE LIKE LIVING WITH
- LO40-4 | ABOUT THESE NOTHING GOOD ABOUT THIS
DONT APPROVE IT

¹ The Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account by clicking on "Login to File" and then "New User Account".

- LO40-1 | Comment noted. See the response to comment CO46-1.
- LO40-2 | Refer to section 4.4 for a discussion of the potential impacts on forested vegetation and mitigation measures that would be implemented. Only 10 feet centered on the pipeline would be maintained in an herbaceous state, and trees taller than 15 feet within 15 feet of the pipeline would also be removed to preserve pipeline integrity.
- LO40-3 | Comment noted.
- LO40-4 | Comment noted. Section 4.12 discusses reliability and safety during construction and operation of the projects.

LANDOWNERS COMMENTS

LO41 – John and Jonna Clarkson

Z-2864

FERC: Atlantic Coast Pipeline Docket # CP15-554

We are extremely against the Atlantic Coast Pipeline that will go through much pristine property in Virginia. With the tremendous population growth areas in Virginia, that undeveloped land is becoming rare. The ACP will destroy that precious Virginia treasure for perpetuity.

The people, who live in DC, the cities of Virginia, and other states, travel specifically TO the counties affected by the ACP, including Nelson County, where we live. They crave the rural nature of our counties as a contrast to the urban sprawl where they live and work. The forests, Appalachian Trail, farms, orchards, breweries, wineries, distilleries, hiking, biking, and horse trails, waterways, and just the peace of getting into the beauty and quiet of nature are all needed to relieve stress and refuel potential as people come to Virginia for vacations. Nelson County is known to many visitors as God's country, because it is so magnificent in its mountains and rural beauty.

The people who live in these rural areas have chosen particularly to live here, BECAUSE it is quiet and undeveloped. They prefer to drive a distance to their work, but come home to the country, raise their families in the country. Many live on land that has been in their families for generations. They have nurtured and preserved the rural environment. They take care of forests and streams on their property. This history of this land and our county is important to us. We have worked to preserve these values. Nelson County has deliberately worked to keep out "smoke stack" industries; it has cultivated an agri-tourism business featuring those advantages we listed above that non-residents choose to come to Nelson for. These businesses, the people who have built them, the people who work in them and the economy of Nelson County will be harmed greatly. The ACP will destroy the future prospects of the tourism industry and the families who depend upon it for jobs.

- LO41-1 | **The ACP first of all goes against the constitutional right of personal property.** It is un-American that a for profit company could be allowed to take a family's property and bury a perpetual threat to their health, livelihood, future value and use of their own home and land.
- LO41-2 | **FERC has admitted in the EIS that there will be an adverse environmental impact. Once that damage is done, there is no reversing it. It is lost forever!**
- LO41-3 | **Studies show that there is enough natural gas infrastructure ALREADY for far into the future. The ACP is not needed.**
- LO41-4 | **Most of the people affected by the ACP use wells for their home water supply; these will be harmed by the ACP. There is no alternative in these rural areas.**
- LO41-5 | **Many live on roads that only have one way in and one way out. If ever there was a leak or explosion, people would have no escape. We have been told that, because Nelson is rural, shut off valves will not be automatic! Every week, we hear of gas leaks and explosions somewhere in our country, so this is a**

- LO41-1 | Comment noted.
- LO41-2 | Comments noted. The EIS acknowledges potential impacts on environmental resources, and identifies the measures that Atlantic and DETI would implement, as well as our additional recommended measures that would further reduce impacts.
- LO41-3 | See the response to comment CO46-1.
- LO41-4 | Potential impacts, and measures to reduce impacts, on groundwater, including water supply wells, are discussed in section 4.3.1.
- LO41-5 | See the response to comment CO48-2.

LANDOWNERS COMMENTS

LO41 – John and Jonna Clarkson (cont'd)

Z-2865

LO41-5 (cont'd) | **serious problem. It seems country people are disposable to Dominion and FERC. Profits are more important than safety of people.**

LO41-6 | **Many of the landowners have conservation easements or agricultural and forestry protected areas. They have taken care of and pledged to continue to take care of these lands that now the ACP will destroy.**

LO41-7 | **Many of these landowners only have their land value as a retirement asset and the ACP will lower that value.**

LO41-8 | **Much of the terrain the ACP proposes to traverse is extreme mountain land that is prone to flooding and landslides. This has already happened in Hurricane Camille in 1969 and the work of constructing the ACP will make that much worse.**

LO41-9 | **The ACP proposes that they only take a strip of land for the pipeline; however, due to the mountainous terrain, the access roads for construction will be excessive, cutting down more trees, destroying more of the natural environment, and leaving that devastation behind. All this will affect the flooding and erosion problem, not just the ditch for the pipeline.**

LO41-10 | **It would be cheaper, more efficient, and certainly less harmful to generate electricity at the natural gas source and transmit electricity from there.**


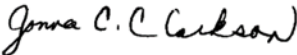
LO41-11 | **Dominion has a bad reputation for not being truthful. No one trusts anyone who speaks for Dominion. We have seen how they have acted during this process. They have a bad track record with a VA nuclear power plant, among other things, so no one trusts that they will do a good job, will use the best materials, that they will treat landowners fairly, or take appropriate care of the pipeline.**

LO41-12 | **In closing, the ACP is not needed, is destructive to the environment and harmful to people. Natural gas is not the energy of the future; it is already evident that methane is harmful and gas sources will run out. FERC and energy companies should be investing in renewable energy.**

People matter. Constitutional property rights matter. Our environment matters. This precious rural nature matters. These are what should be considered in making this overwhelmingly life altering decision, not profit for Dominion or Duke.

The landowners in Nelson will stand together to fight the ACP. We have only grown in strength and determination. Dominion will have to use eminent domain to take Nelson County land if they pursue this robbery and assault on landowners' property. Hostility toward the ACP is strong in all the affected counties and getting stronger the more people learn about Dominion and their intentions.

We ask that FERC do the right thing and deny the application for the Atlantic Coast Pipeline.

Sincerely,  
John and Jonna Clarkson

LO41-6 | Special interest areas such as designated/protected agricultural or forested areas and conservation easements crossed by the project are described in sections 4.4.2 and 4.8.5.

LO41-7 | Comment noted

LO41-8 | Comment noted.

LO41-9 | The EIS analysis of environmental impacts associated with ACP and SHP includes all areas that would be required during construction and operation of the projects, including access roads, ATWS, yards, etc.

LO41-10 | Comment noted.

LO41-11 | The purpose of the EIS is to analyze the potential environmental impacts of ACP and SHP. Past issues related to Dominion are outside the scope of this EIS.

LO41-12 | Comments noted.

LANDOWNERS COMMENTS

LO42 – Kassam Adams

Z-2866

	<p>Kassam-Adams comments on ACP (CP15-554) DEIS at Nelson County High School Feb 22 2107</p> <p>The Draft EIS is seriously flawed and cannot provide the basis for a reasonable decision by FERC.</p> <p>Purpose & need</p> <p>As a citizen I am deeply disturbed with the shallow analysis and consideration concerning the project purpose and need. The DEIS does not contain any meaningful analysis of the legitimacy of the applicant's stated need for the ACP in light of existing energy resources and projected future energy needs. FERC was presented with a wealth of credible contrasting evidence, which it has essentially ignored, as there is no analysis provided by FERC staff.</p> <p>Further, the DEIS acknowledges that modification of existing pipeline systems is an alternative to meet the supposed projected need (as presented by the ACP applicants), but quickly dismisses these alternatives with little analysis.</p> <p>Impact</p> <p>Regarding impact of the proposed ACP, the DEIS is incomplete and rife with omissions and errors.</p> <p>The destruction of forests is one example. By Dominion's own admission, pipeline construction would result in "permanent conversion of forested land to open land in the maintained rights of way." (<i>Resource Report 8 - Land Use, Recreation, and Aesthetics, Section 8.3</i>). The DEIS acknowledges this permanent impact of removal of forests, but somehow concludes that this is acceptable.</p> <p>The section of the proposed route that affects my own properties goes entirely through the beautiful woods that surround our home. Dominion would clear cut a construction right of way as wide as an 8 lane highway, removing a huge swathe of mature hardwood forest and inflicting permanent damage on the ecology, appearance, and character of our area, and on our property values and quality of life.</p> <p>Regarding the impact on the farmlands, forested areas, and the quiet beauty that is the basis of our tourism-based economy in Nelson County, the DEIS inexplicably concludes that: "recreational uses and tourism activities in the project area would not be affected by operation of the project." There is no basis presented for this conclusion.</p> <p>Finally, eminent domain:</p> <p>As a citizen, I strenuously object to the threatened use of eminent domain to take private property (ours or any other) solely for the profit of a private entity, and for a project which is demonstrably NOT needed to meet our region's or our nation's energy needs.</p> <p>As affected landowners with two properties on the current proposed route for the ACP, my husband and I can state unequivocally that we <u>will never negotiate with the ACP</u> and will never consent to the pipeline on our property. We take seriously our duty of stewardship for this land which we love, and in which we have invested our time, energy, and resources.</p>
LO42-1	
LO42-2	
LO42-3	
LO42-4	

- LO42-1 See the response to comment CO46-1.
- LO42-2 Comments noted.
- LO42-3 The pipeline would be installed underground and, thus, not preclude the use of any area for recreational purposes during operations.
- LO42-4 Comment noted.

LANDOWNERS COMMENTS

LO43 – Wisteria Johnson

Z-2867

LO43-1

Name is Wisteria Johnson, 2016 Wheeler Cove Road Shipman, Virginia 22971

I will address Cultural Attachment: The pipeline ~~adversely~~^{adversely} affects the attachment my family has to our culture created by the lay of the land. The entire process of planting the pipeline and then having to live with it creates such a sense of insecurity that it takes a negative impact on the whole emotional composition of my family. This human environment is seven generations in the making. The culture that has been established in my world is accumulative from 1830's to present. It starts with Cherokee and Slave ancestry along with childhood of Confederate army officers. Our family today can stand in the same areas that our ancestors once stood. My family has lived and continues to live off of earth's gifts. To this end we have learned to respect its creatures, care for its soil, water, trees and animals. We have learned the importance of work, respect for self and others. Fifth and sixth generation used our culture and respect for the land to complete college, pursue productive careers, marry and develop children that contributes to society.

To say that the construction of the pipeline is not a threat to our culture because the pipe is buried in the ground is heavily flawed. Let me ask you to consider this thought. Isn't it possible that your particular corporate or government attachment can be ~~adversely~~^{adversely} affected by the unseen elements. If you do not think so, consider your recent former commissioner's status.

LO43-2

Secondly let me express my Homeland Security concern. You know that you are in the business of laying new areas of pipes instead of using existing corridors. You and everyone know its for the sake of greed. But do you realize that by doing this you are planting pipes all over America. I know you have got to know that you are increasing explosive sources. For the life of this country, I do not understand. It is so clear to many of us for the sake of Greed and arrogance, you are creating greater means of easy access to Terrorists. The worse being the image of a bomber with a pipeline map. You are weakening America's infrastructure substantially. American is subject now more than ever to invasion or internal strife.

My last words, I am powerless to stop the money powers. I can only end in this thought. I hope for every damage, injury and emotional hurt that we landowners, families and average citizenry suffer as a result of your indifference and intentional negligence be visited upon you and your family.

LO43-1

The EIS discusses cultural attachment in section 4.10.1.1.

LO43-2

Issues related to terrorism and its potential effects on the proposed projects are addressed in section 4.12.4 of the EIS.

LANDOWNERS COMMENTS

LO44 – Cynthia Corbin (cont'd)

Z-2869

60125 THOMAS NELSON HWY (RT. 29) LOVINGSTON

SPACE CREEK FARMHOUSE
460 HORIZONS Village Road
NELLYSFORD VA
22958

Comment # 76
Cynthia Corbin

LO44-1 I've seen to discuss 3 things that I have been told.

LO44-2

LO44-3

ACP
Docket
CR15-57

- I've been told this pipeline would provide public benefit - meet the increasing need of the public for energy. And that makes it OK to seize privately owned land, scar and ruin huge sections of the beautiful Blue Ridge Mountains, and essentially destroy the growth potential of the already successful ecotourism industry in this area. But I looked and can't find any evidence that the proposed pipeline provides any significant lasting public benefit. All I find are statements like this one from Greg Husport, senior attorney with the Environmental Law Center (ELC), "Dunbar's Atlantic Coast pipeline... is unnecessary." He goes on to say that the existing infrastructure will meet demands for natural gas for at least another 15 years, and he adds "this is a Dunbar's self-enrichment project, not a public interest."
- I've been told the draft EIS that the FERC is currently preparing to approve is a comprehensive study of environmental impacts to the surrounding area: of the proposed ACP route and that as long as the recommendations of the FERC are followed, the impacts of this route of our national treasures will be "less-than-significant." Yet just a couple of days ago, a team of Dunbar's Power surveyors discovered previously unidentified wetlands on my property. This was made known to me not by the surveyors, not by Dunbar Power, but by the FERC, and not by the folks from the ACP. I was only made aware of this because one of my neighbors was taking through the area while the surveyors were there and wanted to make sure I knew about it in a discovery. It makes me wonder how many other important wetlands and watersheds are out to be discovered or mentioned in the EIS and if left unmentioned will be plowed under as if worthless, causing untold and unmeasurable environmental impacts.
- I've been told that if the pipeline is approved and does go through our land that my husband and I will be compensated and given "fair market value" for the property. We bought this property because we fell in love with the views, the farmhouse, the barn, the creek, the proximity to all of the wonderful things that Nature can only be so offer like hiking, fishing, boating, skiing, breweries, wineries, horseback riding and the list goes on. I admit, we found our dream retirement home a little sooner than planned, so I do regret not our house until my husband and I can retire, sell our home in Northern Virginia and move to Haysfork. We decided to offer the home as a vacation rental. You can't imagine how successful that has been. It would love coming here - I don't know for certain, but I think it will all change if there is a huge barn scar running through the middle of it. If we can't rent the property anymore for vacations, that will certainly slow down or even halt our ability to put our retirement plans into action. What I'm saying is - you can't put a "fair market value" on a dream.

Now I want to tell you 3 things.

- I plan to do everything in my power to ensure that private property will only be taken via eminent domain, if and only if valid evidence has shown it provides lasting benefit to the public.
- I will continue to work tirelessly with others affected by this administration to ensure that the FERC doesn't "rubber stamp" the incomplete and frankly, wrong current version of the EIS and that if they do, they are called out publicly to answer for their inaction.
- There's still no way to put a price on a dream, but I'm working on it.

Cynthia Corbin
11254 CAISSON CT
WOODBRIDGE VA 22192

Corbin.ch@comcast.net

LO44-1

See the response to comment CO46-1.

LO44-2

Before a notice to proceed with construction is issued, Atlantic and DETI would be required to comply with all environmental conditions attached to an Order authorizing the projects. Currently, these are presented in the form of recommended conditions in the EIS text and compiled in EIS section 5.2. Among these conditions are requirements to complete all environmental surveys and reports, and documentation to prove that the applicant has received all applicable authorizations required under federal law.

