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File Code: 2720; 1900
Date: March 9, 2016

Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First St., N.E., Room 1A
Washington, DC 20426

Dear Ms. Bose:

Subject: Comments on Final Resource Reports for the Mountain Valley Pipeline Project
OEP/DG2E/Gas 3
Mountain Valley Pipeline, LLC
Docket No. CP16-10-000

The Forest Service appreciates the opportunity to review the final resource reports filed by Mountain Valley Pipeline, LLC for the proposed Mountain Valley Pipeline (MVP) Project (Docket No. CP16-10-000). The proposed project would affect National Forest System (NFS) lands on the Jefferson National Forest.

The Forest Service has reviewed the final resource report and identified information and data requirements necessary for the assessment of effects of the proposed MVP Project on NFS lands. The requirements are detailed in the attached document, along with comments and discussions of the Forest Service's concerns about specific aspects of the proposed project.

For questions, please contact Jennifer Adams, Special Project Coordinator, at (540) 265-5114 or by email at jenniferpadams@fs.fed.us.

Sincerely,

JOBY P. TIMM
Forest Supervisor

Forest Service Comments on Final Resource Reports Dated October 2015

Mountain Valley Pipeline Project (Docket No. CP16-10)

GENERAL COMMENTS

Federal Lands

All materials associated with this proposal should depict and explicitly identify the federal lands potentially involved including, but not limited to, the Jefferson National Forest, NPS-Acquired Lands managed by the Jefferson National Forest (JNF), the Appalachian National Scenic Trail, Peters Mountain Wilderness, and Brush Mountain Wilderness, as well as properties owned in fee by the Army Corps of Engineers. Please update diagrams, topographic or quad maps, alignment sheets, details and ancillary sites, etc. accordingly.

Plans

Some comments on plans (e.g., revegetation plans) may be included, in part, in the tabled comments below though more detailed comments are forthcoming. Also see comments found in the Forest Service's comments on draft resource reports filed on August 18, 2015 and issued by the Federal Energy Regulatory Commission (FERC) on August 11, 2015.

Archeology Survey

In a letter filed with FERC on September 17, 2015, the Forest Service indicated that the archeology survey for the Mountain Valley Pipeline Project (MVP Project or project) would be conducted by the Forest Service. Please note that Mountain Valley Pipeline, LLC (MVP) will now conduct the archeology survey.

Water withdrawals and discharges

Per the JNF Land and Resource Management Plan (LRMP), water withdrawals from NFS lands on the JNF are not authorized without analysis of the instream flow or lake level needs sufficient to protect stream processes, aquatic and riparian habitats and communities, and recreation and aesthetic values, and withdrawal is not permissible if any of the above resources are adversely affected. In the event this analysis shows that water withdrawals adversely affect the above resources, then water required for hydrostatic testing, boring, horizontal directional drilling, dust abatement, or any other use during construction, operation, and maintenance of the proposed project will need to be hauled in rather than withdrawn from NFS lands. Any used or unused water will need to be hauled out and disposed of offsite.

The locations and sources of proposed water withdrawals, and the locations of proposed discharges of water or other solutions, should be evaluated within a watershed water-use context in order to identify any off-site effects on sensitive resources. Effects on sensitive resources would be subject to compliance with Forest Service guidance and direction, and laws and regulations including but not limited to the Endangered Species Act and the National Historic Preservation Act.

For each project activity requiring water during the construction, operation, and maintenance of the proposed project on NFS lands, identify the following:

a. volume of water needed;

b. proposed source where water would be withdrawn;

c. volume of water to be discharged;

d. location and details of discharge (transport method, discharge rate, erosion control measures, etc.);

e. number and weights of loads of water that would be hauled from the water source to the site; and

f. number and weights of loads of water to be hauled from the work site to the discharge site.

Proposed Crossing of the Appalachian National Scenic Trail

The description of this specific portion of the overall proposal is not comprehensive or sufficiently detailed. There are several critical discrepancies and omissions as discussed in the bullets below.

- It is not clear to the reviewer that the route of the pipeline as shown in Figure 1.11-1, on topo map 36, and on alignment sheets 215 and 216 is the same location, nor exactly where that location is with respect to the actual location of the ANST footpath and the NFS tract boundaries.
- It is not explicitly clear to the reviewer whether MVP plans to follow the original proposed route at this location, the Alternative 200 proposed route, or some other route.
- It is not clear to the reviewer that the proponents are aware that for most of the length of Peters Mountain in the vicinity of the proposed crossing, the westernmost portion of the federal land was actually acquired by the National Park Service for the protection of the Appalachian National Scenic Trail. (See NPS ANST Segment Map 492). The route as shown in Figure 1.11-1 appears to cross only NFS lands, but this is a critical point and must be made explicitly clear.
- Figure 1.11-1 – the legend does not capture or identify the special shading on NFS lands. Peters Mountain should be shown and labelled as Peters Mountain <u>Wilderness</u> on the map and in the legend. The western boundary of Peters Mountain Wilderness is shown incorrectly – per the official Legislative Map, dated April 28, 2008, this portion of the wilderness boundary is officially a 100' offset from the centerline of Forest Road 11080.
- Figure 1.11-2 –the legend does not capture the special shading on NFS lands. Brush Mountain should be shown as Brush Mountain <u>Wilderness</u> on the map and in the legend. The southern boundary of Brush Mountain Wilderness, as shown on the official legislative map dated May 5, 2008 appears to be accurate as shown.
- In Figure 1.11-1, on topo sheet 36, on alignment sheets 215 and 216, in Resource Report-8 pages 8-39 and 8-40, the depiction of the conventional bore location of the proposed pipeline contradicts the statement on Resource Report -1 page 1-66, and elsewhere in the Resource Reports, that the conventional bore underneath the Appalachian National Scenic Trail will result in no surface disturbance within 100 feet of the trail. The dogleg in the depictions is significantly closer than 100' to the ANST. It is important that this measurement be to the closest point of the ANST, not necessarily the point where the bore hole passes under the ANST.
- The description of management prescription 4A (Appalachian National Scenic Trail Corridor) in the 2004 FLRMP defines the corridor as the mapped visual foreground zone visible from the footpath, and lists an absolute minimum distance of 100 feet for protection from social, aural, and other impacts. The proponents should be responsible for mapping that location accurately in the area of their proposed activity. All activities within MRx4A should protect the ANST experience. The proponents do not show anywhere in the Resource Reports a need to conduct any surface disturbance within 4A, or why the proposed conventional bore cannot be significantly more distant from the ANST than shown, keeping it outside of the ANST management prescription, and eliminating the need for a Forest Plan amendment for the purpose of changing the ANST management prescription.
- Throughout all the Resource Reports and supporting documents, the proponents state that there will be no access roads, and no ATWS anywhere on NFS lands. It is not clear whether the northern/western bore pit for the proposed conventional bore under the ANST will be on NFS lands or private lands. It appears clear that the southern/eastern bore pit will be on NFS lands. There are no access roads or ATWS shown or described or quantified to access this bore pit. Please identify whether access roads or ATWS are planned on NFS lands in this area.

Please note that the Forest Service has not agreed to the proposed crossing of the ANST, nor the placement of the bore pits, nor the length of the bored section of the proposal. Please see the Forest Service's letter filed with FERC on September 17, 2015 identifying the Forest Service's concerns about the proposed crossing of the ANST and recommending further consultation regarding the proposed crossing.

Please develop and submit a contingency plan for crossing the ANST in the event that the bore is unsuccessful.

Evacuation Distance for Natural Gas Pipeline Leaks and Ruptures based on Blast Radius

Based on the diameter of the pipe and the pressure of the gas contained in the pipe, identify the evacuation feet in distance.

Identify the possible causes of an unanticipated explosion of the pipeline.

Please identify the distance from the proposed pipeline to each facility potentially used by forest users and Forest Personnel on NFS lands.

Discuss the potential effects of an unanticipated explosion on the following:

- sensitive resources in the area;
- forest facilities, forest users, and Forest personnel; and

- the potential for wildfires on NFS lands.

Groundwater Protection

Also identify the measures that would be implemented to protect groundwater from potential contamination as a result of the project. The Forest Service has received comments from stakeholders who have cited chemical spill(s) in the news resulting in effects on water district(s) and landowners' wells and springs. Please identify the project-related sources of potential groundwater contamination that could affect users of water from wells and springs in the watershed.

COMMENTS ON RESOURCE REPORTS AND PLANS

RR# Or Plan Name	Page #	Section #	Comment
1	1-1	1.1.2	The purpose and need described in this section should be expanded to include a discussion of the necessity to cross Federal lands, in particularly National Forest System lands. Forest Service Manual 2700, Special Uses Management (FSM 2700), §2703.2 describes Forest Service policy relating to the use of National Forest System lands (NFS). §2703.2(2) states to authorize use of NFS lands only if: a) the proposed use is consistent with the mission of the Forest Service to manage NFS lands and resources in a manner that will best meet the present and future needs of the American people; b) the proposed use cannot reasonably be accommodated on non-NFS lands. §2703.2(3) goes on to state not to authorize the use of NFS lands solely because it affords the applicant a lower cost or less restrictive location when compared to non-NFS lands. Therefore, in MVP's discussion, they should clearly articulate why the project cannot reasonably be accommodated off NFS lands. This discussion should not cite lower costs or less restrictive locations as the sole purpose of crossing NFS lands.
1	1-23	1.4.3	This section of the report should have a statement that all restoration activities located on NFS lands shall be completed to accepted federal, state, and local Best Management Practices (BMP's) and to the satisfaction of the Forest officer(s) in charge. In addition, as-built drawings of the segments crossing NFS lands will be provided to the Forest Service and all National Forest boundaries disturbed or damaged within the project area will be re-established upon completion of installing the pipe and establishing the right-of-way corridor.
1	1-66, more	1.11	The Project Description within the Jefferson National Forest is very vague and needs additional specificity and details. Table 1.11-1 should include column totals. JNF is managed under many additional specific regulations and policies than solely the 2004 FLRMP. The length of the MVP proposal crossing on NFS lands as listed in section 1.11 and as shown on Figures 1.11-1 and 1.11-2 conflict with Alignment Sheets 215, 216, second 216 – which appears to be mis-numbered and should be 217 - and 218. Per the alignment sheets, portions of NFS lands past MP 196.9 are clearly impacted.
1	1-66, more	1.11	Figure 1.11-2 shows the proposed pipeline crossing Craig Creek twice on NFS lands, after its initial crossing of Craig Creek on private land to the west. Alignment sheet 240 appears to show the actual pipeline crossing Craig Creek a total of 5 times – 3 on private land and 2 on NFS lands. Four of these crossings are not necessary and highly impactive on water and aquatics. In addition, the discrepancy leads to questions of which version to consider accurate, and leads reviewers to question the level of critical analysis which was dedicated to developing these "final" products.
1		Figure 1.11-2	This map appears to show MVP proposing to cross Craig Creek three times within a 0.75 mile length of valley bottom. Two crossings very close together on NFS lands as the proposed route takes two very sharp turns within a short distance. This appears to be an unnecessary zig-zag in the line location where one crossing would be sufficient. This extensive work in and near the riparian area and stream channel will increase soil compaction and stream sedimentation probabilities, quantities and areal extent. Please include an alternative that would reduce the number of crossings.
Multiple	Multiple	Multiple	It appears that significant materials, including viewshed analyses and maps, have been left out of this comprehensive package of "final" Resource Reports. The proponent should re-review this entire package to ensure completeness.
App 1B	36 & 40		The Congressionally designated Wildernesses are not included on the topo maps. The proximity of the proposed pipeline to Wildernesses is important information to consider with regards to the proposed alignment. The potential concern is for noise during construction that would impact the experience and values being sought by visitors to Wilderness and for scenery viewing from the Wilderness during construction and during the life of operations. This can be resolved by adding the Peters Mountain Wilderness and Brush Mountain Wilderness boundaries to the topo sheets.