The EIS discloses the potential impacts on environmental resources resulting from construction and operation of the project. The EIS was prepared in accordance with NEPA, CEQ guidelines, and other applicable requirements. The EIS includes sufficient detail to enable the reader to understand and consider the issues raised by the proposed project and addresses a reasonable range of alternatives. The EIS is consistent with FERC style, formatting, and policy regarding NEPA evaluation of alternatives and different types of impacts, including cumulative impacts. Duration and significance of impacts are discussed throughout the various EIS resource sections. The EIS is comprehensive and thorough in its identification and evaluation of feasible mitigation measures to reduce those effects whenever possible. Atlantic's and DETI's construction and restoration plans contain numerous mitigation measures to avoid or reduce project-related impacts.


LO44-3

Section 4.8.2 describes the easement negotiation process.

LANDOWNERS COMMENTS

LO45 – Barbara and Robert Fuhrman

Z-2870



Comments to FERC representatives, February 22, 2017, Lovingson, VA
Barbara and Robert Fuhrman
215 Flying Eagle Court, Nellysford, VA 22958

Look carefully at the people pictured in the Christmas card. They mean nothing to you, but they mean everything to me. My husband spent 20 years in the Navy, willing to sacrifice his life to defend you and your rights. He now teaches students how to defend our planet by teaching environmental science classes. I have just retired after forty-five years of teaching. My students were taught to use their God-given talents to make the world a better place.

During the past seven years, we have lost control of our lives because of FERC's decisions combined with the greed of the fossil fuel industry. In 2015 we were forced to sell our retirement property because you were placing a pipeline near it. We were scared to live next to a bomb and wanted to retain at least some equity to pass on to our children. We lost \$42,000. We purchased another modest property in Nellysford, Virginia, where we could retire and enjoy beautiful views of the mountains. You had different plans. You moved the ACP literally into our backyard! Your brilliant plan is to cross the river along one border of our property, turn 45 degrees to the right, and then rip up all of the land along the back border of our yard, seizing the land through eminent domain and planting a 42" incendiary device along two sides of our yard. Unbelievable! Unfortunately, we are unable to move again. Our funds are depleted. We are senior citizens and have no way to increase our income.

LO45-1 |

LO45-2 | If you approve the ACP, what kind of a world will you have created for our four-year-old grandson? Will he be able to fish and play by the river? Will he be able to drink our well water? In fact, will his parents allow him to visit us at all knowing that a huge bomb threat exists fifty feet from his sandbox and 125 feet from our house?

LO45-3 |

LO45-4 |

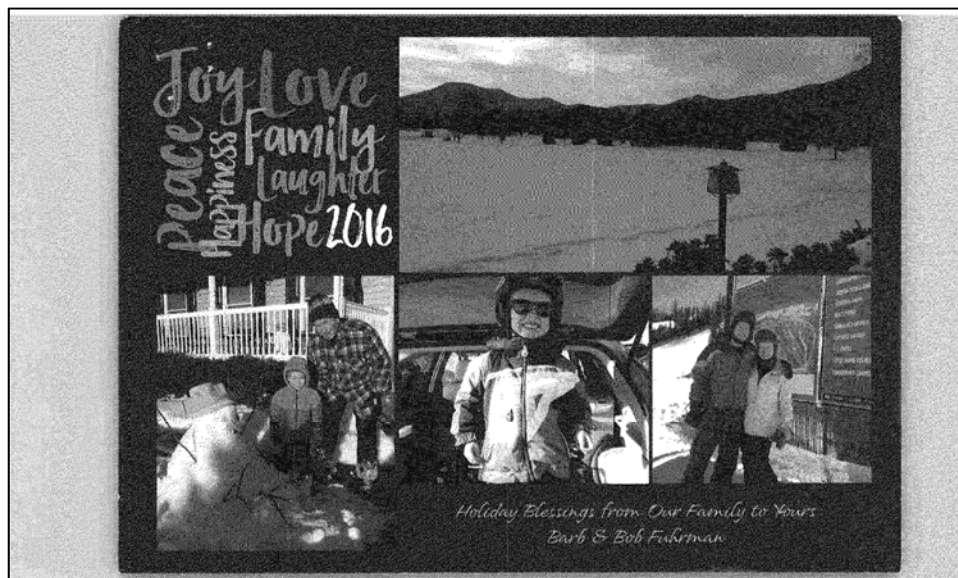
LO45-5 | Worst of all, according to facts found on your own FERC government website, the ACP isn't even necessary to meet our national energy needs for decades! We have an abundant gas supply, and we can use currently existing pipelines to move gas to places where it is needed. In fact, we have such a surplus of natural gas that currently there are fourteen proposed U.S. liquid natural gas export terminals waiting to be certified! Why ship the gas out of our country? Corporate greed.

So, what are you going to do? You have a choice. Your agency is entrusted to maintain an adequate and safe supply of energy. As you contemplate certifying the ACP, please consider your duty to protect citizens and maintain the health of the planet. Our very lives are in your hands. When you go to bed tonight, think of the little boy in the photo. What kind of a world are you creating for him? Will he even be alive to enjoy it? Choose wisely. The damage cannot be undone. You, and all of us, will have to live with the results of your decision. I pray that you will make the right decision.

- LO45-1 We acknowledge the potential risk associated with operation of ACP and SHP. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation. Section 4.9.7 addresses property values, insurance, and property taxes.
- LO45-2 Sections 4.8.1.1 and 4.8.5 discuss impacts on land uses and recreation and special interest areas, respectively, resulting from construction and operation of the project.
- LO45-3 Potential impacts, and measures to reduce impacts, on groundwater, including water supply wells, are discussed in section 4.3.1.
- LO45-4 See the response to comment LO45-1.
- LO45-5 See the response to comment CO46-1.

LANDOWNERS COMMENTS

LO45 – Barbara and Robert Fuhrman (cont'd)



Z-2871



LANDOWNERS COMMENTS

LO46 – Joan and Jim Klemic

FEDERAL ENERGY REGULATORY COMMISSION
ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Comments can be: (1) left with a FERC representative; (2) mailed to the addresses below; or (3) electronically filed.¹

For Official Mail Filing, Send To:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

As applicable, please indicate project(s) you are commenting on:

- Atlantic Coast Pipeline: Docket No. CP15-554
 Supply Header Project: Docket No. CP15-555
 All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

JOAN KLEMIC | JIM KLEMIC
8486 ROCKFISH VALLEY HWY
AFTON VA 22920

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

- LO46-1 IF THERE NEED TO BE MANY PIPELINES AS THERE
APPARENTLY IS, THEY SHOULD BE LOCATED WHERE
THEY DO THE LEAST HARM SUCH AS ALONG EXISTING
PIPELINES AND/OR RIGHTS OF WAY. AS IT STANDS
- LO46-2 THE ACP ROUTE GOES WHERE IT IS DANGEROUS,
WHERE IT IS DAMAGING TO THE ENVIRONMENT,
- LO46-3 WHERE IT DESTROYS HISTORICAL SITES AND WILL
BE EXTREMELY DETRIMENTAL TO NELSON COUNTY
- LO46-4 TOURISM.
- LO46-5 ALL FRACKING IS BAD - THE SCIENCE IS THERE.
PROFIT IS GOOD BUT NOT AT SUCH A SACRIFICE TO

¹ The Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account by clicking on "Login to File" and then "New User Account".

- LO46-1 See the response to comment SA15-3.
- LO46-2 We acknowledge the potential risk associated with operation of ACP and SHP. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation.
- LO46-3 Comment noted.
- LO46-4 Comment noted
- LO46-5 See the response to comment CO48-10.

Z-2872

LANDOWNERS COMMENTS

LO46 – Joan and Jim Klemic (cont'd)

LO46-5
(cont'd)

THE FUTURE GENERATIONS.

FIRST DO NO HARM!

Joan Klemic

Jim Klemic

Z-2873

LANDOWNERS COMMENTS

LO47 – Janice Jackson

Z-2874

LO47-1

Comments made at FERC Session on the Atlantic Coast Pipeline (ACP) DEIS
Nelson County – February 22, 2017
Janice Jackson, 6438 Laurel Rd.
Shipman, VA 22971

My comments address the insufficient and insensitive treatment of Cultural Attachment in the DEIS. For over 2 years, I have been working to raise awareness of the proposed pipeline's devastating impact to historical and cultural sites, and particularly to African American families who have lived in Nelson County for generations, since they acquired ownership of their land after slavery.

During the scoping period, the Nelson County Historical Society and families in the Wingina/Warminster Rural Historic District and Wheeler's/Harris Cove areas wrote letters to FERC about how the pipeline would cause irreparable harm to landowners who are tied to their land through a sense of place and kinship patterns, and have developed deep cultural attachments to the natural, physical and spiritual environment. These letters discussed how this attachment is non-economic and non-transferable, and that its loss cannot be mitigated through monetary compensation or by the receipt of comparable land.

Accession #'s – Nelson County Historical Society (20160411-5407), signed also by Friends of Nelson, the Millennium Group and four other Nelson organizations; 8 letters from the Woodson, Rose, Dillard, ~~Wheat~~ and Early families (20160602-5292); letter from the Harris Family (20160426-5235.)

It has previously been pointed out to FERC that there is precedent and legal standing for inclusion of social and cultural impacts as subjects of environmental concern under its NEPA review of the ACP, and that it is your responsibility to do so. Yet, FERC dismissed the validity of these arguments and inaccurately stated in Section 4.425 that "Historic preservation laws and regulations do not require an assessment of cultural attachment..." **And, in a total insult to long-standing Nelson County families, stated that "We do not anticipate any negative impacts on the Nelson County community's cultural attachment to the landscape."** FERC has made this blanket statement without doing any kind of cultural assessment.

FERC is clearly skirting requirements of federal regulations. NEPA itself, and the Council on Environmental Quality regulations, require that agencies consider the effects of their actions on all aspects of the "human environment." Humans relate to their environment through their culture, so the cultural aspects of the environment obviously must be considered in NEPA analyses.

Section 1508.14 of the NEPA regulations states the following:

"Human Environment" shall be interpreted comprehensively to include the natural and physical environment and the relationship of people with that environment. This means that economic or social effects are not intended by themselves to require preparation of an environmental impact statement. **When an environmental impact statement is prepared and economic or social and natural or physical environmental effects are interrelated, then the environmental impact statement will discuss all of these effects on the human environment.**

Further, Section 1508.7 requires **Cumulative Impact** to be considered, which is defined as impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions...

(OVER)

LO47-1 See the responses to comments CO37-1 and LO43-1.

LANDOWNERS COMMENTS

LO47 – Janice Jackson (cont'd)

LO47-1
(cont'd)

Section 1508.8 defines effects in the above 1508.14 regulations as:

"Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, **historic, cultural**, economic, **social**, or health, whether direct, indirect, or cumulative..."

It is clear that under the requirement to include "human environment," a NEPA environmental analysis must systematically address the "human" — social and cultural — aspects of the environment. This is exactly what Nelson County has been requesting.

ACP and FERC have chosen to ignore procedure required by law. Whether this lapse is evidence of ignorance or evasion, it is clear that any assessment of Cultural Attachment in Nelson County would conclude that construction of the ACP would result in permanent, negative impacts that cannot be mitigated.

Z-2875

LANDOWNERS COMMENTS

LO48 – Janice Jackson

Z-2876

LO48-1

Comments made at FERC Session on the Atlantic Coast Pipeline (ACP) DEIS
Nelson County – February 22, 2017
Janice Jackson, 6438 Laurel Rd.
Shipman, VA 22971

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During the scoping period, the Nelson County Historical Society and families in the Wingina/Warminster Rural Historic District and Wheeler's/Harris Cove areas wrote letters to FERC about how the pipeline would cause irreparable harm to landowners who are tied to their land through a sense of place and kinship patterns, and have developed deep cultural attachments to the natural, physical and spiritual environment. These letters discussed how this attachment is non-economic and non-transferable, and that its loss cannot be mitigated through monetary compensation or by the receipt of comparable land.

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Further, Section 1508.7 requires **Cumulative Impact** to be considered, which is defined as impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions...

James L. Rose
2225 UNION HILL DRIVE
WINGINA, VA, 24599

LO48-1 See the response to comment LO43-1.

LANDOWNERS COMMENTS

LO48 – Janice Jackson (cont'd)

LO48-1
(cont'd)

Section 1508.8 defines effects in the above 1508.14 regulations as:

"Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, **historic, cultural**, economic, **social**, or health, whether direct, indirect, or cumulative..."

It is clear that under the requirement to include "human environment," a NEPA environmental analysis must systematically address the "human" — social and cultural — aspects of the environment. This is exactly what Nelson County has been requesting.

ACP and FERC have chosen to ignore procedure required by law. Whether this lapse is evidence of ignorance or evasion, it is clear that any assessment of Cultural Attachment in Nelson County would conclude that construction of the ACP would result in permanent, negative impacts that cannot be mitigated.

Z-2877

LANDOWNERS COMMENTS

LO49 – Hershel and Darlene Spears

FEDERAL ENERGY REGULATORY COMMISSION
ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Comments can be: (1) left with a FERC representative; (2) mailed to the addresses below; or (3) electronically filed.¹

For Official Mail Filing, Send To:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

As applicable, please indicate project(s) you are commenting on:

- Atlantic Coast Pipeline: Docket No. CP15-554
- Supply Header Project: Docket No. CP15-555
- All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

Hershel & Darlene Spears
2215 Spruce Creek Lane
Nellysford VA 22958

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

The Atlantic Coast Pipeline (ACP) impacts us directly ~
it is coming through our property & will be approximately
100' from our four year old "dream home". We are
fighting the pipeline for many reasons. Obviously,
it affects us directly ~ we have 43 acres all wooded
except for two acres we cleared for the house. The
pipeline will remove many of the trees near our home.
The ACP is also planning to use our single lane
gravel one-quarter of a mile ^{wind} driveway to bring
up the 40' pipes & machinery to work on the
pipeline ~ our peace & quiet will be completely destroyed.

¹ The Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account by clicking on "Login to File" and then "New User Account".

LO400-4

LO49-1 See the response to comments CO8-1 and CO68-12.

Z-2878

LO49-1

LANDOWNERS COMMENTS

LO49 – Sage Beam (cont'd)

Z-2879

LO49-1
(cont'd)

The ACP will have access to our driveway & property for ever in order to maintain the pipeline.

We are outraged that they can destroy our property & use our driveway against our will.

We find it incredible that a private for profit company will be given eminent domain privileges against our wishes.

LO49-2

We also believe the pipeline is not needed.

There are sufficient pipelines already in place to serve the needs of the power & natural gas companies. And even though they deny it, we believe some of this natural gas will be exported to other countries.

LO49-3

We also believe the pipeline should not be allowed to go through National Forests. It will destroy the forests. The forest will be divided & cause issues for the wildlife.

LO49-4

We also feel that the pipeline will destroy Nelson County & the other counties in Virginia. The mountains in Nelson are extremely rocky & steep. Erosion will be a huge problem. It will also negatively impact the streams & rivers.

LO49-5

The ACP will also be bad for the Nelson County economy. Property values & sales have already been impacted & will decrease further with the building of the pipeline.

Nelson County tourism will also be negatively impacted. Several projects have been cancelled or put on hold. People visit Nelson because of its beauty.

We are adamantly opposed to the ACP.

LO49-2 See the response to comment CO46-1.

LO49-3 FS response: Section 28 of the Mineral Leasing Act of 1920, as amended, allows the use of NFS lands for pipelines. Further, the FS has worked with Atlantic to examine opportunities for collocation with other utility corridors on NFS lands. Since the draft EIS, Atlantic has provided additional inventories and analyses as requested by the FS to evaluate the effects of the proposed project. The FS has worked with Atlantic to develop project design features, mitigation measures and monitoring procedures to ensure that NFS resources are protected. Both FERC and the FS are developing mitigation and restoration measures to minimize the impacts on visual, soil, and wildlife resources that include revegetating as much of the operational corridor as possible after construction, as described in the draft COM Plan, appendix G and/or the SUP, if issued.

LO49-4 Section 4.2.3 discusses measures that would be implemented to reduce potential erosion impacts. Potential impacts on surface waters are discussed in section 4.3.2.

LO49-5 Comment noted.

LANDOWNERS COMMENTS

LO50 – John McMoneagle

Joseph W. McMoneagle
1530 Roberts Mountain Road
Faber, Virginia 22938

February 22, 2017

Kimberly D. Bose
Federal Energy Regulatory Commission
888 First Street, NE – Room 1A
Washington DC 20426

Reference: The Atlantic Coast Pipeline, LLC (Docket #CP15-554-000)

Dear Secretary Bose,

This letter I am writing as a retired 100% permanently disabled Veteran and ex-Governmental Contractor who spent almost 35-years living more out of a rucksack or a suitcase than a real building. That entire time during which I spent nearly 13-straight years overseas in service to my country traveling constantly in support of numerous intelligence agencies cost me two wives and my health. I've had two open heart surgeries and have had both shoulders replaced, as well as two twenty inch rods inserted into my spine along with 30 #8 pins – an injury suffered in South East Asia when blown out of a helicopter and falling just over 100-feet through trees, landing in a sitting position. This resulted in numerous fractures now deteriorated by arthritis. As a result I have been in sometimes unbearable pain since that incident. I have tried very hard not to let it interfere with the life I have shared with my third wife for over 30-years. I have been treated for PTSD for more than twenty-five of those years because of the numerous incidents I've experienced in addition to the destruction of my spine.

I am telling you all this because you need to understand just how important this absolute and incredible beauty that Nelson County offers effects those of us who only seek peace, quiet, and the tranquility of our surroundings. I've met many more veterans who live in my area who hold and cherish these same feelings that I do. This is a magical place of healing, where people live who care about the natural beauty and energy this place holds by simply being here.

Not a result of my injuries, but because of them . . . and having survived an open-heart surgery 30-years ago, my wife and I designed our own home. I drew the plans and specifications, then we built it together. I drove every single nail by hand. My insurance company says that the current full replacement value is close to three quarters of a million dollars. I ask you; do you think the value of mine or anyone else's property is going to remain the same after we fall beneath the shadow of a 42-inch natural gas pipeline?

LANDOWNERS COMMENTS

LO50 – John McMoneagle (cont'd)

Z-2881

Joseph W. McMoneagle
1530 Roberts Mountain Road
Faber, Virginia 22938

The following are facts regarding the location Dominion wants to install the pipeline within vicinity of our development:

- LO50-1 | a. The mountainside is completely unstable where they wish to put in an access road. There are currently numerous landslides of dirt visible on both sides of the roughed in roadway.
- LO50-2 | b. If one digs more than two feet on the ridge you hit solid granite which will require blasting. All of the homes on the mountain, to include the mountain top **Monroe Institute facility**, depend on water taken from a multitude of mountain fractures along 400+ foot deep 8-inch wells. Past construction on the mountain has required replacement of my wells numerous times. We now exist on water taken from two of these replacement wells teed-together. Loss of our fourth and fifth well might mean no more water accessible to our home. It will also result in permanently shutting down a multi-million-dollar International learning institute which has operated near our home for more than 38-years.
- LO50-3 | c. We have spent more than 35-years slowly improving our roads to the condition we can now enjoy. They are less than 12 feet in width in places, curves are way too narrow for heavy long-bed trucks to make safe turns or excessive weights passing over them. This has cost everyone here a lot of money, effort and work. Use of them for ingress/egress of pipeline equipment or service vehicles will destroy what we have accomplished. A single breakdown by a pipeline truck going in or out on the mountain will block many people from their jobs or homes as a result.
- LO50-4 | d. Recently, there have been three natural gas pipeline disasters somewhere across the Nation. These are much smaller pipes, yet required in one case, blocking off a square mile for safety. This pipeline will be 42-inches in diameter, the first of its kind, with much higher pressures than any built before. Would you want such a pipeline inside a quarter mile of your home? Would you want as many as 25 international students attending week-long conferences within a quarter mile of such a possible accident? I have direct experience with what are called "air/fuel explosions". The destruction that can be expected from a 42-inch pipe along an overhead ridge a quarter mile away with double the normal pressure will make international headlines.

Aside from the above; I spent most of my life dedicated to two things – protection of the American people and defense of the American Constitution. Who decided that a privately-owned oil company can just take people's property for profit? Who made the decision that money going into a handful of executive pockets is a more important issue than the Constitution right to protection under the law? Who decided not to use the thousands of miles of pipeline already installed throughout the state of Virginia? You must know in your heart that this is unconscionable. How would you feel if you spent 41

- LO50-1 | Comment noted. Refer to section 4.1.4.2 for a discussion of the mitigation measures that would be utilized in steep slope areas.
- LO50-2 | Comment noted.
- LO50-3 | See the response to comment CO55-46.
- LO50-4 | We acknowledge the potential risk associated with operation of ACP and SHP. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation.

LANDOWNERS COMMENTS

LO50 – John McMoneagle (cont'd)

Joseph W. McMoneagle
1530 Roberts Mountain Road
Faber, Virginia 22938

years of your life defending all American's rights not to have this happen, and then someone just walked all over you?

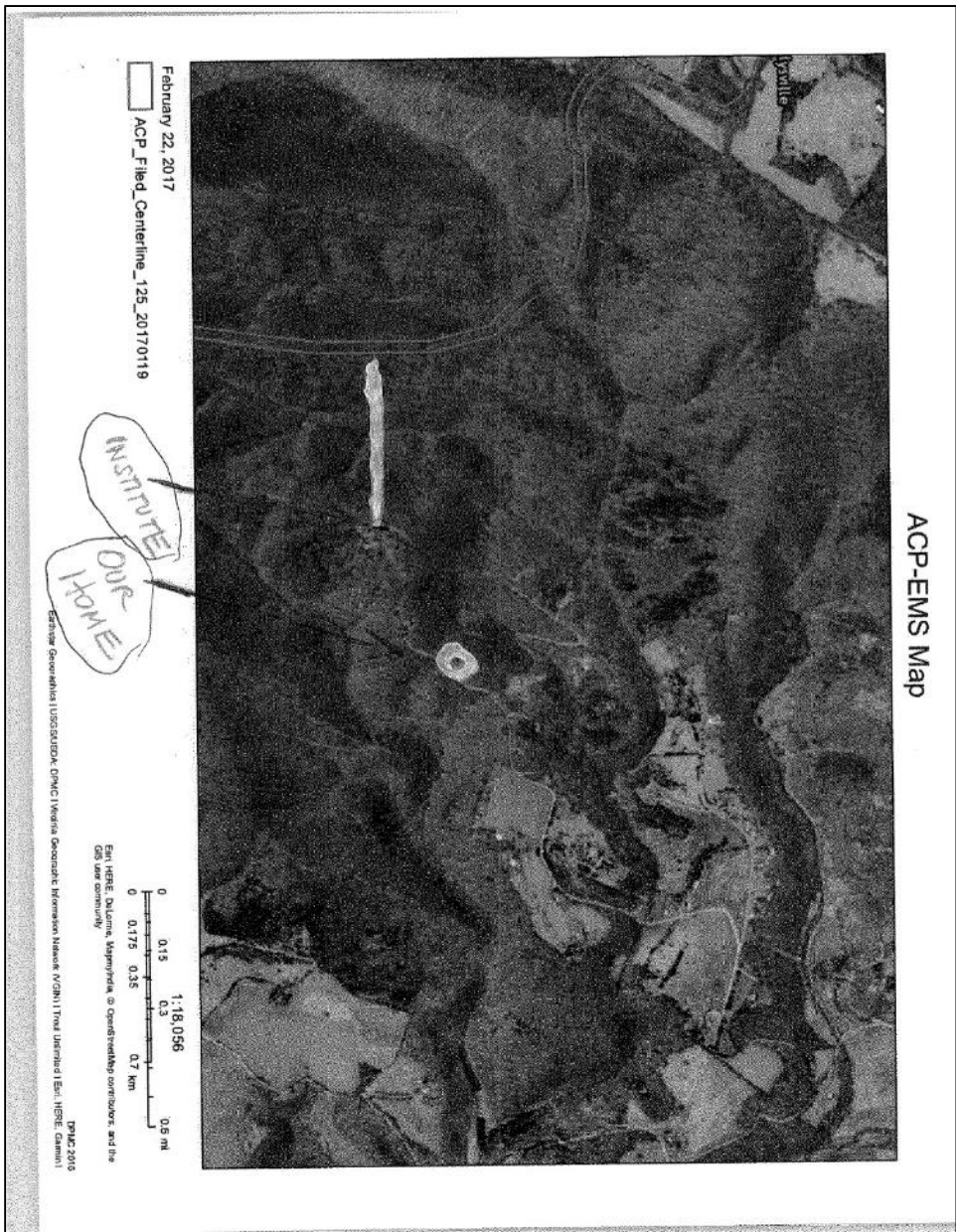
Please do not forget your personal moral and ethical responsibility. Please act responsible as our Federal Energy Regulatory Commission and answer the questions I have raised. Send someone to examine the facts of my statements. I will take them and show them how unstable our mountain is. During Hurricane Camille in 1969, the instability of this very mountain they now want to plant a 42" pipeline in, spewed millions of tons of stone, mud, and detritus downhill wiping out 100+ people, their homes, barns, vehicles, tractors, farm animals and belongings – none of which has ever been seen again. If this farcical plan is approved and a disaster follows, it will be on the conscience of everyone who allowed it to happen.

Sincerely,


Joseph McMoneagle

LANDOWNERS COMMENTS

LO50 – John McMoneagle (cont'd)



Z-2883

LANDOWNERS COMMENTS

LO51 – William Limpert

20170310-0109 FERC PDF (Unofficial) 03/10/2017

February 23, 2017 Scoping Comments For the Atlantic Coast Pipeline Draft Environmental Impact Statement Docket No. CP15-554

William F. Limpert

LO51-1

The Draft Environmental Impact Statement (DEIS) for the Atlantic Coast Pipeline is woefully deficient, and it should be rescinded and revised to correct the numerous mistakes and inaccuracies that it contains. The document incorrectly concludes that virtually all of the negative impacts from the project will be mitigated to less than significant status. It relies on inadequate mitigation plans to be implemented by a company that has proven in the application process that it is more than willing to mislead, omit, and ignore the facts regarding this project, and will be practically uninspected in the field.

FERC purposefully uses information that has been chosen to bolster the case for project approval, and ignores impartial and scientifically accurate information that has been submitted by the public, and is readily available elsewhere that overwhelmingly proves that this project would have far reaching and devastating impacts, and is not in the public interest. These negative impacts include loss of property rights and property values, loss of enjoyment of property, safety risks, significant threats to private drinking water supplies, certain pollution to local waterways, massive deforestation, loss of scenic and historic values, and continued discharge of greenhouse gases, exacerbating our already fragile climate future.

This document leaves FERC open to legal challenges at many levels, and for challenges to any subsequent approvals for this project as well. Rather than serving the public FERC has once again bowed in deference to the hand that feeds them...the energy industry.

This document was written with incomplete information. Information and studies including karst, geohazards, biological, survey results, and other data have been deferred until prior to the end of the DEIS comment period, prior to construction, and even in some cases, until after construction. Under this scenario the public does not have complete information on which to comment on the DEIS.

LO51-2

The document fails to designate the head of Little Valley, near Bolar, in Bath County Virginia as a high consequence area, even though my wife and I and 6 other homes would be trapped at the head of the valley in the evacuation zone, if we somehow survived a pipeline accident. That designation is required by law. Other areas of Bath County also require that designation, and have not been given it. Nevertheless, the document states that public safety will be protected.

LO51-3

The document fails to take into account the many alternatives to the ACP, and in fact, limits any alternatives to another natural gas pipeline that will carry the same amount of gas to the same delivery points.

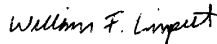
LO51-4

The document incorrectly finds no evidence of property value loss, except in rare cases where property value losses will be settled in court, even though studies and legal decisions that are readily available prove that property value losses would be very large.

LO51-5

The document incorrectly dismisses the risk of geohazards, and was written without geohazard surveys being completed. Atlantic's idea of diverting water away from construction on steep slopes as a geohazard mitigation technique is not acceptable in areas with karst soils in the valleys below, since this change in stormwater runoff can induce new sinkhole formation. Geohazards and karst exacerbate the safety threat.

Three minutes is hardly enough time to comment on this flawed document, but I will close by stating that it is wrong on just about every issue.



William F. Limpert

LO51-1

See the response to comment CO6-1.

LO51-2

See the response to comment CO66-56.

LO51-3

See section 3. There are no other proposed pipelines that deliver gas to the same delivery points.

LO51-4

Comment noted.

LO51-5

We disagree. See also the response to comment CO6-1.

Z-2884

LANDOWNERS COMMENTS

LO51 – William Limpert (cont'd)

20170310-0109 FERC PDF (Unofficial) 03/10/2017

wlimpert@gmail.com

250 Fern Gully Lane
Warm Springs, Virginia 24484
540-839-3202

4102 Garfield Road
Smithsburg, MD 21783
301-416-0571

Z-2885

LANDOWNERS COMMENTS

LO52 – James Bolton

Z-2886

February 22, 2017

Comment of James R. Bolton Re: the Draft Environmental Impact Statement for the Atlantic Coast Pipeline and Supply Header Project (Docket Nos. CP15-554-000, CP15-554-001, and CP15-555-000 FERC/EIS-0274D)

Members of the Commission,

Thank you for providing the opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the Atlantic Coast Pipeline and Supply Header Project.

most specifically, the final Resource Reports , that were prepared for ACP, LLC and Dominion Transmission, Inc. by the Natural Resources Group and submitted to the Commission in September of 2015, the DEIS is, on the other hand, a document prepared for and issued by the Commission itself and purports to represent a comprehensive evaluation and data-based analysis of the projects that result in various well-considered conclusions by FERC staff.

Quoting from p. 1-1 of the DEIS:

“The Commission’s environmental staff has prepared this draft Environmental Impact Statement (EIS) to assess the potential environmental impacts hat could result from the construction and operation of two separate, but related, interstate natural gas transmission pipelines and associated facilities proposed by Atlantic Coast Pipeline, LLC (Atlantic) and Dominion Transmission, Inc. (DTI).”

The DEIS Executive Summary confirms this through the repetitive use of language in the Alternatives Evaluated section found on p.ES-13. For example:

“Our analysis of system alternatives concluded....”

and;

“We evaluated 14 major pipeline route alternatives....”