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RR1, Giles Co. Align-ment Sheets 1	2		The aerial photography imagery that helps indicate the land use is clear in some areas and not clear or non-existent in others. An example is sheet 2 of Giles County Alignment Sheets 1. Is satellite imagery available for these portions of the sheets where aerial photography is unavailable or of poor quality making land uses difficult to ascertain?
RR1 Alignment Sheets	All	Legend	The legend includes items that are not described in Resource Report 1. The following symbols that appear on the legend should be clarified as whether they are proposed as part of the pipeline facilities and if so described and their purpose/need stated in Resource Report 1. If the symbols indicate existing features, then clarification is needed as to whether they will be removed as part of the proposal or are anticipated to remain. These items include but may not be limited to Mailbox, PI Symbol, Test Station, Line Marker-Vent Pipe, and Tank.
1	1.5.1	Table 1.5-1	The inspection/patrol intervals need clarification. Instead of "7.5 months but at least twice per year" should it read "7.5 months but at least twice per *calendar* year"? And instead of "15 months but at least once per year" should it read "15 months but at least once per *calendar* year"?
1	1.10	1-52 to 1-53 and Table 1.10-1	The guidelines for past, present and future projects included in the Cumulative Affects analyses is insufficient for considering potential impacts on scenery and related socio-economics. A broader scale analyses is needed for the long-term, cumulative impacts on driving for pleasure and tourism. Tourists drive to enjoy the scenery, particularly for viewing the mountains, along U.S. 11, U.S. 460, Route 42, I-81, and other "through roads" of Virginia. The steady increase in the number and/or size of communication towers, electric transmission lines, gas transmission lines, etc., as viewed during a multiple hour drive through the mountains has the potential to negatively impact the visitors' experience and tourism. The National Visitor Use Monitoring Report for the Fiscal Year 2011 visitor surveys that occurred on the GWJeff indicates that about 20% of the national forest visitors traveled 100 miles or more to get to the national forest location where they were surveyed (more than half of those actually travelled more than 200 miles). The top recreation activities of those surveyed, in order, were hiking/ walking, fishing, bicycling, viewing scenery and hunting. These five accounted for almost 2/3 of all national forest visits. [1] Table 1.10-1 should include all maintained corridors on the national forests that are visible[2] from major highways, interstates, the Appalachian National Scenic Trail, the Blue Ridge Parkway, and designated State and Forest Service Byways within at least 70 miles (roughly 1.5 hours drive at an average of about 45 m.p.h.) along these same travel routes. Visible corridors to add to the analyses should include electric transmission lines, communications lines (overhead and underground), pipelines, major transportation projects with maintained corridor widths of 40 feet or greater.
1	1-61-62	1.10	Section titled *Vegetation, Wildlife and Habitat, and Aquatic Resources* is very general, incomplete, and needs to include a more thorough cumulative effects analysis by alternative.
1	1-63	1-10 Visual Resources	The description of potential impacts on scenery is insufficient in that it doesn't provide a discussion about the changes in color, line, form or texture. These are the basic visual elements for determining the degree to which the characteristic landscape of the national forest will be potentially changed by a proposed project. There is an emphasis on above-ground facilities, and not enough detail about the potential impacts to scenery where there are no above-ground facilities. This section should discuss the intrinsic value of the various land-use categories and the potential changes in scenery that would result if the pipeline is constructed and operated, with references to changes (contrasts created) in the characteristic landscape, particularly the mountainous, forested land use type.
1	1-61	1.10	There is a one paragraph general discussion on cumulative effects to surface water, and one paragraph on groundwater resources, but no quantitative discussion of pipeline effects in relation to other actions as outlined in Table 1.10-1.
1	1-62	1.10	The section titled *Vegetation, Wildlife and Habitat, and Aquatic Resources* does not mention anything about aquatic resources.

[1] "USDA Visitor Use Report", George Washington-Jefferson NF, USDA Forest Service Region 8, National Visitor Use Monitoring Data Collected FY 2011.

[2] Landscape visibility elements and the process for inventorying/categorizing and mapping visible landscapes are defined in "Landscape Aesthetics: A Handbook for Scenery Management," USDA Forest Service Agriculture Handbook Number 701.

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1		1-B	Each map should reference USGS quadrangle names.
1		1-C	Typical drawings need to include cross section details for steep slopes.
1		1-G	*Project-Specific Erosion and Sediment Control Plan* is absent from the report.
1		1-H	The *Fire Prevention and Suppression Plan* needs to include a section about prescribed fires on NFS lands. The Forest Service often employs prescribed fire as a tool for hazardous fuels reduction and landscape habitat and vegetation treatments. MVP needs to discuss what, if any, effect prescribed fire would have on pipeline facilities or the right-of-way and what restrictions, if any, within or near the pipeline right-of-way might be required for Forest Service prescribed fire planning. For example, are there critical facilities such as valves, stems, signs, etc. associated with the pipeline that would need to be considered in planning for prescribed fire operations?
2	2-22	2.1.4	Applicant states "Impacts will be minimized or avoided by implementation of the construction practices outlined in the FERC Plan and Procedures and as described in the mitigation measures detailed below." Needs supporting independent research citation to back up this statement or remove it. Simply stating that mitigations are effective is not sufficient.
2	2-23	2.1.4.1	Applicant states "Impacts will be minimized or avoided by implementation of the construction practices outlined in the FERC Plan and Procedures and in this section." Needs supporting independent research citation to back up this statement or remove it. Simply stating that mitigations are effective is not sufficient.
2	2-23	2.1.4.1	Applicant states "A depth of 10 feet is above most surficial aquifers utilized as a water source and most existing wells that might be drilled in a shallow aquifer will be cased to at least 20 feet." Please provide citation for the source of this information and explain how this relates to project-related disturbance.
2	2-26	2.1.4.2	Applicant states: "Use of controlled blasting techniques should avoid the impacts of blasting and limit rock fracture to the immediate vicinity of detonation along the trench line, and contain impact to within the construction right-of-way." Provide credible citation of this limited area of effect from controlled blasting. A statement like this, which can be interpreted as a mitigation of the project's effects, must be supported by credible evidence.
			Applicant makes the following statement: "The Project will comply with 10 CFR 1022 with no significant loss of flood storage as above ground facilities will displace approximately 1 acres within 100-year flood zones, therefore a floodplain assessment is not necessary." There is no evidence of the project complying with 10 CFR 1022 or that a floodplain assessment is not necessary. A reading of the CFR finds no exceptions for size as the applicant implies in the statement. The conditions necessitating floodplain assessment appear to be contained in § 1022.5 of 10 CFR Parts A through E of the code. These list exceptions to the floodplain assessment that include among others: routine maintenance of existing structures ((d) (1)); site characterization, environmental monitoring, or environmental research activities ((d) (2)); and minor modification of an existing facility or structure in a floodplain or wetland to improve safety or environmental conditions ((d) (3)). Outside of these very narrow circumstances, it appears that the Department of Energy has the authority to decide the necessity of floodplain assessments. The applicant should explain how the proposed facilities meet the exemptions from 10 CFR 1022 or submit the proposal to the appropriate regulating body for a ruling regarding the necessity of a floodplain assessment.
2	2-51	2.2.3	Applicant proposes withdrawing millions of gallons of water from streams and discharging them at separate locations. For all withdrawals and discharges on the Jefferson National Forest, the project must comply with Forestwide Standards 3 and 4: FW-3: Prior to authorizing or re-authorizing new or existing diversions of water from streams or lakes, determine the instream flow or lake level needs sufficient to protect stream processes, aquatic and riparian habitats and communities, and recreation and aesthetic values. FW-4: Water is not diverted from streams (perennial or intermittent) or lakes when an instream flow needs or water level assessment indicates the diversion would adversely affect protection of stream processes, aquatic and riparian habitats and communities, or recreation and aesthetic values. Please identify all withdrawals that occur either on or have the potential to effect National Forest Lands (upstream or downstream) and conduct an instream flow analysis for all the beneficial uses as identified in these standards. Simply stating that these withdrawals do not occur on or upstream of the NF is not sufficient. Withdrawals upstream of the NF could decrease flows and have a negative effect on the NF. Withdrawals downstream could lower the water table and cause dewatering of the

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			streams on the NF and have a negative effect. Analysis should include a calculation of the minimum flows to sustain a healthy beneficial use and the demonstration that the proposed removals will not dip below these thresholds.
2	2-51	2.2.4	Applicant states “While it is not possible to know how much water would be needed for dust suppression on the pipeline construction right-of-way, during dry seasons, MVP estimates that there would be approximately five 1,000-gallon water trucks per construction spread on a given day.” The complete lack of an estimate of the water use for dust suppression is unacceptable because it precludes any credible analysis. A credible estimate of ALL water uses, including those for dust suppression, must be made and this amount must be used for the analysis of the effects of water withdrawal on beneficial uses. The cumulative effect of all water withdrawals must be analyzed for all beneficial uses.
2	2-51	2.2.4	The report states that “While it is not possible to know how much water would be needed for dust suppression on the pipeline construction right-of-way, during dry seasons, MVP estimates that there would be approximately five 1,000-gallon water trucks per construction spread on a given day. MVP anticipates using 11 construction spreads, which would total 55,000 gallons for 55 water trucks per day”. However, it does not specify where the water will be withdrawn from. This information needs to be provided and evaluated within a watershed water-use context. Water will be withdrawn at a time of the year (dry season) when streams already have a low flow, additional withdrawal could impact water quality and aquatic organisms. An instream minimum flow analysis needs to be done and effects analyzed when withdrawal is proposed, so that in informed decision can be made.
2	2-51	2.2.5	Applicant states “ATWS will be located at least 50 feet away from the water’s edge, except where the adjacent upland consists of actively cultivated or rotated cropland or other disturbed land or as noted with a site specific explanation of the conditions.” ATWS locations must comply with the Jefferson Forest Plan (see Riparian Corridors pp 3-178 through 3-187). Ground disturbance is not permitted for these purposes within the core riparian area for all stream types or in a slope adjusted no-equipment zone around intermittent and perennial streams and wetlands. Set-backs could vary up to 150 feet by stream type and side slopes in the immediate area and must comply with the Jefferson Forest Plan.
2	2-51	2.2.5	Applicant states “However, there are 5 locations where the pipeline route parallels a waterbody within 15 feet as listed in Table 2-A-4 in Appendix 2A.” It appears that Table 2-A-4 does not exist in Appendix 2-4-A or any of the other submitted appendices. Also, paralleling waterbodies within 15 feet will not be allowed on the NF. No substantial parallel routes within the riparian corridor will be allowed on the NF.
2	2-52	2.2.5	Applicant states “There are no liquids in the pipeline that would be released to groundwater or surface water in the unlikely event of a leak.” There is an abundance of evidence that condensates of water and organics occur in natural gas transmission pipelines. Please identify all condensates that could form in the proposed pipeline and be released accidentally by a leak. Discuss the potential effects of a release of condensates.
2	2-56	2.2.5	Applicant discusses “temporary impacts” to streams, mentioning only turbidity. Please identify all short term impacts. Also, no mention of effects to long-term stream hydrology is made. Blasting could affect stream hydrology permanently by fracturing aquifers or damaging perched water tables. It could also directly and indirectly affect fish and macroinvertebrates. Please provide a full discussion of blasting effects supported by independent scientific research.
2	2-51	2.2.5	Text states that ATWS will be 50 feet from water’s edge. The JNF LRMP requires all ground disturbing activities be at least 100 feet from perennial streams; this distance increases with slope. There are likewise set-back distances for ground disturbing activities for intermittent and ephemeral streams, seeps, springs, and lakes. See Tables A1 and A2 in Appendix A in the Forest Plan for required distances from water bodies.
2	2-52 to 2-53	2.2.8	There is a general discussion on *Impacts to Waterbodies from Crossings and Mitigation Measures* in this section; however there has been no site specific analysis of potential impacts to waterbodies or aquatic biota. There has not been a sediment analysis done on the pipeline, access roads, or staging areas, therefore there is not quantitative data with which to do an effects analysis or alternative comparison. A sediment analysis should be completed to determine the potential amount of sediment delivered to the stream systems and subsequent effect on fisheries, and downstream mussels.
2	2-52 to 2-53	2.2.8	The open cut methods as described in this section is proposed for the crossings on National Forest, including 2 crossings of Craig Creek 0.1 miles apart on National Forest (RR3, page 3-58). The report states that temporary sediment barriers will be installed within 24 hours of completing instream activities. The sediment barriers should be concurrent with activities, not after completion of