In fact the phrases “we evaluated”, or “we conclude” are used no less than nine times in this section alone.

LO52-1

While this is all fine, well , and good, and leaving aside, for the moment, any consideration of the thoroughness of the evaluations mentioned and the validity of the arguments used in support of the conclusions arrived at, a closer examination of the language (itself) employed in the body of the document that follows raises serious questions about just whose evaluations and conclusions are being presented.

LO52-1

Applicants are required under 18 CFR to provide information to the Commission regarding environmental resources that could be affected by their proposals. Information provided by Atlantic and DETI for ACP and SHP was independently evaluated and was one resource used by the FERC staff for development of the EIS. See also the response to comment CO6-1.

LANDOWNERS COMMENTS

LO52 – James Bolton (cont'd)

LO52-1
(cont'd)

For example, in FERC's DEIS, **Sec. 3.2.2.1, Existing Transco Pipeline System** (p.3-4), we find:

"Construction of new mainline or lateral pipelines would also be necessary to reach the same delivery points as ACP in southeastern Virginia (approximately 160 miles) and North Carolina (approximately 180 to 200 miles).... The environmental impacts associated with these upgrades and new pipeline construction for the Transco system (a combined total of 640 to 680 miles of new pipeline) would likely be similar to the impacts of ACP and SHP, and we have not identified or received any information that suggests the alternative would provide a significant environmental advantage over ACP and SHP."

Interestingly, going back to Atlantic and DTI's document **Resource Report 10, Sec. 10.6.1.1, Transcontinental Pipeline Company** (p. 10-17), we find the following:

"...construction of new mainline or lateral pipelines would be necessary to reach the same delivery points as the ACP in southeastern Virginia (approximately 160 miles) and North Carolina (approximately 180 to 200 miles). The environmental impacts associated with the upgrades and new pipeline construction for the Transco system (a combined total of 640 to 680 miles of new pipeline) would likely be greater than those of the ACP. Therefore, the theoretical modifications to the existing system would provide no environmental advantage over the ACP."

Clearly, the lines from the Commission's DEIS seem to have been lifted directly from Atlantic and DTI's earlier document. Again, from sections of both documents that discuss a possible alternative using the Columbia Gas Transmission System;

"About 400 miles of new pipeline loop would be required to reach the proposed ACP delivery points in southern Virginia. Additional new pipeline construction would also be required to reach the delivery points in North Carolina, much of which could be similar to the proposed AP-2 mainline for ACP. The environmental impacts associated with construction of these facilities would likely be similar to or greater than those of ACP, and we have not identified or received any information that suggests the alternative would provide a significant environmental advantage over ACP and SHP. For this reason, and the fact that the current system does not meet ACP's purpose and need, modification of the Columbia pipeline system is not considered a viable alternative to ACP and SHP." (DEIS, p.3-5)

And;

"...up to 400 miles or more of new pipeline could be required to reach the proposed ACP delivery points in southern Virginia. Additional pipeline construction would also be required to reach the proposed delivery points in Brunswick County, Virginia (approximately 10 miles) and in southern North Carolina (approximately 170 miles), much of which could be similar to the proposed AP-2 mainline for the ACP."

Z-2887

LANDOWNERS COMMENTS

LO52 – James Bolton (cont'd)

LO52-1
(cont'd)

.....The environmental impacts associated with construction of these facilities would likely be greater than those of the ACP, so these theoretical modifications to the existing Columbia system would provide no environmental advantage over the ACP. For this reason, and the fact that the current system does not meet the ACP's purpose and need, the Columbia system in the Mid-Atlantic region is not considered a viable alternative to the ACP." (RR10, p. 10-18)

One could go on, as there are more such troubling examples of corresponding language in both documents (otherwise commonly referred to as plagiarism), but the point is that in spite of being presented as an analysis of the projects by "the Commission's environmental staff", it would appear that the wording and argument are, in fact, those of the applicants. This realization becomes even more troubling in light of the fact that these passages that parallel each other so closely are not merely summaries of relevant data, but also contain conclusions. Obviously, if these conclusions are, in fact, not independently arrived at by FERC, the entity that is charged to make sure that both the environment and the public are protected from the impacts of infrastructure overbuild, but are merely regurgitated directly from the applicants' previous submissions, the very integrity of the document must be called into question. From this perspective, one is forced to ask exactly what kind of game is being played here. Did the Commission really think that this apparent collusion with the applicants would simply slip by unnoticed? Please rest assured that for landowners along the route, whose property is under threat of being taken from them through eminent domain, and whose well-being, way of life, and in many cases, very livelihoods, are being compromised, this is very definitely not a game. We therefore insist that FERC take its role of protecting both the public and the environment from unjustified impacts more seriously than this fundamentally flawed DEIS indicates by producing a new edition that derives FERC's own data-based conclusions instead of merely mouthing the unavoidably biased and self-serving opinions of the applicants. We expect better and we demand better.

James R. Bolton

Z-2888

LANDOWNERS COMMENTS

LO53 – Carolyn Maki

Z-2889

FERC Comments 2/22/2017

RE: ACP: GW National Forest, South Rockfish Historic District, Tax Parcel: 21 A 113.

Secretary Bose and others,

Asking private property owners to support a corporate activity that is harmful to the public welfare is un-American. My comment is in reference to the proposed Atlantic Coast pipeline. Survey teams were on our property yesterday which just happened to be President's Day. Wednesday, Feb. 22 is Washington's Birthday. I come to you seeking a sensible approach to the impact of this private company's proposed use of eminent domain. This seems ironic since the founders of our country put the following into our constitution:

Amendment V to the U.S. Constitution reads, "No person shall be...deprived of life, liberty, or property, without due process of law; nor shall private property be taken for public use, without just compensation."

While the Constitution limits a government's eminent domain power to the taking of private property for public use — for public roads, public schools, etc. — over the years legislatures and the courts have broadened the use of eminent domain to include the taking of private property for public purposes. Eminent domain is a public trust, not a private power or for-profit corporation.

My family has not started any negotiation as we have fought to keep survey teams off our family farm. Archeological teams had to come back a second day as they found traces of "potentially important historic evidence". We are a historic district (Tuckahoe Indians, Civil war.) Arrowheads, Civil war buttons, bullets and many other remnants of our past generations and history outside can be found in this area.

Here is the data driven, non-emotional approach for decision making. Before you approve a pipeline through this (or any valley) I ask you to please consider the following disruptions:

- LO53-1 • The intent of the establishment of our national forest - specifically the George Washington National Forest and Appalachian Trail was preservation for perpetuity. The proposed right-of-way would not benefit the purpose, intent or wildlife for future generations
- LO53-2 • Maki farm is a registered tree farm on a 5-year forest management cycle. American Tree Farm # 6972. The pipeline would cut through a portion of this managed hardwood forest.
- LO53-3 • Maki farm is in the South Rockfish designated historic district. Farm buildings are 185 years old and my family has been farming it for over 100 years. The house is "pre-Civil War" construction and was cut off from tax parcel 21 A 113 for financial purposes.
- LO53-4 • The economy of this area is built on the rustic beauty of our national forest, agricultural area and the pipeline will impact planned ecologically-focused, future development that will bring permanent employment (Averitt property) to this area.
- LO53-5 • Our plan to gain organic certification for our farm to support the "farm to fork" movement and "knowing where your food comes from." I don't think people will want to buy food grown next to a pipeline.
- LO53-6 • This piece of property was under water and landslide debris in 1969 from Hurricane Camille and the large bridge was washed away in 1988 (Gloria). This is the same location that is considered a "good site" for a buried pipeline? I was present on both occasions at this farm. It took my grandfather over two weeks to get out of this farm by driving his large tractor through the river bottom. This area was devastated. Is the 100 year flood plan worth ignoring for corporate gain? The Army Corp of Engineers were in this county for months channelizing rivers and cleaning up.
- LO53-7 • **Sedimentation into the Chesapeake Bay – We spoke with Vince Piero (Army Corps of Engineers) two years ago to petition to remove part of an island building up under our bridge (farm access). This removal would have helped with the channelization of water to avoid loss of land and potentially the bridge (due to buildup of debris). We were told not to file as the sedimentation risk to the bay was too great and the process was labor intensive. He would deny the application. A private landowner cannot improve their own property in a controlled manner due to risk of sedimentation, BUT A PRIVATE CORPORATION can? The pipeline river/stream crossings represent the same potential risk as stated by the Army Corps of Engineers to the property owners.**

- LO53-1 See response to comment PM04-107.
- LO53-2 See the response to comment CO80-8.
- LO53-3 We acknowledge that the South Rockfish Rural Historic District is listed on the NRHP. It is discussed in sections 4.10.1.1 and 4.10.3 of the EIS.
- LO53-4 FS response: The comment is noted. Socioeconomics issues are addressed in section 4.9 of the FEIS.
- LO53-5 Comment noted.
- LO53-6 The pipeline would be built according to federal requirements. Atlantic and DETI may elect to bury the pipeline deeper in some locations.
- LO53-7 Comment noted.

LANDOWNERS COMMENTS

LO53 – Carolyn Maki (cont'd)

Z-2890

LO53-8

- Pristine Virginia trout waters will be impacted as well as multiple rivers feeding the bay and private water sources. Perhaps the very large donations from Dominion to Trout Unlimited were enough to drive them to work in a cooperative fashion with Dominion, but I find it disheartening that we would risk this environment that is in subtle balance. Native brook trout are hard to find.

LO53-9

- Other than the local economy, my family's farm and future, economic development for organic foods, water quality and property value, we will be significantly impacted if there is a breach of this pipeline. In fact, we will be blown to kingdom come.

No incomplete data in the form of an unsatisfactory DEIS can be tolerated. Require a complete and thorough plan for the specific sites, our farms, our mountains and protect our heritage of our national forest that is subject to a high level of scrutiny. Since our valley and families prefer no unnecessary fossil fuel infrastructure, you are charged to protect the environment, heritage and safety of our future by compelling quality data to make an informed decision. My grandfather stated he was a "steward of the land and was keeping it for the next person." My family and I believe the same. We are keepers and protectors. I cannot believe property rights, national forest protection, local heritage, local economy, water purity (local and bay) and private citizens will be put at risk for corporate gain.

My father fought in Korea and Vietnam to protect our rights and was disabled in the process by exposure to Agent Orange. He was a steward of the land and a protector our citizen's individual rights. As the regulatory body charged with that protection, no reasonable doubt or incomplete data can be allowed in this critical decision making process. What do we do next? Jail? Condemnation? Negotiation? Continue to fight the good fight and be a steward of the land? It is a matter of principle, property rights and questionable need. We question the actual need for the public good and intent of this planned pipeline and the DEIS data quality. Certainly there is no gain to this impacted family and community. We don't want any pipeline and particularly a 42 inch risk to private citizens. The due diligence for structural integrity and environmental impact must be above and beyond what is currently provided in draft format.

I ask for well-informed due diligence and a data-driven decision. I do not feel you will be influenced by an emotionally supported argument.

Carolyn Maki

Maki Family Trust members – EJ Maki, WR Maki

Eminent domain is a public trust, not a private power or for-profit corporation.

LO53-8 Comment noted.

LO53-9 We acknowledge the potential risk associated with operation of ACP and SHP. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation. Section 4.8.1.1 addresses specialty crops and organic farming. Section 4.9.7 addresses property values.

LANDOWNERS COMMENTS

LO54 – Carson Ralston

20170310-0109 FERC PDF (Unofficial) 03/10/2017

FERC Comment 2-23-17

My name is Carson Ralston. I live in Deerfield, Virginia in Augusta County. Our property is on AP-1 mainline route, at milepost 108 to 109.

In May 2016 I submitted a comment in Hot Springs, Virginia at the FERC scoping meeting at Bath County High School. FERC is obligated to consider ALL comments and the comment I submitted is not addressed in the Draft Environmental Impact Statement. So, I will submit the comment again about my concern.

LO54-1

The Draft Environmental Impact Statement on this project lacks information that is important to forest land owners. In the Land Use section of the DEIS, there is no information pertaining to the weight allowance of trucks or logging equipment that will cross the pipeline on private land. Answers have not been provided by Dominion representatives in public information sessions. They don't seem to know. The pipeline is slated to cut our property in half. The forested areas of our property are located "behind" the pipeline. That area will only be accessible by crossing the pipeline. Timber harvesting has been completed on our property in the past. The harvests were done for income and for storm damage cleanup, in order to remove downed and dead trees that increase wildfire risks. We are planning more timber harvests in the future and with no way to access the timber "behind" the pipeline, our financial future will be impacted. We were planning on this income.

How can we continue to use our land in this manner when logging trucks can't cross the pipeline? Logging trucks can weigh 80,000 pounds or more. What is the weight limit for crossing over the pipeline? That needs to be answered. Weight limits imposed on crossing the pipeline, whatever they may be, will permanently impact our future income. It will be an underground barrier preventing us from logging our land that lies behind the pipeline. And we will not be the only ones permanently impacted in this way. In rural areas, logging and farming operations that require heavy equipment and trucks are a regular occurrence. If a weight limitation is not addressed beforehand, many people are going to be cheated when it comes to their farming operations, the use of their land and their livelihoods.

A revised DEIS needs to be completed on the Atlantic Coast Pipeline to address my unanswered comment and the comments and questions that many others have. Much more study and research needs to be provided by Dominion to answer a multitude of concerns. A proper and fair environmental impact review can't be done without that additional information.

Carson Ralston

3441 Deerfield Valley Rd.

Deerfield, VA 24432

LO54-1

Section 4.12.1 has been revised to include discussion of potential safety impacts from heavy farm equipment and other large vehicles crossing the pipeline in open areas (i.e., not at road crossings).

Z-2891

LANDOWNERS COMMENTS

LO55 –Lorraine and Gilford Titus

20170310-0109 FERC PDF (Unofficial) 03/10/2017

LO55-1 | *My husband Gil and I are landowners in Deerfield, county of Augusta, Virginia. He is also a veteran and has Alzheimer's disease....so I must speak for both of us. We've always considered ourselves as stewards of our land and want to do everything we can to protect the land, water and the environment. I don't believe that the pipeline is in our best interest as land owners and citizens.*

The Atlantic Coast Pipeline (ACP) is very detrimental to our way of life and all of those who are affected. The pipeline will bring much destruction and upheaval to our communities. The excavation over and under the roads and waterways will leave behind a path of potential danger to all the inhabitants of this area. The impact will last forever along with possible future dangerous issues.

**Lorraine and Gilford Titus
2677 Deerfield Valley R.
Deerfield, VA 24432**

LO55-1 Comment noted. See also the responses to CO6-1 and LO18-1.

Z-2892

LANDOWNERS COMMENTS

LO56 – Mary Rainey

20170310-0109 FERC PDF (Unofficial) 03/10/2017

Nathaniel J. Davis, Sr., Deputy Secretary
Federal Energy Regulatory Commission
888 First Street NE, Room 1A
Washington, DC 20426

RE: Docket Nos. CP15-554-000, CP15-554-001, CP15-555-000, CP15-556

Comments on the Atlantic Coast Pipeline and Supply Header Project DEIS

Dear Deputy Secretary Davis:

LO56-1

The Augusta County Farm Extension agent told us the soil will not return to growing capacity for 8-9* years after it is disturbed by the ACP. Farmers will suffer crop loss for a long time. Our farm is small (32 acres) so this loss impacts us greatly. Taking an additional 50 feet for right-of-way reduces our land even more.

*This is not temporary!

LO56-2

The environmental damage to our forests and water sources will be felt by residents years after Dominion is finished. Residents will deal with the problems.

Sincerely,

Mary Rainey

Address:

221 Overlook Rd.
Staunton, VA 24401

Print Name:

Mary Rainey

own farm on Middlebrook Rd
in Augusta County

LO56-1 Comment noted.

LO56-2 Comment noted. See also the responses to CO6-1 and LO18-1.

Z-2893

LANDOWNERS COMMENTS

LO57 – Gary Gallagher

20170310-0109 FERC PDF (Unofficial) 03/10/2017

FEDERAL ENERGY REGULATORY COMMISSION
ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT
DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Comments can be: (1) left with a FERC representative; (2) mailed to the addresses below; or (3) electronically filed.¹

For Official Mail Filing, Send To:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

As applicable, please indicate project(s) you are commenting on:

- Atlantic Coast Pipeline: Docket No. CP15-554
- Supply Header Project: Docket No. CP15-555
- All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

GARY GALLAUGHER
24 FALL RIDGE DRIVE
STUARTS DRAFT, VA 24477

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

WE MOVED TO STUARTS DRAFT TO ENJOY
COUNTRY LIVING, OUR HOUSE IS BACKED BY WOODS,
WOODS THAT WE ENJOY TREMENDOUSLY, THE PIPELINE
IS SET TO RUN THROUGH THIS WOODED AREA,
ELIMINATING THE PRIVACY THAT WE ENJOY.
THIS WILL DEFINITELY AFFECT OUR PROPERTY'S VALUE!
WE ARE CONCERNED FOR OUR FUTURE, OUR HOME,
OUR INVESTMENT OVER THE PAST 10+ YEARS. THE BENEFIT
OF THIS PIPELINE DOES NOT INCREASE MY VALUE, IT ONLY
SEVERELY DECREASES OUR HARD EARNED INVESTMENT.
NOBODY DESERVES THIS, AND CONSCIENCE IS WHAT NEEDS
TO BE ADDRESSED TO MAKE THE RIGHT DECISION

¹ The Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account by clicking on "Login to File" and then "New User Account".

LO57-1 Comment noted.

Z-2894

LO57-1

LANDOWNERS COMMENTS

LO57 – Gary Gallagher (cont'd)

20170310-0109 FERC PDF (Unofficial) 03/10/2017

LO57-2

THE RISKS FAR OUTWEIGHT THE BENEFITS. THE RISK OF ENVIRONMENTAL POLLUTION, LONG TERM POLLUTION, THE RISK

LO57-3

OF INCINERATION (IT'S IN MY BACK YARD!). MY WIFE & KIDS ARE AT RISK DAILY WITH THIS SCENARIO.

LO57-4

THE WOODED AREA WILL FOREVER BE CHANGED BECAUSE OF NEEDED ACCESS TO THE PIPE IF IT NEEDS TO BE REPAIRED OR

LO57-5

SERVICED. ALONG WITH THIS, IS THE THREAT OF RAISING PROPERTY TAXES FOR THIS REASON. RAISE MY TAXES TO PAY FOR MAINTENANCE ON A PIPE I DO NOT WANT IN MY YARD. AGAIN, CONSCIENCE IS WHAT YOU NEED TO MAKE THE RIGHT DECISION.

LO57-6

LASTLY, WITH THE "RUMOR" THAT THIS PIPE WILL PROVIDE NATURAL GAS TO NORTH CAROLINA WHO WILL BE SHIPPING OVERSEAS IS AGAIN A DECISION THAT IS SOLEY BASED ON PROFIT. THIS IS NO PROFIT TO ME OR MY FAMILY.

PLEASE USE YOUR CONSCIENCE, WE DON'T WARRANT THESE ACTIONS – WE DON'T WANT THE PIPELINE.

Gary Gallagher

LO57-2

See the response to comment CO116-10.

LO57-3

We acknowledge the potential risk associated with operation of ACP and SHP. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation.

LO57-4

Comment noted.

LO57-5

Comment noted.

LO57-6

See the response to comment CO46-1.

Z-2895

LANDOWNERS COMMENTS

LO58 – Michelle Gallagher

20170310-0109 FERC PDF (Unofficial) 03/10/2017

FEDERAL ENERGY REGULATORY COMMISSION ATLANTIC COAST PIPELINE AND SUPPLY HEADER PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT COMMENTS

Comments can be: (1) left with a FERC representative; (2) mailed to the addresses below; or (3) electronically filed.¹

For Official Mail Filing, Send To:

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, NE, Room 1A
Washington, DC 20426

As applicable, please indicate project(s) you are commenting on:

- Atlantic Coast Pipeline: Docket No. CP15-554
- Supply Header Project: Docket No. CP15-555
- All of the above

COMMENTOR'S NAME AND MAILING ADDRESS: (Please Print)

Michelle Gallagher
24 Fall Ridge Drive
Stuarts Draft, VA 24477 Augusta County, VA * clarification *
75 ft easement
is in the actual
property!

COMMENTS: (PLEASE PRINT) [continue on back of page if necessary]

LO58-1 The proposal ACP comes directly behind our home through the very private & beautiful woods that we enjoy EVERY DAY from our back windows & porch. It was one of the very reasons we chose our home NOT to be surrounded by other home or development. Not only does the impact affect our property (now & the future) in terms of cutting through a beautiful wooded natural land full of wildlife it gives us peace & joy. No - those things are not measurable to a pipeline & hold very little value - but to me, my husband & children it is a HUGE immeasurable value of our daily life & the beauty of our home, our SANCTUARY from a busy, populated & congested world. We get to turn it all off at home. The woods of our property cannot be replaced - it will NEVER be the same again post pipeline.

¹ The Commission strongly encourages electronic filing of any comments or interventions or protests to this proceeding. See 18 CFR 385.2001(a)(1)(iii) and the instructions on the Commission's web site at <http://www.ferc.gov> under the "e-Filing" link and the link to the User's Guide. Before you can file comments you will need to create a free account by clicking on "Login to File" and then "New User Account".

LO58-1 Comment noted.

Z-2896

LANDOWNERS COMMENTS

LO58 – Michelle Gallagher (cont'd)

20170310-0109 FERC PDF (Unofficial) 03/10/2017

LO58-2

That all being said there may come a day once our children are raised that we choose to downsize & move by our timeline & personal desires. Where does this pipeline leave us for future resale of taxes. As desirable as our home & wooded view is now - it will never be the same again! This is not only our plight of fears but that shared with our neighbors & thousands of other Augusta Co. residents. Aesthetically - it will hinder re-sale

LO58-3

The risks of safety "incineration zone" is scary. Seriously - I am confident in the response being "it's such a small risk" But how about the pipeline affect your home & land your view will change thinking of the well being of your home & family. In fact, if you are so confident - move it to your home.

The ever small risk of us ever having our home Burn (statistically so small) happened to us May 2012.

I never expected to have our beautiful rebuilt home and family placed at RISK AGAIN!

Now - my plea is based strongly in emotion - as a mom, my home & family are my greatest concern. This pipeline threatens entirely to much of my life to support it going through OUR BACKYARD!

I see the pink flags along active & vibrant farmland around our home, through the river we drive over every day - our country's Agricultural impacts will be felt by the farmer's limited land they can farm in the future. Our rivers need to be protected & conserved, fish, game & all wildlife depend on the quality of our waters as do we for our outdoor lifestyle that we have in the beautiful Shenandoah Valley - our home. ~~##~~

Thank you
Michelle S. Gallagher 2/23/17

LO58-2

Comment noted. Section 4.9.7 includes our analysis of impacts on property values.

LO58-3

We acknowledge the potential risk associated with operation of ACP and SHP. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation.

Z-2897

LANDOWNERS COMMENTS

LO59 – Roberta Koontz

20170224-5007 FERC PDF (Unofficial) 2/23/2017 6:46:39 PM

Date: 2/23/17 To: FERC From: Roberta K Koontz Docket: CP15-554-000 ACP

Subject: **THE TRUTH** - Property values & ability to sell property destroyed by the ACP

We own a very historic 1000-acre farm in Bath County with an 1797 brick dwelling which is our home. We placed two conservation easements with the Virginia Outdoors Foundation (VOF) years ago. We are now unable to adequately care for the 1000 acres and want people with similar goals of preserving the land & making it their home to purchase acreage from us. We have listed property for the past 18 months with Old Dominion Realty in Fishersville, VA. For more than one year, we have had three parcels listed for sale for a total of about 740 acres. These parcels include very nice farm land, forests, an orchard, wonderful views, great water resources, recreational areas and more. It is very desirable, beautiful and unspoiled property.

LO59-1

Initially, when we listed the property, the ACP was not planned to cross our property but was close although there was uncertainty as to the route. Potential buyers would not even come to look at our property. Since around March 2016, the route for the ACP is planned to cross our property. This is in spite of the two VOF conservation easements we hold. Dominion is attempting to get around this with a "land swap" which is illegal according to our attorneys.

Dominion with support from FERC (apparently) continues to claim that the ACP will not lower property values at all. And Dominion continues to claim that it is fair to offer to purchase of a few acres for the ACP at the market price. So for our 1000-acre farm, Dominion might only need to purchase 30 or so acres. The price for 30 acres does not begin to compensate for the fact that the ACP destroys the property value. Especially Dominion is routing the ACP and an access road through our prime areas of development and building sites. Dominion has refused to compromise with us at all despite us having hired an attorney to negotiate with them. And despite Dominion's widely publicized claims that they are "working closely with land owners and compromising", etc., Dominion has done nothing to compromise with us.

We have just retained litigation attorneys to represent us and attempt to negotiate with Dominion. While we do not want to litigate, we have been left with no other option by VOF and Dominion.

I am attaching a letter from our two real estate agents at Old Dominion Realty (Cathy Ward and Charlie Ward). They are documenting the VERY NEGATIVE IMPACT on sale of our property due to the ACP.

No buyer wants land anywhere close to the ACP and certainly not live & farm on land that has the ACP running across the middle along with a permanent access road. We will be living in the BLAST ZONE. How easy will it be for us to sell our historic home that is within the ACP blast zone. How could we possibly recover our investments. And certainly we could never realize a profit from our investment of 13 years to date.

We feel it is absurd, outrageous and deceptive for Dominion to claim that property values are not negatively impacted by a gas pipeline. Who would want property with a

-1

LO59-1

Studies provided by local organizations (e.g., the Key-Log Economic Impacts Study) and comments from local Realtors provide anecdotal evidence with regard to sale value of properties; unfortunately, it does not present sources for the data presented with regard to loss of property value due to proximity to a pipeline.

The FERC staff conducted its own independent research and found multiple studies that examined the effects of pipeline easements on sales and property values, and evaluated the impact of natural gas pipelines on real estate.

Based on FERC staff's research, our analysis found no conclusive evidence indicating that natural gas pipeline easements or compressor stations would have a significant negative impact on property values, although this is not to say that any one property may or may not experience an impact on property value for either the short or long term.

Z-2898

LANDOWNERS COMMENTS

LO59 – Roberta Koontz (cont'd)

20170224-5007 FERC PDF (Unofficial) 2/23/2017 6:46:39 PM

LO59-1
(cont'd)

gas pipeline running through it when they can easily buy property without a gas pipeline. Who would have their family live in a pipeline BLAST zone.

LO59-2

And that is not to mention the unknown future with Dominion having 24x7 access to enter and use of your property. And Dominion can always take more property & rights away due to "eminent domain". And then there are the horrible access roads on private property that will have traffic 24x7 with no notice or accountability from Dominion.

In our case, the access road proposed by Dominion to cross our property will destroy the historic entrance to the farm and run within feet of our historic home, destroying our one-lane gravel driveway & significant improvements. It will destroy our safe access to and from the barns. If the access road is built as proposed by Dominion, we would have to abandon the property and spend significant resources to be able to return for our farming operations and home. We have 1.64 miles of road frontage on Highway 629 and yet Dominion wants to build a access road for the ACP on top of the heart of our farm & home. This is vindictive and harmful to all that we possess. And this is not going to have a negative impact on the value of our property? Not to mention our livelihood, quality of life, safety, destruction of our improvements, view, peace & quiet, etc.

LO59-3

We have a great immediate need to sell our property but are unable to do so because of the ACP for the past 18+ months. I almost died in 2016 and my husband is in poor health. We do not have much longer to enjoy our lives. We are unable to utilize assets we worked for 40+ years to accumulate. And we have the cost of fighting the ACP. We have the stress of FERC filings, reviewing documents, opposing Dominion, etc. How is this fair. How can the US government do this to hard-working and law-abiding citizens. If eminent domain is to be given to Dominion, then property owners should be well compensated but they are not.

To summarize, the ACP will destroy the value of our property forever. We have been unable to sell property that we need to sell in order to live quite modestly & maintain the farm. What is now worth millions of dollars probably cannot be sold at a fraction of the value before the ACP. And the pristine, historic property that was to be preserved will be lost forever.

Force Dominion to admit and state the truth about damaging property values due to the ACP. Force Dominion to compensate land owners for the destruction of the property & property values forever.

The letter from our real estate agents follows:

LO59-2

As documented in Atlantic's May 8, 2017 supplemental filing and reflected in revised appendix E, proposed access road 36-081.AR1 has been removed from the project.

LO59-3

Comment noted.

Z-2899

LANDOWNERS COMMENTS

LO59 – Roberta Koontz (cont'd)

20170224-5007 FERC PDF (Unofficial) 2/23/2017 6:46:39 PM



Old Dominion Realty
1750 Jefferson Hwy
Fishersville VA 22939
Office (540) 943-0085
Cell (540) 480-7912

Roberta Koontz
The Wilderness
13954 Deerfield Road
Deerfield, VA 24432

Dear Roberta,

Sorry this has taken so long for us to get back to you. We were waiting and hoping that more properties would have gone under contract. However, we are not finding any properties in your area that have been recently sold.

We feel due to the fact the Gas Line is having such an impact on the properties in Bath and Western Augusta County, buyers are afraid to purchase in the event, that the gas line will go through their property making it such undesirable for farming and building their dream homes.

Your property has been on the market over a year and we have only a handful of interested buyers. We have to disclose that the gas line is coming through this area, whether it is located on the acreage or not. It still has an impact on the value.

Buyers do not want to be anywhere close to the gas line. We know there are many safety precautions that will be in place, it doesn't seem to change buyers minds.

Unfortunately, we can advertise and spend lots of money, it won't change people's minds about the gas line.

Sincerely,

Cathy Ward
Charlie Ward

Z-2900

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz

20170223-5179 FERC PDF (Unofficial) 2/23/2017 4:42:25 PM

LO60-1

My name is Robert Koontz, and my wife and I have two conservation easements, totaling 1,000 acres with VOF.

I want to thank VOF for allowing us to present our thoughts and statements concerning these easements remotely, since due to illness, we are not able to attend your meeting in person.

Frankly, it is almost unbelievable that we would have to be so vocal in trying to get VOF to obey the laws of Virginia.