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			activities. Erosion and sedimentation is a concern to the stream and downstream aquatic resource, especially in light of the concentration of proposed activities within the riparian corridor. A more thorough analysis of impacts from these crossings needs to be completed for adequate effects determination. The rationale for the multiple crossings of Craig Creek and "dog-leg" of the line within the riparian area of Craig Creek on National Forest needs to be examined and other options or additional alternatives explored.
2	2-52 to 2-53	2.2.8	The open cut methods as described in this section is proposed for the crossings on National Forest, including 2 crossings of Craig Creek 0.1 miles apart on National Forest (RR3, page 3-58). The report states that temporary sediment barriers will be installed within 24 hours of completing instream activities. The sediment barriers should be concurrent with activities, not after completion of activities. Erosion and sedimentation is a concern to the stream and downstream aquatic resource, especially in light of the concentration of proposed activities within the riparian corridor. A more thorough analysis of impacts from these crossings needs to be completed for adequate effects determination. The rationale for the multiple crossings of Craig Creek and "dog-leg" of the line within the riparian area of Craig Creek on National Forest needs to be examined and other options or additional alternatives explored. This segment was reviewed in the field, and is considered unacceptable given impact to stream, riparian, and aquatic resources. The line as staked, parallels the stream entirely too close and for too long of a distant. Consider the turn to the east being on top of Brush Mountain, rather in the Craig Creek bottom, or realign the entire crossing of Craig Creek.
2	2-54 to 2-55	2.2.8	There is a general discussion on *Impacts to Waterbodies from Turbidity and Sediment Runoff and Mitigation Measures* in this section; however there has been no site specific analysis of potential impacts to waterbodies or aquatic biota. There has not been a sediment analysis done on the pipeline, access roads, or staging areas, therefore there is not quantitative data with which to do an analysis. A sediment analysis should be completed to determine the potential amount of sediment delivered to the stream systems and subsequent effect on fisheries, and downstream mussels. Three pipeline open-cut stream crossings and ¼ mile of access roads, including a road crossing, are all proposed within a ½ mile reach of Craig Creek, in part, on National Forest. One of the pipeline crossings is proposed as downslope with a winch construction method (Figure 1.11-2), meaning it is at the base of a very steep slope. Erosion and sedimentation is a concern to the stream and downstream aquatic resource, especially in light of the concentration of proposed activities within the riparian corridor. A more thorough analysis of potential sedimentation and effects needs to be completed for adequate effects determination. The rationale for the multiple crossings of Craig Creek and "dog-leg" of the line within the riparian area of Craig Creek on National Forest needs to be examined and other options or additional alternatives explored.
2	2-55	2.2.8	Report states: "To minimize and/or mitigate potential impacts from pipeline construction and disturbance from other facilities, MVP will implement the FERC Plan and Procedures and our E&SCP, specifically with respect to erosion and sedimentation control, bank stabilization, and bank revegetation, which will minimize impacts related to turbidity and sediment transport into adjacent waterbodies." Recent experience with pipelines on the Forest has shown that frequent E&S inspection and maintenance is necessary to help control off-site erosion. Site specific monitoring and mitigation plans will be necessary to adequately address effects, since just stating that impacts will be minimized or mitigate does not quantify the effects.
2	2-58	2.2.8	There is a general discussion on *Impacts to Waterbodies from Rock Blasting and Mitigation Measures* in this section; however there has been no site specific analysis of potential impacts to waterbodies or aquatic biota. The text states that impacts could include increased sediment load and injury from shock wave. One of the pipeline crossings with shallow bedrock is on Craig Creek on National Forest land (table 2.2-11) and is also proposed as downslope with a winch construction method (Figure 1.11-2). Further site specific analysis of effects needs to be done for adequate evaluation and decision.
2	2-61	2.3	Applicant states "A Nationwide Permit application will be submitted to the Norfolk District USACE for work in the Waters of the United States (including wetlands) within Virginia." All permits to be submitted to the USACE that propose the destruction or modification of wetlands on NF lands shall be submitted to the FS <u>before</u> submission to the USACE. Mitigation for wetlands destroyed by the construction of this pipeline should be assumed to be in-kind mitigation at a minimum of 2:1.
2	2-71	2.3.4	The applicant states "ATWS areas will, to the extent practicable, be located in upland areas a minimum of 50 feet from the wetland edge. In most instances our ATWS is located beyond 50 feet of the wetland. However, there are locations where MVP has located ATWS within 50 feet of the wetland due to topography or other constraints."

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			The Jefferson Forest Plan assigns the same protection to wetlands as it does to perennial streams. Ground disturbance will not be allowed within the 100 foot core area or the slope adjusted area beyond.
2	2-72	2.4	This discussion specific to the Jefferson National Forest and list of waterbodies crossed does not include a site specific analysis of sediment and erosion potential. According to Table 2.4-1 there are 11 permanent access road stream crossings, 3 permanent pipeline stream crossings, and 15 temporary access road or workspace crossings within the riparian corridor. Several of the roads are Forest Service roads as identified in Appendix 2-C-6, however, they are not indicated as such in the access roads table in Appendix 1F. An accurate and complete picture of the project needs to be generated and a more thorough analysis of potential sedimentation and effects needs to be done so that an informed decision can be made.
2	2-72	2.4	The determination that there will be no water contamination from long term operation and maintenance is unsupported by quantitative analysis of potential sedimentation or other adverse effects, or relevant literature. There was not a readily accessible discussion on acres of exposed soil and miles of road construction/reconstruction, broken down by slope, soil type, and time of the year/length of exposure. These are all things that are necessary when determining the timing and magnitude of effects to aquatic resources.
3	3.2.11 3.2.10 Appendix 3C	3-23 - 24	We commend the desire to restore "The areas disturbed by construction…to their original grades, condition and use or better, to the greatest extent practicable" (para. 4, page 3-23). However, it appears from para. 3, page 3-24 that vegetative restoration in the temporary construction zone will rely on "Natural revegetation of shrub and forest cover types… to take significantly longer, with some saplings and nurse trees established within 5 to 10 years, and tree cover then continuing through natural succession of the forest type". Given the age, size, and condition of many of the upland sites coupled with the level of disturbance expected, natural regeneration to current vegetation cover types, is unlikely in most situations. The oak species, which dominate the impacted areas, do not readily regenerate from seed on disturbed sites. Oak is an advanced growth dependent species. Natural regeneration certainly does occur, but this most often occurs from a combination of stump sprouts and existing established seedlings that have germinated and developed in the understory over decades (advanced regeneration). Given the level of disturbance in the temporary construction zones, it is highly unlikely that the Oak Forest Community Types would naturally regenerate to eventually achieve their "original condition and use or better". A logical impact of this proposal is the conversion of Oak Forest Community Types to grass and herbaceous in the permanent ROW and Mixed-Mesophytic Forest (mesic sites), red maple (no real Community Type here, just a Dry Mesic Oak without the Oak on dry sites), to Xeric Pine and Pine Oak (again without the oaks most likely on xeric sites) in the temporary construction zones. The acreages of these expected conversions and loss of hard mast producing habitat (e.g. oaks) should be disclosed in the EIS Of course non-native invasive plants are also very likely candidates to revegetate all disturbed areas as recognized in section 3.2.10 and Appendix 3C. We appreciate the emphasis on prevention and monitoring described in Appendix 3C relating to NNIS. However, we question the reluctance to utilize herbicides, especially with regards to woody invasive species (e.g. ailanthus, paulownia, autumn olive, multiflora rose). Hand pulling and/or cutting (Appendix 3C) will not "eradicate" these species. Herbicides have proven to be the safest, most inexpensive, and most effective method of control for species like this. We suggest that MVP recognize the role that herbicide control of invasive species will most assuredly play and to analyze the effects of herbicide treatment in the EIS. The chemicals likely to be used should be identified and the impacts disclosed in the EIS. Herbicides used on the NFS lands must have an appropriate risk assessment on which the disclosure of effects is based. We strongly suggest that MVP adhere to herbicides and application rates for which risk assessments have already been completed (http://www.fs.fed.us/foresthealth/pesticide/risk.shtml). Incorporating a thorough discussion of the use of chemicals and disclosure of impacts relating to those applications in the EIS will allow a decision on the use of herbicides to control NNIS to be made now, rather than creating the need for yet another analysis and decision later when the inevitable need arises.
Through-out	Through-out	Through-out	Deficiency: There is no sediment analysis for comparison of effects described or performed in the document. For purposes of analysis and assessment of impacts, the applicant should use a sediment modeling program that includes the delivery estimates of sediment to streams through evaluation of the following variables at a minimum: a. Proposed disturbance area: including the disturbed area of the pipeline corridor, access roads, staging areas, and any other ground disturbance associated with the installation

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			and maintenance of the pipeline and associated facilities. Any sedimentation from illegal use by ATV's, horses, vehicles, or other unauthorized activities that are possible as a direct result of the pipeline construction should also be estimated and modelled. The decision to include these activities in monitoring should be based on the existing legal and illegal uses of FS and adjacent lands in the immediate vicinity. b. Slope (both the slope of the disturbed surface and the side slope in the vicinity of the proposed disturbance) c. Soil type (to include the fine fraction of the soil) d. Distance to a sediment delivering channel (for the FS, this is equivalent to the flow path that begins at an 11-acre watershed The analysis should estimate the amount of sediment delivered to the channel (generally expressed in tons), and the fate and impact of that sediment in the context of the natural background sediment of the watershed. Discussions of sediment impacts should be related to the beneficial use of the waterbody and should quantify the amount of sediment produced by the proposed action and its effects on the stream habitat. The analysis should be performed in sufficient detail so that FS specialists can evaluate the impacts to Threatened, Endangered, and the Regional Forester's Sensitive Species (TES) and the stream health. Sufficient stream habitat information should be collected to assess these impacts. These should one or more of the following: pebble counts or other physical habitat assessments, benthic macroinvertebrates monitoring, stream chemistry and turbidity. Selection of the appropriate assessment and monitoring strategy should be coordinated in advance with a FS specialist. Cumulative effects of associated activities and pipeline construction on private property in the analyzed watersheds, past activities, and anticipated future activities in the modeled watersheds on public and private property must be considered and included in the estimated disturbance as is appropriate. Without sediment analysis, no credible statement of impacts or comparison of impacts can be made by the applicant. The FS requires that sediment analysis be performed by the terms above at a minimum. Simply listing the anticipated impacts and promising to mitigate impacts is insufficient for the FS to make an informed and credible decision.
3	3-12	3.1.4.2	The statement that "Sediment-related impacts are generally temporary, lasting only during the period of active in-stream construction" does not take into account potential sediment impacts from upslope grubbing, trenching, grading during construction of pipeline corridor and access roads. Impacts from these activities need to be quantitatively evaluated via sediment analysis and effects on water bodies and aquatic biota disclosed.
3	3-10	3.1.4	The statement that "no long-term effects on dissolved oxygen, pH, benthic invertebrates, or fish communities are expected to occur due to the construction or operation of the project facilities" is unsupported by quantitative analysis or relevant literature. This information is necessary for adequate evaluation and decision.
3	3-13	3.1.4.3	Text states that ATWS will be 50 feet from water's edge. As stated in FS comments, the Jefferson National Forest plan requires all ground disturbing activities be at least 100 feet from perennial streams; this distance increases with slope. This also should be applied when near a stream, and not necessarily just crossing it as specified in the response. See Tables A1 and A2 in Appendix A in the Forest Plan for required distances from water bodies.
3	3-13	3.1.4.3	The statement "Implementation of the FERC Plan and Procedures will minimize short and long-term water quality impacts within the waterbodies crossed by the proposed pipeline" is unsupported by quantitative analysis or relevant literature. This information is necessary for adequate review and decision.
3	3-24	3.2.11	The report recognizes the potential impacts to forested vegetation (primarily trees) adjacent to the ROW. However, we question the conclusion that such impacts are "anticipated to be minimal", especially considering the potential for stress on these adjacent trees to trigger an oak decline event that could potentially grow far beyond the edges of the ROW. Firstly, you state that trees can spread their root systems "up to 2.9 times beyond the dripline" based upon Gilman, 1988. Upon reading Gilman, we interpret this to mean 2.9 times the distance from the bole of the tree to the edge of the crown, or approximately 3 times live crown radius. Based on this "2.9" number you then conclude that because the trench will be located 37 feet away from the nearest standing tree "impacts are anticipated to be minimal". Based upon equations developed by Bechtold (Crown Diameter Prediction Models for 81 Species of Stand Grown Trees in the Eastern United States, Bechtold W. Southern Journal of Applied Forestry, Vol. 27, No. 4. Nov. 2003) an 18" chestnut oak would be predicted to have a crown width of 30'. The dripline would be approximately 15' and 3 times that dripline in the neighborhood of 45 feet. Thus it seems quite likely that the trench itself is likely to disturb roots of dominant trees located 37 feet away.