Virginia code allows land protected by easement to be converted out of conservation use only if the conversion is both essential to the orderly growth of the locality, and in accordance, with the official comprehensive plan of the locality in which the easement is located.

In Bath County, where our easements exist, the County Board of Supervisors, has unanimously stated that the pipeline and its associated access roads are not essential, and moreover does not meet with the official comprehensive plan.

The relevant question before you today is whether the proposed conversions meet the requirements with respect to Bath County.

If there is no, no in VOF's vocabulary, then in all reality, this board is overseeing the end to the conservation easement program in Virginia.

LO60-1 See the response to comment SA8-252.

Z-2901

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

20170223-5179 FERC PDF (Unofficial) 2/23/2017 4:42:25 PM

LO60-1
(cont'd)

If a historic property like The Wilderness of 1,000 acres that began with a grant in the 1750's, that has been continuously farmed since then, that has supplied this nation cattle and food to Braddock and Washington in the French and Indian War, has a home built in 1797 by a great Virginia Revolutionary War General, is the headwaters to Mill Creek due to its springs, that numerous species of wildlife including the endangered James Spineymussel, has several orchards, numerous pastures and crop lands, and a family cemetery; can not be preserved for future generations of Virginians, then no property held by VOF is safe from being brutalized and ravaged for profit of others.

Knowing what we know today, we are so sorry that we have used VOF as a protector of our property, who had at the time of our signing of our two easements, assured us, that as long as there would be a Commonwealth of Virginia our land and cemetery would be protected.

In the sunset of our lives, where we wanted only peace and quiet, we seem to be in a horrible fight, by ourselves, in preserving our historic land and home from destruction. The State of Virginia is not currently making historic land that goes back to the 1750's. Once this property under easement is ravaged and destroyed, it can not be put back together.

There are many alternates for Dominion to get from their starting point to their end point without going through

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

20170223-5179 FERC PDF (Unofficial) 2/23/2017 4:42:25 PM

LO60-1
(cont'd)

conservation easement lands. These easements were in place long before a pipeline was proposed, and Dominion could draw a line that doesn't go through them. VOF doesn't have to necessarily make it extremely easy for Dominion to draw this line. There are existing routes that Dominion can take without destroying the Conservation Easement program in Virginia.

Thank You

The Wilderness Farm
13954 Deerfield Road
Deerfield, VA 24432
Robert and Roberta Koontz
thewildernessbc@hotmail.com

Z-2903

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

20170223-5160 FERC PDF (Unofficial) 2/23/2017 4:25:57 PM

Decision on easement conversion for pipeline tabled

By John Bruce · Staff Writer

RICHMOND — Thursday, Feb.9, the [Virginia Outdoor Foundation](#) voted to defer consideration of [Dominion's](#) application to swap portions of open-land conservation easements with [Hayfields Farm](#) and another property in [Nelson County](#) to expedite construction of the proposed [Atlantic Coast Pipeline](#).

VOF chair [Stephanie Ridder](#) convened the board's open session after meeting behind closed doors less than 10 minutes to discuss potential litigation and real estate negotiation. She cited numerous emails from the public were being received "as we meet."

"It's our consensus to keep this matter open," Ridder said.

The motion from board member Beth Obenshain to defer carried unanimously after a long day of hearing overwhelming opposition from an audience of 100 people who often applauded those who spoke against the application.

During morning public comments and remarks by affected landowners, 12 people spoke in favor of Dominion's application and 37 voiced opposition. Opponents included Bath Planning Commission chair [John Cowden](#) and Augusta County Supervisors chair Tracy Pyles.

Landowners of Berry, Revercomb and Bright conservation easements lands expressed support on prerecorded videos.

Robert Koontz voiced his opposition on video.

"If approved, I will go to court," said Normandy Capital LLC owner [Chuck Burke](#). "I don't want to have to do it."

Many speakers shared their sympathy with the VOF board for facing tremendous legal pressure from Dominion and from opposing landowners and conservation groups.

"You're between a rock and a hard place," [Sierra Club's Kirk Bowers](#) told the board. "Dominion will challenge you if you don't approve, and we will challenge you if you do."

The board met in closed session two hours after hearing public comments and before hearing an afternoon presentation by Dominion before an audience that shrank to less than half its size that morning.

[Southern Environmental Law Center](#) executive director [Greg Buppert](#) told The Recorder that VOF should say no to the application. "Staff has been clear that Dominion should avoid easements."

Z-2904

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

20170223-5160 FERC PDF (Unofficial) 2/23/2017 4:25:57 PM

See next week's Recorder for details.

Z-2905

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

20170223-5161 FERC PDF (Unofficial) 2/23/2017 3:28:35 PM

Pipeline project awaits critical state decision

Perspective

BY ANNE ADAMS · STAFF WRITER

[WARM SPRINGS](#) — The decision could make or break the future of their farm.

Robert “Bob” and Roberta “Robbie” Koontz are in arguably the toughest battle of their lives — to preserve hundreds of acres they have worked tirelessly to save from industrial ruin.

When utility powerhouse [Dominion Resources](#) moved its planned [Atlantic Coast Pipeline](#) from central [Highland](#) to a more southwesterly route, the Koontz’s historic property, “The Wilderness,” was sitting midline, and vulnerable, with the proposed gas transmission line headed straight up their driveway.

Never mind they had carefully documented the rich and deep history of the place going back to the 1700s. Never mind they worked closely with the [Virginia Outdoors Foundation](#) to place not one but two conservation easements on the land to protect and conserve it. Never mind they are documenting endangered and threatened species that make their place habitat and home.

All that might not matter at all, depending on what happens Feb. 9. When Dominion re-routed the line after the [U.S. Forest Service](#) nixed the original route to avoid sensitive habitat, the company moved the project through properties in southern Highland and northern [Bath County](#) — nine of which were, in whole or in part, under conservation easements held by the VOF.

The foundation has explained to the [Federal Energy Regulatory Commission](#) the project cannot cross those easements unless they are converted — a legal state process that requires the company to offer another, similar property upon which an easement can be attached. According to the law, no open-space land acquired and designated as open space land can be converted or diverted from that use unless VOF determines that is “essential to the orderly development and growth of the locality, and in accordance with the official comprehensive plan for the locality in effect at the time of conversion or diversion; and there is substituted other real property which is of at least equal fair market value, of greater value as permanent open-space land than the land converted or

Z-29006

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

20170223-5161 FERC PDF (Unofficial) 2/23/2017 3:28:35 PM

diverted and of as nearly as feasible equivalent usefulness and location for use as permanent open-space land as is the land converted or diverted.” Dominion proposes to use Hayfields farm in [McDowell](#) as the substitute property.

As reported last week, to meet the “essentiality” requirement, Dominion must demonstrate the conversion is essential to the orderly development and growth of the locality and must submit a letter or statement and/or materials from the local government, regional, state, or federal entity to this effect. None was provided in its most recently revised application. The VOF will hold a hearing Feb. 9 to decide whether Dominion’s proposal holds up under the legal requirements for conversion.

From documents The Recorder acquired through a [Freedom of Information Act](#) request, it’s evident this decision is critical to Dominion’s forward progress. Michael Lapidés of [Goldman Sachs](#), Global Investment Research, reached out to VOF Deputy Director [Martha Little](#) last November to discuss the issue. Goldman Sachs is monitoring the project’s progress for utility investors, including the state and federal filings required, according to that report.

Little told Lapidés there has never been a case for the foundation involving energy infrastructure with a project this large or for as many acres. “The closest case was a road expansion for a locality landfill project that ‘converted/diverted’ approximately 18 acres,” she told him.

Lapidés sent Little a Dec. 5 report generated by Goldman Sachs noting the “complex permitting and siting process” for the pipeline “still remains ahead.”

“For both (Dominion) and (Duke Energy), once built, we forecast that this project represents roughly \$125 million-\$150 million of net income annually,” the summary states. “Dominion, the project manager for ACP, already announced project delays earlier this year given the need to revise routing of this project.”

Further, it states, “We view the companies’ effort to gain access to conservation easements overseen by the VOF as a key step necessary for construction.”

The summary noted:

- “Our forecast assumes the project comes online at (year end) 2019 but we recognize potential for further delays exists due to siting and routing challenges, especially given (1) the project will run through various national/state forest land and (2) the project intersects or goes through 10-11 sites under VOF oversight or control.”

Z-2907

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

20170223-5161 FERC PDF (Unofficial) 2/23/2017 3:28:35 PM

• “In (a) FERC filing, VOF disclosed (1) that VOF views the ‘minor conversions’ to VOF easements as decidedly not ‘minor’ as they would represent the largest conversion of open space land in the VOF’s 50 year history,

(2) that eight of the easements, in VOF’s view, do not contain legal language that permits this scope of activity (the construction of ACP) without impairing conservation values of the affected properties and (3) that VOF views the construction and operation of the interstate gas pipeline as ‘inconsistent’ with the open space protections afforded by easements.”

The report concludes, “While we still assume completion of the project at (year end) 2019, we recognize the effort to route ACP through or near VOF controlled easements remains a key item for ACP and could impact Dominion and Duke earnings power in 2018-19 if incremental delays, due to siting or routing issues, emerge.”

The summary contained a link to a report for investors, but Little told The Recorder she was unable to see it, and believes it’s only available to the energy company shareholders or project investors.

Another correspondence shared with the VOF was from area resident [Peggy Quarles](#), who wrote [Stephanie Ridder](#), VOF board chair, in November, explaining concerns that since the Federal Energy Regulatory Commission issued the draft [Environmental Impact Statement](#) for the project, that might lead VOF to conclude it will be approved for its certificate to build.

Quarles and another person had a conversation with Jennifer Adams of the U.S. [Forest Service](#), a pipeline project coordinator, about FERC and the [National Environmental Policy Act](#) process.

“The purpose of the discussion was to clarify our expectations about the draft and final EIS and when there would be an indication of whether or not FERC would approve either the (Mountain Valley Pipeline) or ACP. Jennifer pointed out that the draft EIS for the MVP does not contain a recommendation section and that it does not in any way predict what the forest service or FERC might ultimately decide. This is not obvious — it would be easy to assume that just issuing the draft EIS for the MVP implies approval. She warned us not to make that assumption,” Quarles told Ridder.

“Further, in the FERC process, even the final EIS is not the decision document for a certificate. The final EIS is the document of the environmental staff containing recommendations to the commissioners. It is the commissioners who decide and issue a decision document. Jennifer

Z-2908

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

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pointed out that the NEPA process may be a decision document for other types of federal actions and that many people are confused.”

She continued, “The Forest Service is evaluating the proposed route with the same thoroughness as the earlier route over [Cheat Mountain](#). They did not endorse, promote or cooperate with Dominion on the GWNF6 route (the one through northern Bath County). The final EIS is not the decision document for the Forest Service about the special use permit and plan amendments. In fact, the Forest Service has mentioned along the way a supplemental EIS may be necessary. And we believe that the Forest Service decision is just as critical to your interests as the FERC certificate. If the Forest Service denies the special use permit, your easements will probably not be crossed,” Quarles told the VOF chair.

“This is important to VOF because Dominion and others want us to believe that the draft EIS for the ACP will indicate what FERC’s decision will be and that VOF should take steps in response. Based on our conversation with Jennifer, this will not happen. In fact, we may find that we do not know what FERC or the Forest Service will do for quite some time. The likely timing of both actions should be considered. To agree to Dominion’s conversion proposal prematurely, even conditionally, before you know what the Forest Service and FERC decisions will be, gives FERC a free pass to ignore the VOF as any kind of barrier to approving the route. And the fact that you may be willing to do so runs the risk of damaging the confidence of current and future landowners in your commitment to protect them. The potential environmental damage of a massive pipeline on these easements far exceeds any allowed landowner uses, such as foresting or agriculture. And it is permanent.

“We urge you again to delay consideration or, even better, reject the Dominion application until it is clearly necessary. If the [1704](#) conversion must occur, it will be available to you at that time. We believe that Dominion has no incentive to withdraw the offer, even after the certificates and permits have been issued and appeals exhausted,” Quarles said. The Koontzes are not hopeful.

“Our hopes, dreams and our remaining years will all be ruined if VOF does not reject the proposal,” they told the foundation.

Three times they’ve written to VOF’s board to urge the foundation to reject the plan. They have faced an appraiser, who arrived to calculate the value of their land — one paid by Dominion. A real estate agent told them they are unlikely to be able to sell the property as long as the threat of the

Z-2909

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

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pipeline project exists. They're tired, their health is precarious, and they're not sure what to do next.

In their Jan. 11 to the VOF board, the Koontzes explained they could not attend the Feb. 9 meeting due to health issues. "The stress of travel and the distress of dealing with the proposed diversion of our property prohibits our participation. It is important that you know that our failure to appear in no way reflects a lack of absolute commitment to preserving our property; property we thought was preserved when we placed it under conservation easement," they wrote.

They told the VOF board it must refuse to accept the conversion/diversion plan from Dominion, arguing:

- Good faith consideration of the easement donors' commitment to preserve their properties requires VOF to reject the proposal, they said. "To elect to agree to the diversion is an abdication of your statutory preservation role. Put the burden on Dominion to convince a court that the proposal is acceptable."
- The proposal fails to meet requirements of the law which "specifically includes two elements which cannot be met, namely a determination that the diversion is (a) essential to the orderly development and growth of the locality, (the locality, Bath County, has publicly rejected that notion), and (b) in accordance with the official comprehensive plan for the locality, (the county specifically found that it was not)."
- Failure to reject the proposal will effectively destroy the foundation's conservation easement program and jeopardize the efforts of other land trust organizations in [Virginia](#). "What landowner seeking to preserve land in Virginia would consider putting property in a [Conservation Easement](#) when it would be manifest that VOF will not defend the conservation values?" they asked.
- Donors will suffer an additional and substantial diminution of the value of their property. "The market for property in the [Deerfield](#) area has been significantly depressed," they said.
- Hundreds of acres of rural lands, remarkable natural and cultural resources will be destroyed. "The width of the easement for the ACP project is such that it will create a jarring scar across the very visible landscape in the Valley. The use of the land will be curtailed and many potential building sites for homes, barns and other improvements allowed under terms of the existing conservation easement will be rendered unbuildable and/or undesirable. And these assessments do not begin to address the effects of a gas line explosion. The effect on the karst

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LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

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topography that exists on our farm has not been evaluated by ACP or any state agency.”

They explained, “We purchased our farm, The Wilderness, which was established by a 1750 land grant, farmed since then and the house constructed in 1797, with the goal of protecting it forever. To that end we committed the bulk of our financial resources to the purchase, preservation and maintenance of the farm, leaving us with limited means. Our plan under the easement was to create and market large tracts of land configured consistent with the streams, ridges and open fields. The proposed location of the pipeline is wholly antithetical to the character of the landscape.”

Robbie Koontz said the appraisal of their farm was somewhat forced. The couple’s attorney agreed to allowing it because he felt it might benefit them with respect to VOF and Dominion. “He also knew the appraiser and thought he would be fair,” she said. “And in the end, Dominion could have obtained a court order. So far, we have refused to allow Dominion to survey our property or set foot on the property until the appraiser. This appraiser is apparently appraising all 11 of the VOF easement properties for Dominion ... This is very disturbing. I do not believe Dominion could have obtained a court order but to date, they apparently do not want to make waves with VOF just yet. We did not allow a Dominion agent to set foot on the property. The appraiser came alone and Bob knew what he looked like.”