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			Secondly, digging of the trench is not the only source of impact to the roots of adjacent trees. Soil compaction from heavy equipment can also have a negative impact on tree roots. Such heavy equipment use in the construction zone directly adjacent to standing trees is likely. Such use would be expected to stress those trees. This stress to mature and overmature oak species (especially black and scarlet oaks) on marginal to poor sites will likely trigger oak decline (see <u>Incidence and Impact of Oak Decline in Western Virginia, 1986</u>. Oak, Steven W., Cindy M. Huber, Raymond M. Sheffield. Southeastern Forest Experiment Station Resource Bulletin SE-123). Please improve the effects disclosure with respect to indirect impacts to adjacent trees to be more realistic and include the impacts of compaction as well as trenching in the EIS. While a quantitative analysis of the potential for oak decline may be difficult, please qualitatively address the potential for triggering oak decline due to the proposed construction activities.
3	3-30-32	3.3.3	The section of *Migratory Birds* needs more detailed analysis of effects of proposed actions and is missing some high priority species known to occur in the proposed corridor alternatives. Despite previous comments submitted of the existence of a significant wintering golden eagle population in West Virginia, Virginia, and North Carolina, there is no mention of golden eagles or analysis of potential effects of proposed actions on wintering habitat or impacts to individual birds, as required by the Bald and Golden Eagle Act. Cerulean warblers have been documented along the Blue Ridge Parkway and associated slopes below the ridgelines as far south as Floyd County. Potential impacts of the proposed project on habitat on this species should include the area of the Parkway and Blue Ridge Mountains currently being proposed to cross. Potential impacts of this project on high priority migratory bird species should include all life cycles (breeding, post-breeding, migrating, wintering) for the species that utilize habitat along the proposed route, during the time periods they are there. As the golden eagle illustrates, the Appalachians and Piedmont provide important wintering habitat, as well as migratory corridors, for high priority species that may not breed in this area.
3	3-34	3.3.3	Thank you for proposing to partner with WHC for vegetation restoration, in particular considering native seed mixes for pollinators, incorporating Integrated Vegetation Management, and restoring a gradual transition of vegetation across the proposed corridor. Especially where the corridor proposes to cross mature forest, a gradual transition of vegetation to the actual pipeline location from each side will minimize a hard edge and help provide cover for species needing to travel across the proposed corridor.
3	3-34 through 3-55	3.4 and 3.5	The entire sections of *Endangered, Threatened, and Special Concerns Species*, and associated *Environmental Consequences on Jefferson National Forest Lands* are incomplete, as it does not describe direct, indirect, or cumulative effects of the proposed pipeline, by alternative, on described species found within the area. Please provide a complete analysis for review and decision.
3	3-43 through 3-56	3.4.3 and 3.5.2	T&E surveys are incomplete. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-54	3.4.5	The statement “ the Project corridor has been determined to be unoccupied by state and federally listed species” is incorrect and confusing, based on information provided in other sections, for instance the survey information detailing a number of locations for the threatened northern long-eared bat. And based on statements that multiple surveys are incomplete and ongoing at the time of submission of what have identified as final resource reports.
3	3-55	3.5	The entire section of *Environmental Consequences on Jefferson National Forest Lands* is woefully inadequate since it does not describe direct, indirect, or cumulative effects of the pipeline on biotic resources found within the area. Please provide a complete analysis for review and decision.
3	3-55	3.5.1	The report provides recognition and inclusion of impacts to old growth communities. However, old growth may not necessarily be limited to just the 6C Mgmt. Rx. While we strive to maintain the accuracy of stand data, we are always refining this data through field surveys when we propose management activities that disturb vegetation. These field surveys are also used to address the operational definition of old growth in areas proposed for disturbance. We are prepared to work with MVP “to schedule the requested vegetation survey and site index measurement for the portions of the Project on USFS lands” as stated on page 3-56. Impacts to old growth should also include the permanent access road along the southeast flank of Peters Mountain.
3	3-56	3.5.2	T&E surveys are incomplete. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-56	3.5.1	The report discloses impacts in terms of acres by Major Forest Community types, as well as impacts to stands greater than 40 and 100 years old. This will provide the necessary specificity required to make an informed decision as it relates to forested vegetation. We do note, however, that this information is based on geospatial data. While we strive to maintain the accuracy of this data, we

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			are constantly refining this data through field surveys when we propose management activities that disturb vegetation. We are prepared to work with MVP "to schedule the requested vegetation survey and site index measurement for the portions of the Project on USFS lands" as stated on page 3-56.
3	3-57	3.5.3	Sensitive species surveys are incomplete. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-57	3.5.4	There is no discussion of proposed project and alternative effects to MIS or their habitat. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-57	3.5.5	An analysis of site-specific impacts on locally rare species and habitat, and comparison between alternatives, is necessary for adequate review and decision. Example from Table 3.5-4: Hellbender surveys within the project area are still ongoing.
3	3-57	3.5.3	Sensitive species surveys are incomplete. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-57	3.5.4	There is no discussion of proposed project and alternative effects to MIS or their habitat. An analysis of site-specific impacts on species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-57	3.5.5	An analysis of site-specific impacts on locally rare species and habitat, and comparison between alternatives, is necessary for adequate review and decision.
3	3-58	3.5.7	The section on *Stream Crossings within National Forest Land* only discussed 3 pipeline stream crossings on NFS lands although there are additional waterbody crossings on Jefferson National Forest according to Table 2.4-1 (specifically, 29 including access roads and workspace). Of special concern are the 3 pipeline open-cut stream crossings and ¼ mile of access roads, including a road crossing, all proposed within a ½ mile reach of Craig Creek, in part, on NFS lands. One of the pipeline crossings is proposed as downslope with a winch construction method (Figure 1.11-2), meaning it is at the base of a very steep slope. Erosion and sedimentation is a concern to the stream and downstream aquatic resource, especially in light of the concentration of proposed activities within the riparian corridor. Craig Creek has downstream Federally listed, FS Sensitive and locally rare aquatic species. Surveys are incomplete. It is also important to note that it is within the Chesapeake Bay watershed. A more thorough analysis of potential sedimentation and effects needs to be completed for adequate effects determination. The rationale for the multiple crossings of Craig Creek and "dog-leg" of the line within the riparian area of Craig Creek on National Forest needs to be examined and other options or additional alternatives explored.
6	6-1	6.1	Section 6.1 provides regional-scale geologic settings. In addition, the Resource Report needs to provide the geologic settings at a scale more relevant to the portions of the Jefferson National Forest (JNF) traversed by the MVP pipeline corridor. Section 6.7 JNF (page 6-49) begins to address the JNF geologic setting but needs more reference to and analysis of existing geologic information. This geologic setting specific to the JNF needs to consider and refer to published geologic reports and maps relevant to portions of JNF to be traversed by the project, such as: A.P. Schultz, C.B. Stanley, 2001. Geologic Map of the Virginia portion of the Lindside Quadrangle, Virginia Division of Mineral Resources Publication 160, 1:24,000-scale map. Schultz, A.P., Stanley, C.B., Gathright, T.M., II, Rader, E.K., Bartholomew, M.J., Lewis, S.E., and Evans, N.H., 1986, Geologic map of Giles County, Virginia: Virginia Division of Mineral Resources Publication 69, 1:50,000-scale map. Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Display the pipeline corridor (and any project facilities such as access roads) within the JNF surface ownership boundary overlaid on the most detailed scale published geologic maps available. The geologic setting specific to the JNF is more than just the geologic units listed by mileposts (Table 6.1-2; Appendix 6-A). Using the most detailed published geologic maps and reports available, the geologic setting needs to discuss the project within the context of geologic materials (lithologies and surface deposits), geologic structures (such as strike and dip of beds, joints, faults, and other discontinuities), geologic processes (such as landslides, floods, etc.), and geomorphic landforms (such as dip slopes, anti-dip slopes) relevant to the construction and operation of the project on the JNF. Based on the types of geology and level of detail in published sources, the geologic setting specific to

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			the JNF would provide an indication of the type and level of detail of geologic field investigations that may be needed to address the issues related to geologic resources and geologic hazards.
6	6-4	6.1.2	Section 6.1.2 Topography states: "Topography along the pipeline route varies from flat to slopes exceeding 45 percent…For topographic details along the MVP route, see the U.S. Geological Society (USGS) 7.5-minute series topographic quadrangle excerpts located in Resource Report 1". However, more slope information is need for the National Forest. Because slope steepness is so important in the analysis of the proposed pipeline, provide a detailed display and analysis of slopes on the National Forest relevant to the proposed pipeline. Quantify and classify the slope gradients on the JNF using the best DEM or elevation data available. Prepare a slope map covering the JNF pipeline corridor and the areas upslope and downslope of the corridor that are relevant to assessing 1) potential landslides (including debris flows) that may affect proposed facilities, 2) runout pathway for potential debris flows caused by cut slope or fill slope failures. Prepare similar slope map for areas of potential access road construction on JNF. The slope breaks used to classify slopes on the slope map should include slope breaks relevant to slope stability and/or used in project design. For example, one slope break should be the slope % at which cut-and-fill road construction would change to full bench road construction. Another example, a similar slope break should by the slope % at which cut-and-fill pipeline corridor construction would change to full bench construction. Other examples of slope breaks to include in slope map are the slope % used to determine major differences in types of pipeline corridor construction, such as: a) side hill excavation that is parallel or sub-parallel to slope contours; b) excavation that is perpendicular to slope contours and using winch lines; and c) excavation that is perpendicular to slope contours and not using winch lines. The slope map is also needed to assess slope stability of any proposed disposal sites for excess excavation (such as from full bench construction).
6	6-15	6.4	Comment on entire section 6.4. Geologic hazards are geologic processes or conditions (naturally occurring or altered by humans) that may create risks to public health and safety, infrastructure, and resources. Describe the affected environment of existing or potential geologic hazards that the MVP project may affect or be affected by on National Forest lands in a site-specific manner for each geologic hazard discussed in section 6.4.
6	6-17	6.4.1.2	Figure 6.4-1 Seismic Hazards map provides a regional setting. In addition, provide a more detailed map showing the Giles County Seismic Zone (GCSZ) and the Pembroke Fault Zone (PFZ) in relation to the JNF traversed by the pipeline corridor.
6	6-17	6.4.1.2	This Seismicity section states: "The PFZ 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." Since this is a known active earthquake zone, assess the potential for the zone to produce earthquakes with greater than magnitude 5.8 and greater than MM-VIII. Include discussion of magnitude 7 earthquake estimated by Bollinger (1988, 1981). Bollinger, G.A., Wheeler, R.L., 1988, The Giles County, Virginia, Seismic Zone Seismological Results and Geological Interpretations, U.S. Geological Survey Professional Paper 1355. Bollinger, G.A., 198l, The Giles County, Virginia, seismic zone Configuration and hazard assessment, *in* Beavers, J. E., ed., Earthquakes and earthquake engineering; The eastern United States: Knoxville, Tennessee, September 14-16,1981, Proceedings, v. 1: Ann Arbor Science, Ann Arbor, p. 277-308. Include discussion of magnitude 7.4 earthquake for Paleozoic extended terrane seismotectonic zone estimated by USGS: Petersen, M.D., et al, 2014, Documentation for the 2014 update of the United States national seismic hazard maps: U.S. Geological Survey Open-File Report 2014–1091, 243 p., *http://dx.doi.org/10.333/ofr2014109* Using the deaggregation tool in Petersen, M.D., et al, 2014, display the contribution of earthquakes of different magnitudes to the 0.14 g estimate for peak acceleration in PFZ.
6	6-17	6.4.1.2	Peak ground acceleration for the MVP pipeline crossing the JNF was estimated at 0.14 g in Figure 6.4-1 and Appendix 6-D Table 6.1 (Draper Aden Associates 2015c – Appendix 6-D). However, ridgetop amplification could increase this acceleration number by a factor of two or three times. Whisonant Watts, and Kastning (1991) state: "According to these data, the 1897 Pearisburg earthquake (M = 5.8) would have produced a seismic acceleration in the Sinking Creek Muntain area of approximately 0.12 G. Ridgetop amplification could have enhanced this number by a factor of two or three times along the crest of Sinking Creek Mountain (Bollinger, personal communication)." Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 1 – Potential Seismic Triggering of Giant Bedrock Landslides and Suspected Mass Movements in the Giles County Seismic Zone. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina.