The couple is wary of giving Dominion or its contractors permission to do anything on their land. “We had a close brush with this because Dominion once announced to our attorney that they were bringing over their archaeologists in three days or so to assess a big sinkhole on the property that we believe has been the dump for the property perhaps for 100-plus years,” Mrs. Koontz said. “We had protested the ACP passing right next to this sinkhole, through our attorney. I think this was in September, when I was barely out of the ICU. The sinkhole and potential collection of very historic relics is in the path of the ACP. We refused to allow Dominion to come and said we would hire our own archaeologists. I tried to hire an archaeologist but we could not possibly afford them,” she said.

After the VOF decision, she added, the couple might have to stop using their attorney on the pipeline issue. “He will remain our estate planning attorney but really does not want to continue on with this work,” she said. “And we cannot afford it. He feels that after the VOF decision, our only recourse will be to litigate. We cannot possibly afford to litigate whether ACP can be routed through our property. It is a costly and losing battle

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LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

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due to eminent domain. However, we can litigate about where the ACP crosses our property. Our attorney has met with and talked to Dominion attorneys and representatives several times. Although they moved the ACP on Revercomb property, and apparently on other property, to accommodate his wishes ... Dominion refuses to move the ACP to the edge of our property or at all, including a horrific access road they have mapped out. They will destroy all the prime areas of the 800 acres on this side of State Route 629."

The couple has consulted with real estate professionals about selling their farm. Mrs. Koontz pointed to a letter she received from a Fishersville representative.

"We were waiting and hoping that more properties would have gone under contract," the agent told the couple. "However, we are not finding any properties in your area that have been recently sold. We feel due to the fact the gas line is having such an impact on the properties in Bath and Western Augusta County, buyers are afraid to purchase in the event, that the gas line will go through their property making it such undesirable for farming and building their dream homes."

Further, the agent said, "Your property has been on the market over a year and we have only a handful of interested buyers. We have to disclose that the gas line is coming through this area, whether it is located on the acreage or not. It still has an impact on the value. Buyers do not want to be anywhere close to the gas line. We know there are many safety precautions that will be in place; it doesn't seem to change buyers' minds. Unfortunately, we can advertise and spend lots of money, it won't change people's minds about the gas line."

The couple wrote to the Virginia Outdoors Foundation about this problem on Jan. 11, including a copy of the real estate agent's letter. "Due to our poor health and age, my husband and I have been trying to sell three parcels of our VOF protected property for over a year. Our real estate agents ... are highly qualified, experienced and successful agents. They tell us that potential buyers will not even look at our property due to the ACP. Buyers do not want to be near the ACP, let alone purchase a property with the ACP running through it," they wrote. "Dominion continues to assert and claim that the ACP will not have a negative impact on property values. Who on earth would believe this? This is an outrageous, deceptive and absurd claim. No buyer wants to purchase property with or even near a gas pipeline. And then possibly have ACP access roads, storage locations and who knows what on their property, as we will, according to

Z-2912

LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

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Dominion. And then also live in a 'kill zone' where their family, animals, friends, livelihood and assets can be blown away.

"Buyers know that their investment in such a property would be grossly diminished in the unlikely event that they could even resell the property in the future. Yet Dominion claims all of these dangerous and invasive ACP structures and activity will not negatively impact the value of our property. Or our livelihood." The couple urged the VOF to read the letter from [Old Dominion](#), the real estate agency. "They have given us permission to share this letter widely with other property owners and residents of Bath County to reveal what is really happening to property values near the ACP. This information is factual and specific to The Wilderness in Bath County with a VOF conservation easement. Dominion cannot substantiate their claim that property values on The Wilderness not being negatively impacted. Our property values have been negatively impacted by Dominion and the ACP for over one year now. And there is nothing we can do about it," the couple wrote. "We will now have the worst of both scenarios. We have a property with many restrictions that, for example, do not allow subdivision, which some buyers want to do. These restrictions were obviously designed to protect and preserve the historic property. At the same time, the property will house the invasive and dangerous Atlantic Coast Pipeline. And property owners on The Wilderness will have to live in or near a kill zone. There will be no protection from Dominion now or in the future — ever. Dominion and the ACP will be a complete unknown and very high risk for the once pristine and very historic property," they continued. "The ACP as already impacted us negatively because we are unable to sell much of our property. Having 1,000 acres to maintain has become stressful and expensive. Having a great deal of our assets tied up and unavailable to us through no fault of our own is stressful, expensive and unfair. Having to hire an attorney and consultants to fight Dominion is expensive, stressful and unfair. Having to spend hours researching issues and filing comments to FERC is tiring, time consuming and harmful to our health. VOF has done nothing to protect us or even help us. It is almost impossible to believe this corruption exists and honest citizens can have their lives ruined." The Koontzes kept at it, writing yet a third letter to VOF — this time pointing to environmental impacts from the pipeline project, including damage to the endangered James spiny mussel, after consulting the [Virginia Department of Game and Inland Fisheries](#). "We have worked with the VDGIF on many projects and highly respect them," Mrs. Koontz said. "We received the highest U.S. and state grants dollars in Virginia in one year, maybe 2005, for establishing wildlife habitats and for projects to

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LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

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improve the land and water, thanks to Bob. (DGIF's [Al Bourgeois](#) once took me on a 'bear release' with a 256-pound male bear, which ranks as one of the high points in my life. VDGIF staff have highly skilled and dedicated biologists including two fishery biologists in Bath County alone. That suggests that there is a lot of important marine life in Bath County that requires support from VDGIF."

She added, "VDGIF has helped us so many ways including management of our deer population, which we love but recognize can suffer greatly without some management. We had a limited hunting club of VDGIF employees only for the first four years or so that we owned the farm. We knew we could trust them."

The Koontzes read up on the James spiny mussel, learning it has been critically endangered since 1990 or earlier. "So it has not rebounded while being highly endangered and protected," Mrs. Koontz said.

"It breaks my husband's and my heart to think of all the rare resources of this long-pristine and historic property that could be destroyed forever."

The letter to the VOF explains, "These comments concern the environmental impact of the ACP on our historic property with respect to such things as air, erosion, soil, water, plants, trees, farm crops, agriculture fields, wildlife habitats, all living creatures, endangered species, etc. Are we all merely collateral mortality for the great Dominion and their ACP?" they wrote.

"Dominion and even VOF representatives claim that Dominion has been working with property owners, making compromises, etc. That is certainly not true for us. Our attorney has talked with Dominion about moving the proposed path of the ACP so there is less negative impact on us, our property values, the farm, our livelihood, etc. Dominion has been unwilling to move their proposed route of the ACP on The Wilderness. No compromise at all. The proposed ACP path will wipe out all of the prime building sites for the property. Dominion moved the path for the farmer living next to us, but not us. No compromise. And Dominion plans a major access road that could run over top of the historic entrance to our farm (our driveway) and right next to the 1797 structure where we live. Dominion has selected the prime areas of our farm for the ACP. The ACP could have been routed along the edge of our property with far less negative impact on us. The access road could also be routed along the edge of the property. I believe Dominion cares nothing for property owners and in fact, they want to punish those of us who do not want to surrender our property rights to them. What other conclusion could we draw from Dominion's behavior towards us?" she said.

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LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

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“FERC recently released the [Environmental Impact Study](#) for the ACP published by Dominion as required by FERC. I have been recovering from a recent surgery and unable to study the report. However, I have seen many comments and evaluations by others that are highly critical of Dominion’s process, conclusions, remedies (if any) and the report itself. For example, Dominion never conducted any studies of karst on our property. We have sinkholes and caves, which are evidence of karst. Yet Dominion claims there are no problems with karst in the path of the ACP. Their claim was proven false in the area of [Little Valley](#) and they now admit there is karst in this area. They offer excuses that blame everyone else such as mapmakers for the error. This is just one small example of Dominion versus the environment.

“Our farm is a haven for wildlife, trees, plants, fish, etc. There are forests, fields, meadows, ponds and creeks. Our historic 1797 home is unique in Bath County. For example, the first carriage house ever built in Bath still stands and is used today (circa 1800). Previous owners of the property were famous patriots who helped with the settlement of Virginia. We have worked hard to provide the proper environment and protection for these great resources on the property.”

The Koontzes explained that conservation easements for their property were key in their strategy to preserve and protect the property.

“We made significant investments in the renovation of the old house while trying to preserve the historic integrity. And we have invested considerable monies in improving and maintaining the property. We have invested considerable resources in improving the farm land and protecting the water. Our goal is to protect this wonderful property and preserve the property for future generations to enjoy,” they explained to VOF.

“The negative environmental impact on our property from the ACP is horrific, final and unfair. We have found one specific example of Dominion’s lack of regard for the environment of our farm,” Mrs. Koontz wrote. “My husband contacted Al Bourgeois, district wildlife biologist with the Virginia Department of Game and Inland Fisheries to inquire about marine life on The Wilderness. Several VGDIF biologists including the fisheries biologists for Bath County investigated areas on our farm and determined that there is a critically endangered species living in [Mill Creek](#) on our property. It is the James spiny mussel. There could be more endangered plants and living creatures on the property. And more environmental risks such as karst.

“Not only does Dominion plan to route the ACP near and through water sources feeding Mill Creek, Dominion actually plans to have the ACP cross

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LANDOWNERS COMMENTS

LO60 – Robert and Roberta Koontz (cont'd)

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Mill Creek and then go up very high, steep slopes running next to Mill Creek. This is unacceptable and outrageous. And Dominion never even evaluated our property to identify issues and risks. The James Spiny Mussel is at great risk due to Dominion's lack of regard for our property and environment."

Mrs. Koontz provided a series of email correspondence between her husband and VDGIF biologists. "The James Spiny Mussel is just one example of something Dominion does not care about or even know about. I am confident there are many more unknowns that will just become collateral mortality of the ACP. And there is nothing we can do about it. We need your help to keep the ACP off of our property," she said.

Mrs. Koontz has researched the number of threatened species in Bath County and knows some of them exist at The Wilderness. "We have many, many bats on the property and we love our bats. They used to inhabit our attics but now have moved on to caves. We never harmed any of them in this multi-year relocation program. We have a lot of shale on the property, so one or more of these plants could be on the property. We have regular sightings of wonderful bald eagles. Bald eagles and other eagles live on or near the property," she said. "Certainly some of the listed plants might be present on the farm."

The Koontzes' frustration is endless.

"It makes me just ill that some landowners will speak in favor of VOF agreeing to the land swap," Mrs. Koontz said. "But sadly, I think some landowners obtain a conservation easement in the first place for the money they receive. And now that Dominion is giving them even more money, they support Dominion."

The Virginia Outdoors Foundation will hold its hearing Feb. 9 at 10 a.m., though details are subject to change through Feb. 6. The meeting will be held at the Virginia Department of Game and Inland Fisheries, 7870 Villa Park Suite 400, in [Henrico](#). VOF accepts written comments on the issue, and they may be emailed to: bcabibbo@vofonline.org. They should include name, address, and daytime phone number in order to be accepted as part of the official meeting record.

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LANDOWNERS COMMENTS

LO61 – Scott Ballin

20170314-0206 FERC PDF (Unofficial) 03/13/2017

ORIGINAL

Statement of Scott D. Ballin to the Federal Energy Regulatory
Commission (FERC)
Concerning the Atlantic Coast Pipeline (ACP)
Monterey, Virginia February 28, 2017

SLOW DOWN THE BUILDING OF THE ACP!

CP15-554

(This statement is being mailed in as I did not get to the meeting in time due to weather conditions.)

Scott D. Ballin, JD
Trustee and Landowner for 'FarAfield'
2158 Deerfield Valley Road West Augusta, Virginia
tel: 540 939-4624 mobile: 202 258-2419 email: scdba@aol.com

I appreciate the opportunity to be able to make some brief comments concerning the ACP, a pipeline that will snake its way through historic and pristine Augusta County and other parts of Virginia in the so-called name of the 'common good'. As I have learned more about this project and the manner in which it has been handled I as a citizen and speaking on behalf of my family have become more more concerned. Allowing Dominion to control so much of the process is like having the 'fox guarding the chicken house'. Their strategies and tactics are of great concern and in some ways reprehensible. Time does not permit me to go into details although I alluded to many of them in an Op Ed I did for the Staunton News Leader late last year. Suffice is to say that they have 'bought' or 'silenced' much of the legislature of Virginia including our Governor, hired the best lawyers, lobbyists, and public relations people money can buy; twisted the arms of landowners and mislead them about the consequences of the ACP, tried to convince people that thousands of jobs will be created, and funneled money into many non-profit organizations to curtail opposition to the project. The bottom line is that Dominion stands to gain billions in profits while the 'people' are taken advantage of.

The Federal Regulatory Commission has a responsibility to do its job thoroughly, deliberately, transparently and above all fairly. I have lived and worked in

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LANDOWNERS COMMENTS

LO61 – Scott Ballin (cont'd)

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Washington for many years and know that regulatory agencies are often bureaucratic, short-staffed in what they do, often rubber stamping thousands of pages rules and regulations. **Yet their purpose is to make the right decisions.** Whether one is a democrat or republican this past election should have sent a message that the **people** of the country need a say in what happens to them.

LO61-1

1. Last year, Dominion decided to **reroute** the ACP by adding **an additional 30 miles of pipeline** through our national forests, and across the farm lands in Bath and Augusta Counties. **This was a route that even Dominion rejected.** The pipeline will not only bisect Deerfield Valley (along Deerfield Valley Road) which is a very narrow valley but it will cross terrain and farmlands that have been part of people's heritage going back over 200 years, The area where the pipeline is planned has very high water tables. The ACP will cross the Calf Pasture River at several points, one being at a point where the river has demonstrated significant **volatile** activity. This is not a docile river. Huge amounts of water coming out of the mountains can quickly change the flow. In the 1980's the river tore through the valley, destroying houses and property and significantly changed the flow of the river. It took many months to have the river restored. Locating a pipeline along such a path is insane, and more disruptive than necessary. It seems that FERC has not fully taken into consideration the short term and long term environmental impact seriously, relying instead on the Dominion submissions.

LO61-2

2. As a landowner I have been subjected to Dominion's public relations tactics trying to convince me, my family and other others that the ACP will be safe. One only has to review their Securities and Exchange Commission (SEC) filings to see that that is not the case. **Deerfield Valley is a narrow valley and if there were an explosion many in the valley would perish.** Unlike open terrain, there are really no escape routes to be had. And one has to ask, has Dominion, and FERC for that matter, seriously taken into account the potential of terrorist activities taking place along the 600 miles of pipeline? I have been sent contracts and W-9 forms to sign in advance suggesting that I better sign 'now' or lose out. This is all done months and months before the pipeline is either approved or disapproved. This is borderline unethical.

LO61-1

As discussed in section 3.3.4.2, Atlantic adopted the GWNF6 route after the FS stated it would not approve Atlantic's former route through the National Forests. We have taken short- and long-term impacts into consideration as discussed in section 5.