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			The pipeline corridor crosses three ridgetops on JNF (Peters Mountain, Sinking Creek Mountain, and Brush Mountain). Assess the potential for ridgetop amplification to increase seismic acceleration by a factor of two, three or more times.
6	6-17	6.4.1.2	Peak ground acceleration for the MVP pipeline crossing the JNF was estimated at 0.14 g in Figure 6.4-1 and Appendix 6-D Table 6.1 (Draper Aden Associates 2015c – Appendix 6-D). The estimate is based on data from U.S. Geological Survey (Petersen et al, 2014). The USGS tool (Petersen et al, 2014) uses seismotectonic zone models. The zones cover vast areas of the eastern U.S. The Paleozoic extended terrane seismotectonic zone extends from Mississippi to Canada, and includes the Giles County seismic zone or PFZ. The Giles County Seismic Zone (GCSZ) or the Pembroke Fault Zone (PFZ), because it is a known active seismic area at a specific location along the MVP corridor, deserves additional, specific analysis beyond that provided by the seismotectonic zone models of Petersen et al (2014). For example, a detailed analysis of the Giles County Seismic Zone was provided by Bollinger in 1981 and 1988. Provide an updated analysis specific to Giles County Seismic Zone (GCSZ) or the Pembroke Fault Zone (PFZ). As part of the updated analysis, consider the more recent correlations of peak ground acceleration and modified Mercalli intensity. For example, Wald et al (1999; Table 1) provide for California earthquakes a range of ground motions for modified Mercalli intensities showing Peak Acceleration (% g) range of 34-65 for an MM intensity of VIII. Similar relationships are discussed in Worden et al (2012). Another example, Atkinson and Kaka, 2007 provide for Oklahoma earthquakes a Peak Acceleration (% g) range of 27 for an MM intensity of VIII. Dangkua and Cramer, 2011 provide similar relationships for modified Mercalli intensities and peak acceleration for eastern North America. The May 31, 1897 earthquake has been characterized as MM-VIII. Provide an estimate of the peak acceleration for the Giles County 1897 MM-VIII earthquake using Dangkua and Cramer, 2011 and other research as appropriate.
6	6-17	6.4.1.2	The May 31, 1897 earthquake with MM intensity of VIII has been characterized as a magnitude 5.8 earthquake. The GCSZ or PFZ is a known active seismic zone capable of generating earthquakes of magnitude 6 and 7. Draper Aden Associates 2015c report in Appendix 6-D states that the estimate 0.14 g is "expressed as a fraction of gravitational acceleration, g), with a 2 percent probability of occurring in 50 years (i.e., mean return period of approximately 2,500 years)". Return periods can be modeled and estimated for the GCSZ or PFZ, but the return periods are not known, and cannot be known without earthquake records for thousands of years for the GCSZ or PFZ. Moreover, earthquakes do not occur on regimented, clockwork return periods. Assuming for a moment a 2500 year return period for 0.14 g, it is possible for multiple earthquakes exceeding 0.14 g to occur within a 2500 year return period. The return periods for earthquakes are subject to the same misunderstandings as the return periods for floods. Some people living in a 100 year floodplain are surprised when multiple 100 year flood events occur, sometimes within a few years of each event. So, even assuming a 2500 year return period for 0.14 g, given the active GCSZ or PFZ seismic zone, one might also assume a case for multiple events exceeding .14 g within the 2500 year return period. In such a case, the probability of exceeding 0.14 g would be greater than a 2 percent probability of occurring in 50 years. More fundamentally, the relationships of MM Intensity to peak accelerations from some studies, such as Wald et al (1999) and Atkinson and Kaka (2007), suggest that earthquakes with MM intensity of VIII, in general and thus possibly including the May 31, 1897 earthquake, may have peak accelerations significantly greater than 0.14 g. The estimated magnitude 5.8 earthquake was within the magnitude 5 to 6 range of the more common earthquakes that the GCSZ or PFZ might generate compared with the less frequent, higher magnitude 6 or 7 earthquakes. The May 31, 1897 earthquake occurred just over 100 years ago and is in a known active seismic zone. In estimating peak acceleration to use for the MVP pipeline for the next 50 years, it would seem sensible and conservative to use an estimate at least as great as an estimate of the peak acceleration for the May 31, 1897 earthquake. Provide an estimate of the peak acceleration for the 1897 Giles County MM-VIII earthquake using Dangkua and Cramer, 2011 and other research on relationships of MM Intensity to peak accelerations as appropriate. Display median and ranges for peak ground acceleration for these estimates. In addition, as another approach, estimate the peak ground accelerations for a M5.8 as a function of distance using ground motion prediction equations (GMPEs) such as Toro, Abrahamson and Schneider (1997) and Tavakoli and Pezeshk (2005). Display median and ranges for peak ground acceleration for these estimates.

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			Compare the estimates from these other approaches with the estimate of 0.14 g. The estimates from these other approaches are needed to provide a check on whether the 0.14 g estimate is reasonable or not for the GCSZ or PFZ in light of the May 31, 1897 earthquake M 5.8 and MM intensity of VIII. Also, check on whether the 0.14 g estimate is reasonable or not for the GCSZ or PFZ in light of this following statement from page 6-44: "The effects of the 2011 magnitude 5.8 earthquake near Mineral, Virginia are being widely studied due to the proximity of the North Anna nuclear power station. The USGS estimated that the 2011 earthquake produced a peak ground acceleration of 0.26 g at the NAPS site." Wald, D. J., V. Quitoriano, T. H. Heaton, and H. Kanamori (1999). Relationships between peak ground acceleration, peak ground velocity and modified Mercalli intensity in California, Earthquake Spectra 15, 557–564. Worden, C.B., Grettenberger, M. C., Rhoades, D. A. and Wald, D. J. , 2012, Probabilistic Relationships between Ground-Motion Parameters and Modified Mercalli Intensity in California, Bulletin of the Seismological Society of America, Vol. 102, No. 1, pp. 204–221, February 2012, doi: 10.1785/0120110156 Atkinson, G.M. and I. Kaka, SL.I, 2007, Relationships between Felt Intensity and Instrumental Ground Motion in the Central United States and California, Bulletin of the Seismological Society of America, Vol. 97, No. 2, pp. 497–510, April 2007, doi: 10.1785/0120060154 Dangkua, D.T. and Cramer, C.H., 2011, Felt Intensity versus Instrumental Ground Motion: A Difference between California and Eastern North America?, Bulletin of the Seismological Society of America, Vol. 101 no. 4, p. 1847-1858 doi: 10.1785/0120100133 Toro, G.R., N.A. Abrahamson and J.F. Schneider (1997). A Model of Strong Ground Motions from Earthquakes in Central and Eastern North America: Best Estimates and Uncertainties. *Seismological Research Letters,* v.68, no. 1, pp. 41-57. Tavakoli, B and Pezeshk, S, 2005, Empirical-Stochastic Ground-Motion Prediction for Eastern North America, Bulletin of the Seismological Society of America, Vol. 95, No. 6, pp. 2283–2296, December 2005, doi: 10.1785/0120050030
6	6-17	6.4.1.2	In addition, assess the large rock block landslides on Sinking Creek Mountain as evidence for potentially much more powerful and destructive earthquakes than magnitude 5.8 and MM-VIII. The pipeline corridor traverses the JNF on the southeast flank of Sinking Creek Mountain. A series of large rock block slides extends for miles along the southeast flank of Sinking Creek Mountain (Schultz, A.P., 1993). Schultz (1993) states that the analysis shows that the rock block slides 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." Whisonant, Watts, and Kastning (1991) did a study of landslides in the Giles County Seismic Zone (GCSZ) and identified landslides on Sinking Creek Mountain and elsewhere as landslides likely to be of seismic origin or to contain evidence of seismic events. Review and discuss the studies which have considered earthquakes as a triggering mechanism for the large rock block landslides on Sinking Creek Mountain, such as: Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Schultz, A.P., and Southworth, C.S., 1989, Large bedrock landslides of the Appalachian Valley and Ridge of Eastern North America, in Schultz, A.P., and Jibson, R.W. (eds.), Landslide processes of Eastern United States: Geological Society of America Special Paper 236, Chapter 4, p. 57-74. Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 1 – Potential Seismic Triggering of Giant Bedrock Landslides and Suspected Mass Movements in the Giles County Seismic Zone. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina.

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6	6-19	6.4.1.3	This section on "Active Faults" is focused on active faults with known surface expression (surface faulting). However, there also are active faults with uncertain or no known surface expression. There are several issues for this "Active Faults" to consider. First, in the arid and semi-arid western U.S., the ground cracks and scarps of surface faulting produced by some earthquakes are relatively easy see in sparsely vegetated lands; and the evidence of surface faulting can be preserved on the land surface for long periods in the drier climate. In contrast, in the humid eastern U.S., the ground cracks and scarps of surface faulting that might be produced by some earthquakes would be more difficult to find in sparsely populated, and heavily vegetated mountains of western Virginia; and the evidence of surface faulting would be difficult to preserve on the land surface for long periods in the wetter climate. Consider changing title of section from "Active Faults" to a title such as "Surface rupture potential from faulting" or "Active surface faults" or "Active surface faults and rupture potential from surface faulting" in order to reflect the specific hazard addressed in this section. Assess potential for 1) surface faulting on known faults and 2) potential for new faulting to rupture the ground surface within the pipeline corridor (Collins, T.K., 1990, New Faulting and the Attenuation of Fault Displacement, Bulletin of the Association of Engineering Geologists, Vol. XXVII, No. 1, pp. 11-22). After the August 3, 2011 earthquake of magnitude 5.8 in Louisa, Virginia, geologists from the federal and state agencies were searching for evidence of surface faulting. No known surface faulting was associated with historic earthquakes in the Central Virginia Seismic Zone (CVSZ). Despite the lack of evidence of historic surface faulting in CVSZ, there was recognition that the August 3, 2011 earthquake of magnitude 5.8 might have produced surface faulting. If an earthquake of magnitude 5.8 like the 1897 earthquake were to occur again in Giles County, geologists from the federal and state agencies would be searching for evidence of surface faulting in the GCSZ or PFZ. The geologists would be conducting the kind of intense, scientific search that was not conducted in 1897. Thus, the potential for surface faulting is not a negligible hazard when one recognizes that every damaging earthquake generated by GCSZ or PFZ, such as the 1897 magnitude 5.8, would likely be followed by geological field investigations to see if surface faulting occurred. Moreover, if a damaging earthquake were to occur in the GCSZ or PFZ during the operation of the MVP pipeline, it is likely that MVP would inspect the pipeline to see if surface faulting occurred and displaced and damaged the pipeline. Such surface faulting may occur on preexisting faults or on new faults (Collins, 1990). The potential for surface faulting would be present for each damaging earthquake in the GCSZ or PFZ; the stronger and more damaging the earthquake, the more potential for surface faulting; and the pipeline would be a long, linear feature traversing the GCSZ or PFZ. In this sense, the risk of potential surface faulting to the pipeline in the GCSZ or PFZ ought not to be dismissd as a "negligible risk".
6	6-23	6.4.1.5	Describe historic accounts of landslides from the May 31, 1897 earthquake. It is important to find out as much as possible about these landslides because these types of landslides will likely be common with earthquakes of similar or greater magnitude. In addition, consider potential for landslides generated by earthquakes with epicenters outside the GCSZ or PFZ, such as described by Jibson and Harp, 2012. Jibson, R.W and Edwin L. Harp, E.L., 2012, Extraordinary Distance Limits of Landslides Triggered by the 2011 Mineral, Virginia, Earthquake, Bulletin of the Seismological Society of America, Vol. 102, No. 6, pp. –, December 2012, doi: 10.1785/0120120055
6	6-23	6.4.1.5	Identify the large rock block landslides on Sinking Creek Mountain. The pipeline corridor traverses the JNF on the southeast flank of Sinking Creek Mountain. A series of large rock block slides extends for miles along the southeast flank of Sinking Creek Mountain (Schultz, A.P., 1993). Schultz (1993) states that the analysis shows that the rock block slides 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." Whisonant, Watts, and Kastning (1991) did a study of landslides in the Giles County Seismic Zone (GCSZ) and identified landslides on Sinking Creek Mountain and elsewhere as landslides likely to be of seismic origin or to contain evidence of seismic events. Review and discuss the studies which have considered earthquakes as a triggering mechanism for the large rock block landslides on Sinking Creek Mountain, such as:

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			Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Schultz, A.P., and Southworth, C.S., 1989, Large bedrock landslides of the Appalachian Valley and Ridge of Eastern North America, in Schultz, A.P., and Jibson, R.W. (eds.), Landslide processes of Eastern United States: Geological Society of America Special Paper 236, Chapter 4, p. 57-74. Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 1 – Potential Seismic Triggering of Giant Bedrock Landslides and Suspected Mass Movements in the Giles County Seismic Zone. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina.
6	6-32	6.4.3	This statement is incorrect: "Slope information along the Project is provided in Resource Report 1, Appendix 1-I". Correct statement to show that the slope information is in Appendix 1-J.
6	6-32	6.4.3.	This reference is incorrect: "Watt 1982". Watt was Secretary of Interior, not the author. Correct reference to show authors of Landslide Overview Map of the Conterminous United States.
6	6-34	6.4.3	The Landslide section states: "MVP has performed a preliminary inventory of potential areas of landslide or rockfall concern along the pipeline alignment. This was completed through review of available historic aerial photographs, soils, topographic data to identify indications of potential landslide hazards." The review does not mention a review of geology, which is required to inventory potential landslide or rockfall concerns along the pipeline corridor. Landslides are geologic hazards. Geology is the overarching discipline for considering landslides because geology encompasses not only soils and topography, but a host of surface and subsurface factors relevant to landslides, such as lithology, structure, climate, vegetation, groundwater, and a multitude of landslide type ranging from shallow slides to deep-seated landslides. Correct this deficiency of geologic information by providing a review of geologic setting on the JNF relevant to inventory of potential areas of landslides or rockfalls by a professional geologist or engineering geologist. Consider and refer to published geologic reports and maps relevant to portions of JNF to be traversed by the project, such as: A.P. Schultz, C.B. Stanley, 2001. Geologic Map of the Virginia portion of the Lindside Quadrangle, Virginia Division of Mineral Resources Publication 160, 1:24,000-scale map. Schultz, A.P., Stanley, C.B., Gathright, T.M., II, Rader, E.K., Bartholomew, M.J., Lewis, S.E., and Evans, N.H., 1986, Geologic map of Giles County, Virginia: Virginia Division of Mineral Resources Publication 69, 1:50,000-scale map. Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Display the pipeline corridor (and any project facilities such as access roads) within the JNF surface ownership boundary overlaid on the most detailed scale published geologic maps available. Identify the types of landslides mapped in the vicinity of the pipeline corridor. Based on existing information, discuss the geologic factors (such as lithology, surficial deposits, structure, discontinuities, etc.) relevant to potential landslides along the pipeline corridor on the JNF.
6	6-34	6.4.3	The Landslide section states: "Areas where the alignment crosses steep hill slopes are identified in Table 6.4-6, and Appendix 6-D.3 includes a map set depicting these areas. As shown in the table, the pipeline route traverses approximately 3.8 miles of steep hill slopes that of potential stability or landslide concern." The steep slopes on the JNF are not identified in Table 6.4-6, and Appendix 6-D.3. Identify the steep slopes on the JNF by milepost and slope (%).
6	6-36	6.4.3	The Slope (%) column in Table 6.4-6 has a footnote: "a/ Design slope is based on desktop and field review, or range from map analysis of alignment." Specify how the Slope (%) was calculated for the JNF portion of the pipeline corridor. Was Slope (%) calculated using 10 meter DEM or other basis. Define what Slope (%) is considered "steep" for Table 6.4-6, and Appendix 6-D.3.
6	6-37	6.4.3	The Landslide section of Resource Report 6 failed to recognize the largest known landslides in eastern North America on Sinking Creek Mountain. The pipeline corridor on the JNF crosses Sinking Creek Mountain which has the largest known landslides in eastern North America (Schultz and Southworth, 1989). The pipeline corridor on Sinking Creek Mountain (MP 217.2 – 218.0) traverses one of the large bedrock landslides mapped by Schultz (1993). The Landslide section of Resource Report 6 failed to identify this large bedrock landslide on a published geologic map (Schultz, 1993).

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			The failure of the Landslide section of Resource Report 6 to recognize an existing large bedrock landslide traversed by the pipeline corridor and the failure to assess the potential for large bedrock landslides in the pipeline traverse of Sinking Creek Mountain needs to be corrected by an investigation conducted by an engineering geologist.
6	6-37	6.4.3	The pipeline corridor on the JNF crosses Peters Mountain which has some similarities (lithologies, structures, etc.) to Sinking Creek Mountain. The failure of Resource Report 6 to recognize and assess potential for large bedrock landslides (similar to the Sinking Creek Mountain landslides) in the pipeline traversing of Peters Mountain needs to be corrected by an investigation conducted by an engineering geologist.
6	6-37	6.4.3	The pipeline corridor on the JNF crosses Peters Mountain, Sinking Creek Mountain, and Brush Mountain. These mountains have the potential for more frequent types of rockslides of lesser dimensions than the large bedrock landslides of Sinking Creek Mountain. The failure of Resource Report 6 to recognize and assess potential more ordinary types of rockslides in the pipeline traverse of Peters Mountain, Sinking Creek Mountain, and Brush Mountain needs to be corrected by an investigation conducted by an engineering geologist.
6	6-37	6.4.3	The Landslide section of Resource Report 6 failed to assess the site-specific debris flows hazards for the pipeline corridor traversing the JNF on Peters Mountain, Sinking Creek Mountain, and Brush Mountain. For example, the pipeline corridor on Sinking Creek Mountain (MP 217.2 – 218.0) traverses a debris flow deposit mapped by Schultz (1993). The Landslide section of Resource Report 6 failed to identify the debris flow deposit on a published geologic map Schultz, 1993). The failure of the Landslide section of Resource Report 6 to recognize existing debris flow deposits traversed by the pipeline corridor and the failure to assess the potential for debris flows in the pipeline traverse of Sinking Creek Mountain, Peters Mountain and Brush Mountain, needs to be corrected by an investigation conducted by an engineering geologist.
6	6-37	6.4.3	The Landslide section states: "MVP is in the process of conducting field observations at these steep hill slope sites of potential stability issues…These investigations are being conducted by a geotechnical engineer experienced with landslide evaluation." It is essential that investigations also need to be conducted by an engineering geologist (not just a geotechnical engineer) on steep slopes on JNF. An investigation by an engineering geologist is especially important because of the Resource Report 6 major deficiencies in geologic information relevant to potential landslides on JNF. For the JNF portions of the pipeline corridor, provide site-specific geologic maps of consolidated and unconsolidated deposits, and geologic structures, such as dip slopes and the orientation of bedrock discontinuities (bedding, joints, and other fractures). Consider the types of landslides relevant to the site-specific geology, such as debris slides, debris flows, slumps, rockfalls, and rockslides including the potential for large bedrock landslides on Sinking Creek Mountain and Peters Mountain. Conduct on-site engineering geologic investigation and mapping such as described by Keaton and DeGraff (1996): Keaton, J.R. and DeGraff, J.V., Surface Observation and Geologic Mapping, pp. 178-230 in Landslides Investigations and Mitigation, Special Report 247, Turner A.K. and Schuster R.L. editors, 1996, Transportation Research Board, National Research Council, National Academy Press, Washington, D.C., pp. 674. Identify existing slope stability conditions in the footprint and upslope and downslope of the footprint of the proposed facilities (such as existing landslides; streamside slopes subject to undermining by streams; geologic structures that may be adverse to slope stability such as dip slopes; existing or potential debris flow paths).
6	6-37	6.4.3	The Landslide section needs to consider and make reference to such sources of geologic information as: Schultz, A.P., 1993, Geologic map of large rock block slides at Sinking Creek Mountain, Appalachian Valley and Ridge Province, southwestern Virginia, and comparison with the Colorado Front Range. U.S. Geological Survey I Map 2370, 1:24,000-scale map. Schultz, A.P., Stanley, C.B., Gathright, T.M., II, Rader, E.K., Bartholomew, M.J., Lewis, S.E., and Evans, N.H., 1986, Geologic map of Giles County, Virginia: Virginia Division of Mineral Resources Publication 69. Schultz, A.P., Bartholomew, M.J., and Lewis, S.E., 1991, Surficial Geology of the Radford 30x60° quadrangle, Virginia and West Virginia: U.S. Geological Survey I Map 2170A.

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			Schultz, A.P., Miller, E.V., Bollinger, G.A., Gathright, T.M., Rader, E.K., and Hubbard, D.A., 1985, Geologic and seismic hazard potential, Giles County, Virginia, including a discussion and map of bedrock geology: Prepared by the Virginia Division of Mineral Resources; the Department of Geological Sciences, Virginia Polytechnic Institute and State University and the United States Geological Survey under contract #14-08-0001-A0076, 44 p., 2 maps at 1:50,000. Schultz, A.P., 1986, Ancient, giant rockslides, Sinking Creek Mountain, southern Appalachians, Virginia: Geology, v. 14, no. 1, p. 11-14. Southworth, C.S., and Schultz, A.P., 1986, Characteristics of giant rock-slides in the Appalachian Valley and Ridge, Virginia, West Virginia, Maryland, and Pennsylvania: U.S. Geological Survey Open-File Report 86-94, 4 p. with 3 oversized sheets. Southworth, C.S., and Schultz, A.P., 1986, Photogeologic interpretation reveals ancient, giant rockslides in Appalachian Valley and Ridge Province, Virginia and West Virginia, in Association of Engineering Geologists Newsletter, v. 29, no. 2, p. 31-33 and back cover. Schultz, A.P., 1987, Failure kinematics of ancient giant block slides and rock slumps, southern Appalachian Valley and Ridge Province, in Schultz, A.P., and Southworth, C.S. (eds.), Landslides of eastern North America: U.S. Geological Survey Circular 1008, p. 32-33. Schultz, A.P., and Southworth, C.S., 1989, Large bedrock landslides of the Appalachian Valley and Ridge of Eastern North America, in Schultz, A.P., and Jibson, R.W. (eds.), Landslide processes of Eastern United States: Geological Society of America Special Paper 236, Chapter 4, p. 57-74. Schultz, A.P. (ed. & compiler), 1989, Roadlog and site description for the 1989 Southeast Friends of the Pleistocene Field Excursion: surficial geology of the New River Valley, southwest Virginia: U.S. Geological Survey Open-File Report 89-635, 72 p. Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 1 – Potential Seismic Triggering of Giant Bedrock Landslides and Suspected Mass Movements in the Giles County Seismic Zone. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina. Whisonant, R.C., Watts, C.F., and Kastning, E.H., 1991. Neotectonic Investigations in the Southeastern United States: Part 2 – Preliminary Investigation of Caves in the Giles County Seismic Zone Possibly Containing Evidence of Seismic Events. A report prepared of Ebasco Services Incorporated, Greensboro, North Carolina. Whisonant, R.C. and Watts, C.F., 1991. Comprehensive Stability Analysis of Ancient Giant Landslides, Valley and Ridge Province, (abs), In Proceedings of the 34th Annual Meeting of the Association of Engineering Geologists, Chicago, IL, pp 612-620.
6	6-37	6.4.3	The Landslide section states: "MVP is in the process of reviewing areas of potential slope stability issues. This information will be assessed and field evaluations completed. The impacts to the pipeline and vice versa, will be evaluated for each area identified and mitigation measures recommended. The recommendations will be included in the final pipeline design." The engineering geologic field evaluations and assessments of potential slope stability issues and "impacts to the pipeline, and vice versa" are needed for the Draft Environmental Impact Statement (DEIS), not just for final pipeline design. Provide field evaluations and assessments conducted by an engineering geologist on the JNF for the DEIS.
6	6-37	6.4.3	Describe the scope and magnitude of historic debris flows events, such as in: Plate 1 from Hack, J. T., and Goodlett, J. C., 1960, USGS Professional Paper 347.http://pubs.er.usgs.gov/publication/pp347 Morgan, B.A. et al., 1999, INVENTORY OF DEBRIS-FLOW AND FLOODS IN LOVINGSTON AND HORSESHOE MOUNTAIN, VA: 7.5 MINUTE QUADRANGLES FROM THE AUGUST 19/20, 1969 STORM IN NELSON COUNTY, VA, USGS OFR-99-518. http://geology.er.usgs.gov/eespteam/terrainmodeling/ofr99_518.htm Discuss the frequency of debris flow events, including the major debris flow events in Virginia and West Virginia from 1949 to 1996: Figure 1 from Eaton, L.S., Morgan, B. A.,Kochel, R.C. and Howard A.

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			D., 2003, Role of debris flows in long-term landscape denudation in the central Appalachians of Virginia, *Geology* 2003;31;339-342. http://geology.gsapubs.org/content/31/4/339.short Recognize that intense storms can occur outside the hurricane season as well as in hurricane season.
6	6-37	6.4.3	Describe any slope instabilities with existing pipelines in the mountainous areas of Virginia and West Virginia, such as the Celanese pipeline traverse of Peters Mountain. Provide details sufficient to characterize the factors involved so that the potential for similar slope instabilities can be assessed on the MVP project.
6	6-37	6.4	Add a section under Geologic Hazards titled "Floods and Other Stream Hazards" and describe the affected environment for floods, stream erosion and scour in a site specific manner for the MVP project on the Jefferson National Forest.
6	6-37	6.4	Add a section under Geologic Hazards titled "Acid-Producing Rocks" and describe whether acid-producing rocks (lithology) are present along the MVP project on the Jefferson National Forest.
6	6-31	6.6	In order to assess impacts on the Jefferson National Forest (JNF), the location and magnitude of the proposed slope modifications (excavations and fills) need to be identified in a site specific manner. Provide plans and typical drawings showing the dimensions of the slope modifications (cut and fill) for each type of MVP project footprint to be located on the JNF such as: Access roads to pipeline right-of-way (ROW) corridor (incudes new construction and reconstruction) Pipeline ROW excavation for trench (ditch). Pipeline ROW excavation for roads (travel area and working area) Pipeline ROW loose material from trench excavation (ditch spoil storage) Pipeline ROW topsoil (topsoil storage). Pipeline ROW loose material from construction road excavation (travel area and working area). Additional Temporary Workspace (ATWS). Contractor yards and equipment staging/storage areas. Disposal areas for excess excavation or other materials. For each type of footprint (such as listed above), state whether it will be or will not be located on the JNF.
6	6-39	6.6.1.2	Correct this statement: "These techniques and other best management practices are outlined in the typical construction drawings included in Appendix 1-D, Typical Construction Drawings, of Resource Report 1." The typical drawings are in Appendix 1-C1.
6	6-39	6.6.1.2	The construction typical drawings of mainline construction in Appendix 1C-1 are largely for flat land, and are not adequate for the steeper slopes typical of the National Forests. Provide construction typical drawings for the range of slopes gradients (%) requiring excavation on NFS lands, including a typical drawing for the maximum slopes (%) to be excavated in the construction right-of-way. Label the loose material from all excavations not just the trench excavation. While additional field information may refine the designs, MVP needs to provide, before or at the start of DEIS process, the typical drawings requested here and in related comments below; the slope and other information currently available should allow MVP to provide initial typical drawings with dimensions suitable for assessing the location and magnitude of construction on National Forests. Provide construction typical drawings with dimensions showing a cross-section of original slope and cut-and-fill for each slope class (in 10% increments) where cut-and-fill construction would occur on the National Forest. For example, if cut-and-fill construction is planned on slopes ranging from 10% to 78%, then provide a construction typical drawing for each of these construction slopes: 10%, 20%, 30%, 40%, 50%, 60%, 70%, and 80%. Provide in each typical drawing a cross-section showing the construction details from the top of the cut to the toe of the fill. Because the angle of the cut slope (or cut slope ratio such as 1:1, ¾:1, ½:1 or ¼:1) may vary depending on the geologic site conditions, the typical drawing may include a maximum and a minimum cut-slope to bracket the likely variation in cut-slope angles. Similarly the angle (or slope ratio) of fill slopes may vary, and so, the drawing may include a minimum and maximum fill-slope. Provide these typical drawings (at 10% slope intervals) for each of the three types of mainline construction techniques within the JNF as identified on Figures 1.11-1 and 1.11-2 (Resource Report 1) : 1) Typical Overland Construction, 2) Down Slope with Winch, 3) Down Slope without Winch.
6	6-39	6.6.1.2	The typical drawing for mainline construction on a ridge (Appendix 1-C1, Drawing No. MVP-8) in Resource Report 1 is inadequate and too generalized to assess the magnitude of the proposed slope modifications (excavations and fills) on ridges in the National Forest. Drawing No. MVP-8 shows ditch spoil storage on a ridge sideslope, but does not identify the slope (%) of the ridge sideslope, nor does

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			it identify the maximum slope (%) of a ridge sideslope that spoil would be allowed for slope stability (for temporary storage or permanent disposal). Even more critical, Drawing No. MVP-8 does not show the temporary storage or permanent disposal of the main excavation of the ridge. The main excavation in the construction ROW is much greater volume than the ditch excavation. Provide a range of typical drawings to show the temporary storage or permanent disposal of the main excavation for the range of typical slopes (%) along ridgetops and perpendicular to ridgetops (sideslopes) on the JNF. Where the main excavation will not be stored and/or disposed in the ROW, identify where the excavated material will be stored and/or disposed. Provide construction typical drawings with dimensions showing a cross-section with original slope (natural grade) and cut-and-fill for each typical ridgetop where construction would occur on the National Forest. For example, if construction would be on six different slope forms of ridgetops, (such as six ridgetops with symmetric side-slopes of 10%, 20%, 30%, 40%, 50%, 60%), then provide a typical drawing for each of these six types of ridgetops with symmetric slopes. Provide similar construction drawings for each typical ridgetop with asymmetric side-slopes (such 10% on one side-slope and 50% on other side-slope of ridgetop. Of special concern is the potential for failure of loose excavated material during construction and the potential for failure of fill slopes (including fill in reclaimed slopes) in the many years after construction. Display in the typical drawings the maximum extent (dimensions) of the loose excavated material in temporary storage or in permanent disposal or fill. For Down Slope Construction with or without winch as identified on Figures 1.11-1 and 1.11-2 (Resource Report 1), two drawings for needed for each typical ridge: 1) a drawing oriented perpendicular to ridge (such as Drawing No. MVP-8), 2) a drawing oriented parallel to the ridgeline showing the original ground and the final grade of the main construction ROW. This information is needed for Down Slope or ridge construction in order to assess the slope stability of cut slopes and fills slopes that may fail parallel to or perpendicular to the linear ROW. The need for this type of information is recognized in the following statement on page 6-43: "When steep side slopes are encountered, additional measures will be taken to ensure slope stability. Slope stability will be addressed during Project design and construction for both excessively steep parallel and side slopes." However, what is not recognized is the need for some of this information now in order to identify the scope and magnitude of the proposed slope modifications (excavations and fills) on the JNF and to assess potential effects on slope stability on the JNF for the Draft Environmental Impact Statement (DEIS). Provide the mileposts and a map showing the location (length along centerline) to which each typical drawing applies.
6	6-39	6.6.1.2	For each typical drawing of mainline construction on JNF, provide a typical drawing for reclamation with dimensions showing a cross-section of reclamation in relation to construction cut-and-fill and original ground surface. The section states: "MVP will minimize impacts by returning contours to pre-construction conditions to the maximum extent practicable…" Recognize that returning to original contour using fill on steep slopes may be unstable and subject to slope failure. Describe criteria that will be used to determine whether excavated material will be stable if returned to original contour. If fill placed to original contour would be unstable, describe alternative reclamation method. Assess the potential for failure of fill slopes resulting from reclamation on steep slopes regardless of whether or not the fill is placed back to original contour. If fill for reclamation on steep slopes would be unstable, describe alternative reclamation method.
6	6-39	6.6.1.2	Provide typical drawings for showing the dimensions (magnitude) of proposed modifications on cut slopes and fill slopes along existing Forest Service access road on Peters Mountain. Provide an assessment by an engineering geologist of the proposed slope modifications.
6	6-39	6.6.1.2	Provide an engineering geologic assessment of 1) the potential for natural landslides to impact the project, and 2) the potential for failure of project-constructed slopes to impact the project and to impact infrastructure, resources and public safety. Project-constructed slopes include all slope modifications (excavations, cut slopes, fills slopes, backfills, excess excavation or excess fill disposal areas, reclamation fills and slope modifications, etc.). Assess risks to people, facilities, and resources associated with potential failure of slopes modified for the project. Assess short-term slope stability (during construction of the pipeline) and long-term slope stability (during operation of the pipeline and beyond).

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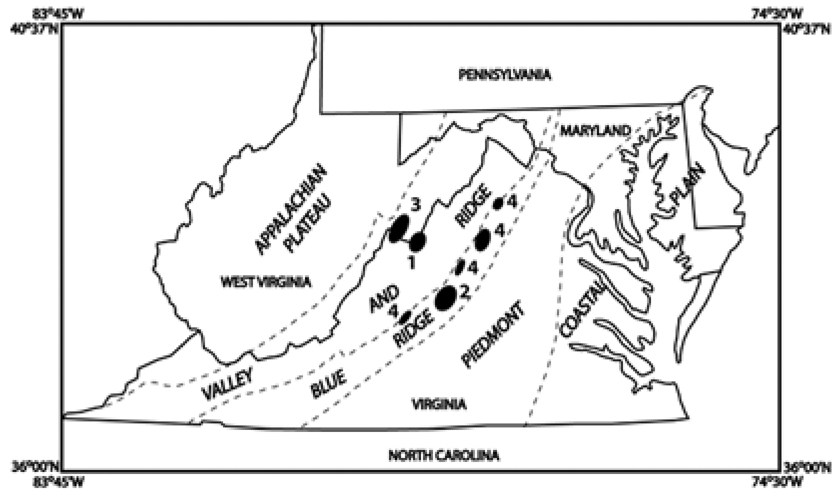
Because of the overarching influence of geologic structures (dip slopes and antidip slopes) on both natural landslides and project-related slope failures, provide engineering geologic assessment divided into 4 sections on JNF: the west flank of Peters Mountain, the east flank of Peters Mountain, the east flank of Sinking Creek Mountain, and the west flank of Brush Mountain.

1. –**Natural landslides**: Identify existing slope stability conditions in the footprint of, or relevant to, the proposed facilities (such as existing landslides; streamside slopes subject to undermining by streams; geologic structures that may be adverse to slope stability such as dip slopes; debris flow paths). Assess potential for various types of landslides (mass movements, mass wasting) to affect pipelines, access roads,

2. – **Natural debris flows**: Assess the potential for debris flow type of landslides to impact the pipeline and associated facilities. Consider the frequency of debris flow events, including the major debris flow events in Virginia and West Virginia from 1949 to 1996 (Figure 1 from Eaton, L.S. et. al., 2003).