LO61-2

We acknowledge the potential risk associated with operation of ACP and SHP. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation. See also the responses to comments CO8-1 and CO48-2.

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LANDOWNERS COMMENTS

LO61 – Scott Ballin (cont'd)

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- LO61-3 3. There are many questions that need to be answered before Dominion and FERC move forward with this project. The hard working people and families of Augusta County and the Commonwealth deserve transparency and truthful answers to their questions. They don't need a for profit corporation telling them what they should think or do.
- LO61-4 4. FERC does not seem equipped or qualified at this time to be making any final decisions about this 600 mile monstrosity. It shouldn't be pressured by Dominion to do so. There are three vacancies on the Commission of five. There is no Chairman who I understand must go through Senate confirmation. In spite of the fact that there are many capable staff at FERC, it would be unconscionable for a governmental agency to be making such important decisions when decision-making and approval processes are at a virtual standstill. Even if the positions were filled and a new Chairman appointed the new Commission must take the time to go through the record carefully and fully. And if necessary keep the record open. All the Commissioners should all consider conducting 'site visits' to the areas that will be affected and to see firsthand what the potential ramifications of the ACP will be on the communities. They have an open invitation to visit our valley and property in Deerfield Valley.
- LO61-5 5. We as Virginians who will be impacted by the projects have a 'right' to be heard. Pro-forma 'listening' sessions are not enough. We all support having energy policies that will secure Virginia's future energy needs. But this project as currently planned is not it. We also want policies that preserve and protect the history of the state and what we value as essential to the 'common good'.
- LO61-6 6. It may also be time for serious oversight hearings (about the role that FERC should be playing) to be conducted not only by FERC but by Congress as well. It is time to consider modernizing the current statute and to make it more relevant to the needs of the country.

The Sage Advice of Norman Bay

I want to leave you with the thoughts of former FERC Chairman and Commissioner **Norman Bay** who recently left the Commission. As noted in the **NGI Daily Gas Price Index** (February 6, 2017), "**Bay called on the Federal Energy**

LO61-3 Comment noted.

LO61-4 A final decision has not been made regarding approval of ACP and SHP. The EIS provides the FERC staff's analysis of environmental impacts of the projects and recommended mitigation measures to reduce impacts. The Commissioners at FERC ultimately have the authority to evaluate the merits of a project's objective and either approve the proposal, with or without conditions or modification, or decide to not approve the projects. At such time as the Commission has a quorum to review the projects before it, a decision will be made whether to approve or deny ACP and SHP.

LO61-5 The format of the draft EIS comment sessions was consistent with FERC's most recent public outreach efforts. FERC considers and weighs all comments equally regardless of which the format they are presented (orally, electronically, etc.). See also the response to comment CO46-1.

LO61-6 Comment noted.

LANDOWNERS COMMENTS

LO61 – Scott Ballin (cont'd)

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LO61-7

Regulatory Commission to continue improving how it determines public need in pipeline consideration proceedings, suggesting the agency has become too reliant on precedent agreements with shippers as the main determining factor while overlooking 'other considerations' that could prove important in evaluating the long-term benefits of a pipeline project." He went on to say that while FERC does not regulate the production of natural gas, methane emissions, or the use of fracking, many commentators have raised environmental concerns in our certificate proceedings". Bay said that FERC should conduct a comprehensive review of the environmental impacts of the increased production occurring in the Marcellus and Utica shales (even though there is no statutory obligation to do so so). "Even if not *required* by the National Environmental Policy Act, in light of the heightened public interest and in the interests of good government, I believe the Commission should analyze the environmental effects of increased regional gas production from the Marcellus and Utica..... Where it is possible to do so, the Commission should be open to analyzing the downstream impacts of the use of natural gas and to performing a life-cycle greenhouse gas emission study".

LO61-7 See the response to comment CO46-1.

Z-2920

LANDOWNERS COMMENTS

LO62 – Teresa Rhodes (cont'd)

20170314-0235 FERC PDF (Unofficial) 03/13/2017

Against ACP FERC Docket #15-554-000

Concerns of the Proposed Atlantic Coast Pipeline

I am Teresa Rhodes. My husband and I have 3 properties that the Atlantic Coast Pipeline is proposing to go through on Devil's Racetrack Road and Guin Road.

I have many concerns about this pipeline; some of which you already have heard.

- LO62-1 | **We are farmers and the land will not be as productive when a pipeline is placed on the land. They allow farming on the land, but farmers will probably need to have special crossing pads for heavy equipment. Today most farm equipment is considered heavy equipment. The pipeline is buried only 48 inches deep on the**
- LO62-2 | **farmland. Farmers will only get 2 years of compensation for crop loss. I have seen pictures of farmland in Johnston County that has had a pipeline for 20 years and the crops are still not as productive as the land adjacent without a pipeline. There are many farms involved in land the pipeline wants.**
- LO62-3 | **The Pipeline and Hazardous Material Safety Administration said there has been an average of more than one "significant incident" a week along high pressure gas transmission lines nationwide since the year 2000.**

According to the Pipeline Safety Trust a 36 inch pipeline operating at 1460psi has a potential blast radius or hazardous areas radius of approximately 900 to 1000feet or more on each side of the pipeline.

Pressure in densely populated areas is generally lower than rural "low consequence" areas also known as "sacrifice zones". These sacrifice zones have different requirements for the gauge of metal used; the thinnest being in the most rural Class 1 zones. That is the majority of Johnston County.

LO62-1 | As discussed in section 4.8.2, Atlantic and DETI would secure easements to convey both temporary (for construction) and permanent (for operation) rights-of-way on private lands. Landowners have the opportunity to request that site-specific factors and/or development plans for their property be considered during easement negotiations, and that specific measures be taken into account. This may include details regarding depth of pipeline cover. Also, Atlantic and DETI are required to comply with DOT regulations regarding pipeline installation depths, which vary depending on class location (see section 4.12.1).

In addition, section 4.12.1 has been revised to include discussion of potential safety impacts from heavy farm equipment and other large vehicles crossing the pipeline in open areas (i.e., not at road crossings).

LO62-2 | As described in section 2.5.6, for at least 2 years following construction, Atlantic would continue monitoring areas until revegetation thresholds are met, temporary erosion control devices are removed, and restoration is deemed successful. Restoration of upland areas would be considered successful if the right-of-way vegetation is visually successful in density and cover of non-nuisance vegetation, surface conditions are similar to adjacent undisturbed lands, construction debris is removed, and proper drainage has been restored. Atlantic and DETI would submit quarterly reports to the FERC that document any problems identified during the inspections or by landowners, and describe the corrective actions taken to remedy those problems. We would also conduct periodic restoration inspections until restoration is deemed complete.

LO62-3 | We acknowledge the potential risk associated with operation of ACP and SHP. However, the data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation.

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LANDOWNERS COMMENTS

LO62 – Teresa Rhodes (cont'd)

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Z-2923

LO62-3
(cont'd)

There are many homes nearby on adjoining property and it goes about a mile from the Meadow School. Not only are landowner affected by this proposed pipeline, but the adjoining property owners. All 3 of our properties have been in our families for over 100 years. We have worked on this land growing up, planting and harvesting crops, and gardens. The land is in our blood. Our children have worked on the land and it has meaning for them. One had planned to build a home in the area of one of the pipeline routes. No one wants to be beside a potential hazard to bring up their children and live.

Regulations are designed to make construction less expensive for the pipeline industry to build in rural areas. They get the land cheaper and can construct their pipeline with thinner walled pipe and without certain safety features saving them millions of dollars.

LO62-4

On a larger scale the National Transportation Safety Board has found existing pipelines are not all receiving the attention necessary to prevent disasters and tragedies. There are not enough inspectors to inspect them and disasters can happen when people are careless.

There are reports of pipelines not yet 2 years old experiencing deep corrosion issues.

Since 2001 natural gas pipeline explosions and other accidents have resulted in the loss of at least 45 lives and many more serious injuries, usually from burns. There have been more than 80 explosions and fires since 2012 that have resulted in more than \$44million in damages. Will the landowner be liable for damages if there is an explosion or leak on their property?

LO62-5

Natural gas is odorless and many times a leak is only known by the evidence of dead vegetation. It has also been reported that leaks are underreported by pipeline officials. Leaked fracked gas passing through pipelines has toxic components like PCBs, arsenic, radon and methane. Methane, a greenhouse gas,

LO62-4

There is no evidence to support this claim. Nationwide natural gas transmission pipeline incident statistics show that there are about 3.57 incidents per 10,000 miles of pipeline. Sections 4.12.2 and 4.12.3 of the EIS address the historic incident data for natural gas transmission pipelines, including injuries and fatalities. The data, as presented in the EIS, demonstrate that natural gas transmission pipelines continue to be a safe and reliable means of energy transportation. The topic of financial liability is outside the scope of this EIS and is more property addressed in legal forums.

LO62-5

Section 4.11.1 provides methane emissions for the project; radon is addressed in section 4.11.1.4.

LANDOWNERS COMMENTS

LO62 – Teresa Rhodes (cont'd)

20170314-0235 FERC PDF (Unofficial) 03/13/2017

LO62-5
(cont'd)

is 21 times more potent than carbon dioxide. In case of a leak, fire or explosion, our county's fire departments and emergency response team will be the first responders. A local fireman told me that they have been told to "just let it burn until someone from the pipeline arrives". How long it takes a pipeline company team to arrive: "Who knows?" We need to think about our citizens, our children and grandchildren because this will impact everyone. Are the health and safety of the citizens of Johnston County important? I think they are.

LO62-6

We should not be a "sacrifice zone" for the corporate profits of Dominion Resources, Duke Energy, Piedmont Natural Gas and AGL.

We do not need a pipeline in Johnston County or North Carolina!

Thank you for your time.

Please do not give them a certificate of public convenience and necessity because this pipeline is not a convenience for the landowners and surrounding citizens and is not a necessity. It is only for these private companies to enrich themselves at the EXPENSE OF OTHERS.

Z-2924

LO62-6

Section 4.9.4 describes the effects that the projects could have to local services (including emergency services).

As described in section 4.12.1, DOT regulations require that Atlantic and DETI establish and maintain a liaison with appropriate fire, police, and public officials and to coordinate mutual assistance and ensure that these services have the equipment and training necessary to respond to any emergencies related to ACP and SHP. Atlantic and DETI would communicate with emergency responders on an annual basis. Atlantic and DETI would also establish a continuing education program to enable customers, the public, government officials, and those engaged in excavation activities to recognize a gas pipeline emergency and report it to appropriate public officials.

LANDOWNERS COMMENTS

LO63 – Mary Rainey

20170314-0381 FERC PDF (Unofficial) 03/13/2017

March 8, 2017

Mary Rainey
221 Overlook Rd
Staunton, VA 24401

FILED
SECRETARY OF THE
COMMISSION
2017 MAR 13 P 3 24
FEDERAL ENERGY
REGULATORY COMMISSION

ORIGINAL

CP15-554

Dear Ms. Rose:

I do not support an unnecessary pipeline that will inevitably increase electric bills. Why destroy homes, farms, water quality and forest land for an expensive pipeline that benefits private stockholders and not rate-payers?

The Department of Energy stated in 2015 that Virginia citizens do not need additional pipelines.

Our climate and our land will be forever changed and destroyed so that a few may profit.

Sincerely,
Mary Rainey

P.S. You have the power to stop this!

LO63-1 Comment noted. See also the responses to comments CO6-1 and CO46-1.

LO63-1

Z-2925

LANDOWNERS COMMENTS

LO64 – Roberta Koontz

20170329-5023 FERC PDF (Unofficial) 3/28/2017 7:03:15 PM

From: wildernessfarm@mgwnet.com
Subject: fercflingthewildernessdhrregistry0317
Date: March 28, 2017 at 7:00 PM
To: patnotfarm@mgwnet.com



To: Kimberly Bose, FERC From: Roberta K Koontz Reference: CP15-554-000

Subject: Nomination for registry of The Wilderness as a Virginia Landmark and the National Registry of Historic Places. The Wilderness is owned by Robert & Roberta Koontz in Bath County and has significant historic value to the Commonwealth of Virginia and the United States. It is perhaps the only remaining early 19th century or late 18th century brick structure of its kind remaining in Bath County. It is greatly endangered by Dominion and the ACP.

Dear Ms. Bose,

The Wilderness is a 1000-acre farm in Bath County that has been in continuous cultivation since the 1740s. There is a late 18th century or early 19th century Georgian brick home & carriage house that was built and subsequently owned by several very famous Virginians and American patriots. This architectural treasure from colonial Virginia has been continuously inhabited since it was built by General Samuel Blackburn and Ann Mathews Blackburn as their home. The property remains pristine and unspoiled with wonderful woods, agricultural fields, open spaces, ponds, creeks, spring, wildlife and endangered species. There could be important archaeological sites that have not been documented on the property.

There are two conservation easements with the Virginia Outdoors Foundation (VOF) that we believed would preserve the property for future generations to understand and enjoy. However, VOF is cooperating to the maximum with Dominion including the strong support for a "land swap" which several attorneys have told us is illegal. VOF has done nothing to help us.

LO64-1 | Dominion has routed the path of the ACP through 750 acres of our property. They have selected prime property for the route of the ACP because "that is what they do" according to Gregory Park of Dominion. Our most important historic structures and where we reside will be in the BLAST ZONE of the ACP. Although we have a great deal of property where the ACP could be moved to reduce the danger to us and our property, Dominion has refused to do this.

There are many valid arguments to justify moving the ACP off of our property altogether. This includes the fact that the ACP is unnecessary, other pipeline easements could be used for the ACP, the rare historic property should be protected from the ACP, we have two conservation easements that specify this type of structure should not be placed on the property, we have significant karst issues that are ignored by Dominion, the ACP will ruin us financially, the ACP will have a negative impact on the economy in Bath County, no jobs will be generated by the ACP as claimed by Dominion, the ACP will destroy the fragile environment, etc. However we believe that the historic importance of the property ALONE should justify moving the ACP away from the property or to the very edge.

LO64-2 | Please take the time to read the attached nomination for The Wilderness as a Virginia Landmark and the National Registry of Historic Places. This comprehensive document was compiled by an expert architectural historian who worked closely with architectural historians at the Virginia Department of Historic Resources (DHR) and with us. The lengthy nomination describes the architectural and historic importance of the property in detail. We believe that the nomination will be approved by DHR and the US Department of the Interior in the very near future. The Review and Compliance Section of the DHR has been alerted that the ACP endangers the property. Part of their charter is to protect historic properties such as ours. They should be taking steps in the near future to protect The Wilderness from the ACP.

We ask that FERC assist the DHR and US Department of the Interior in every way to help protect The Wilderness, our historic and rare Bath County property. There is more than just one gas pipeline to be considered here. Our historic property is important to the Commonwealth of Virginia and the United States of America. And to us and future generations.

Roberta K Koontz
The Wilderness - Bath County
wildernesfarm@mgwnet.com



Wilderness NR
form (2...21).pdf

LO64-1 | Access roads would no longer be used on your property, and we find the currently proposed route acceptable when considering erosion, karst, and landslide issues.

LO64-2 | We acknowledge that the Wilderness has been recommended eligible for listing on the NRHP. It is discussed in section 4.10.1.1 of the EIS.

Z-2926