Figure 1. Areas affected by debris-flow events in Virginia and West Virginia from 1949 to 19[…]
1—June 17–18, 1949, storm in western Virginia and eastern West Virginia; 2—August 19–2[…]
1969, storm in western Nelson County, Virginia; 3—November 3–5, 1985, st…



Eaton L S et al. Geology 2003;31:339-342

Credit: Figure 1 from Eaton, L.S., Morgan, B. A.,Kochel, R.C. and Howard A. D., 2003, Role of debris flows in long-term landscape denudation in the central Appalachians of Virginia, *Geology* 2003;31;339-342.
http://geology.gsapubs.org/content/31/4/339.short

3. - Assess the potential impacts on pipeline and access roads of swarms of debris flows, such as occurred in June 1949 in Augusta County (Figure 2) and in August 1969 in Nelson County (Figure 3).

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			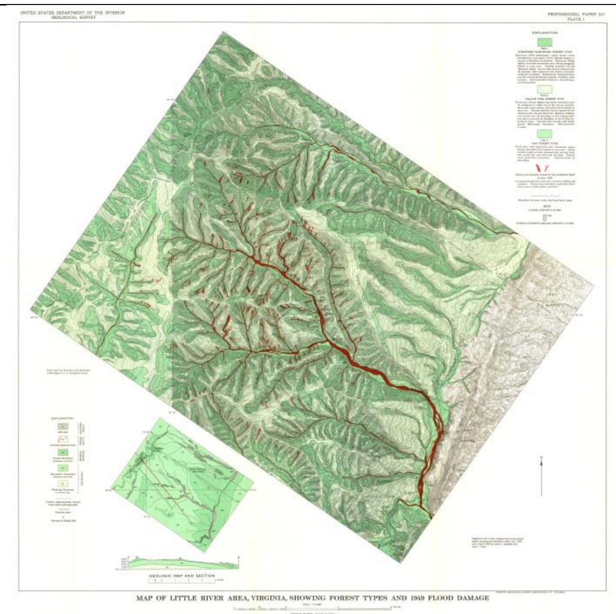 Figure 2 - A June 17-18, 1949 storm triggered more than 100 debris flows in the Little River area on the North River Ranger District in Augusta County, Virginia. Credit: Plate 1 from Hack, J. T., and Goodlett, J. C., 1960, USGS Professional Paper 347.http://pubs.er.usgs.gov/publication/pp347  Figure 3 - Debris flows in Davis Creek area triggered by remnants of Hurricane Camille August 19/20, 1969 in Nelson County, Virginia. Credit: Map excerpt from Morgan, B.A. et al., 1999, INVENTORY OF DEBRIS-FLOW AND FLOODS IN LOVINGSTON AND HORSESHOE MOUNTAIN, VA: 7.5 MINUTE QUADRANGLES FROM THE AUGUST 19/20, 1969 STORM IN NELSON COUNTY, VA, USGS OFR-99-518. http://geology.er.usgs.gov/eespteam/terrainmodeling/ofr99_518.htm 3a. – **Project-related slope failures (landslides)**: Assess the slope stability of proposed cut slopes and fill slopes during construction and operation of the pipeline, access roads, and associated facilities. Identify any risks to people, facilities, and resources associated with potential failure of slopes modified for the project. 3b. –**Access road cut slope and fill slope stability**: Assess the stability of any cut slopes or fill slopes to be modified on existing Forest Service access road on Peters Mountain. Identify methods and locations for disposal of excess excavation.

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			3c. – **Trench backfill stability**: In considering the stability of fill in pipeline trenches, determine the slope % at which fill in trenches would be unstable and subject to fill slope failure. Prepare a slope map of the project area. Use slope % at which fill in trenches would be unstable as one of the slope breaks in classifying slopes on the slope map. Identify methods and locations for disposal of excess excavation from the trenches. 3d. –**Pipeline corridor road slope stability**: The access roads to reach the pipeline corridor are a familiar type of road. In contrast, the road built in the pipeline corridor is a different type of road, cutting a wide swath across the landscape in order to accommodate heavy construction equipment traffic to dig the trench and install the pipeline. While different in scale and layout than an access road, the construction within the corridor is basically a wide road with an adjacent pipeline trench (Figure 4).  Figure 4 – Example of construction road with adjacent pipeline trench. Material excavated for the road is piled on uphill side of road; material excavated for the trench is piled in a berm on downhill side of trench. Assess the slope stability of the corridor road and adjacent pipeline trench during construction and operation of the pipeline. Of special concern is the loose, unconsolidated material (soil, colluvium, weathered or fractured bedrock) resulting from the mainline excavation (not just trench excavation) and stored in temporary piles or berms. Show the volume (cubic yards) of loose, excavated materials in temporary storage, and state how long these piles or berms would remain before some or all of the material is used for backfill or is graded as part of reclamation? If a significant rainstorm occurs during the time these temporary piles or berms are present (such as in Figure 4), it could result is a mass failure of the temporary piles or berms, and then, a debris flow that could produce off-site damage downslope and in stream channels. To estimate the volume and stability of these temporary piles or berms, a cross-section of this stage of the construction process is needed. The project design would have three types of cross-sections: 1) original ground surface, 2) final cut-and-fill, 3) cross-section to temporary piles or berms at construction stage of maximum loose excavated material, that is, before the trench is backfilled or pipeline ROW roadway is reclaimed. Longitudinal profiles showing the slope % or grade along the corridor road at this stage of construction would also be needed to assess slope stability. 3e. – **Project-related debris flows:** Assess the potential for debris flows caused by failure of fill slopes created by the project (such as access roads, pipeline corridor road and pipeline construction,

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			and associated facilities). Assess the potential for debris flows caused by failure of waste disposal areas (such as disposal areas for excess excavation along access roads, corridor road and pipeline). Assess risks to public safety, downslope infrastructure, streams and other resources associated with potential failure of fill slopes or disposal areas for the project. Recognize the potential for fill failures to result in debris flows that can travel hundreds or thousands of feet downslope (Collins, T. K., 2008, Debris flows caused by failure of fill slopes: early detection, warning, and loss prevention. Landslides. 5:107–120). http://link.springer.com/article/10.1007/s10346-007-0107-y#page-1 Provide a slope map covering the mountainside from the ridge above, to the creek below, for the pipeline on the JNF in order to assess the debris flow potential upslope from the pipeline, as well as potential for debris flows caused by fill slope failure from the pipeline project. 4. –**Seismically induced landslides**: Assess potential for seismically induced landslides to impact the pipeline. Assess potential for large bedrock rockslides, such as found along Sinking Creek Mountain, to occur on Peters Mountain as well as Sinking Creek Mountain. Assess potential for earthquakes to trigger cut slope failure or fill slope failures originating on slopes modified by MVP project.
6	6-39	6.6.1.2	The following statement is premature in respect to JNF: "The overall effects of construction and operation of the Project facilities on topography and geology will be minor. Primary impacts will be limited to construction activities and will include temporary disturbance to slopes within the construction right-of-way resulting from grading and trenching operations." Until the geologic information requested in comments on Section 6.4.3 is gathered and then assessed in accord with the comments Section 6.6.1.2, it is premature assess the effects on the JNF.
6	6-41	6.6.1.2	This section states: "MVP is in the process of reviewing areas of potential slope stability issues. This information will be assessed and field evaluations completed. The impacts to the pipeline and vice versa, will be evaluated for each area identified and mitigation measures recommended. The recommendations will be included in the final pipeline design." An engineering geologic field evaluations and assessments of potential slope stability issues and "impacts to the pipeline, and vice versa" are needed for the Draft Environmental Impact Statement (DEIS), not just for final pipeline design. Provide the field evaluations and assessments conducted by an engineering geologist for the DEIS.
6	6-44	6.6.1.3	This section has two statement claiming that 0.28 g is used for the MVP project: "As noted above, peak seismic loading for the Project alignment in Virginia and West Virginia was estimated to be 0.28 g or less (USGS 2014a)." "Based on the assessed seismic-related risks in West Virginia and Virginia (i.e., no known active faults at surface; probable peak ground acceleration of 0.28 g) it is anticipated that PGD hazards to the Project alignment will remain low." However, these statements are inconsistent with Section 6.6.4 Seismic Hazards and the two reports in Appendix 6-D which state that 0.14 g (not 0.28 g) is used for the MVP project. Clarify this inconsistency.
6	6-43	6.6.1.3	See several comments on Section 6.6.4 Seismic Hazards, and revise this Section 6.6.1.3 as appropriate.
6	6-43	6.6.1.3	See comment about adding a seismically induced landslides section within Section 6.6.1.2. Provide a cross-reference here to the seismically induced landslides section.
6	6-49	6.6	See comment about adding a "Floods and Other Stream Hazards" section within Section 6.4. In conjunction, add a "Floods and Other Stream Hazards" section within 6.6. Assess the potential for floods to impact the MVP project and the potential for the MVP project to affect flooding, for example, by failure of constructed slopes resulting in temporary landslide dam in narrow mountain valleys and hollows. Assess potential for flooding to affect pipelines, roads, and associated facilities.
6	6-49	6.6	See comment about adding a "Acid-Producing Rocks" section within Section 6.4. In conjunction, add a "Acid-Producing Rocks" section within 6.6. State whether acid-producing rock is identified in the corridor traversing the National Forests. If acid-producing rock is identified, assess the potential for release of sulfuric acid from acid-producing rock into water bodies and wetlands.
6	6-49	6.6.2	This section on Operational Impacts and Mitigation mainly describes mitigation. There is only on short sentence to assess impacts: "Operational impacts on geologic resources are expected to be minimal." This is a grossly deficient assessment of the various geologic hazards that may affect, or be affected by, the pipeline projects over the many decades of operations. See all the comments on geologic hazards in Section 6.6.1 Construction Impacts and Mitigation. Apply these same comments to Section 6.6.2 Operational Impacts and Mitigation.
6	6-49	6.7	This section states: "The JNF is located in the area with highest seismic hazards as discussed in Section 6.4.1. However, these hazards - including soil liquefaction near water crossings and the

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			potential for landslides and rock falls - are not considered severe and can be mitigated with appropriate construction design." Contrary to the above statement, the potential for seismically induced landslides is likely the most severe geologic hazard in terms of potential catastrophic destruction of the pipeline. The Landslide Section 6.4.3 and Section 6.4.1.5 failed to recognize the largest known landslides in eastern North America on Sinking Creek Mountain. The pipeline corridor on the JNF crosses Sinking Creek Mountain, which has the largest known landslides in eastern North America (Schultz and Southworth, 1989). The pipeline corridor on Sinking Creek Mountain (MP 217.2 – 218.0) traverses one of the large bedrock landslides mapped by Schultz (1993). The Landslide section 6.4.3 failed to identify this large bedrock landslide on a published geologic map (Schultz, 1993). The Landslide section 6.4.3 failed to recognize research on the seismic origin of the Sinking Creek Mountain landslides (Whisonant, Watts, and Kastning (1991); Schultz and Southworth (1989); Schultz (1993). See the comments on Section 6.4.1, and revise Section 6.7 accordingly. Assess the potential for seismically induced landslides to disrupt large sections of pipeline on Sinking Creek Mountain, Peters Mountain and Brush Mountain.
6	6-50	6.7.1	Change "Forests" to "Forest" and change "within the Forests" to "within the pipeline corridor on the Forest" to read: "Communication with Tom Collins, Forest Geologist, revealed that no permits for the collection have been issued for the Forest (Collins, 2015) and that Mr. Collins is not aware of existing paleontological sites (collection sites or "type sections") within the pipeline corridor on the Forest."
7	FERC Env Info Request Report 7, Aug 11, 2015	#13	It appears this request has not been completed regarding 7.3.1.6 and soil amendments and revegetation aids. MVP refers the reader to Section 1.4 and RR-3, which do not have this information. This is important because MVP does not mention fertilizer or lime additions in RRs-7, 1 or 3 nor do they say when they will used these soil amendments or other revegetation aids listed in FERC's Upland Erosion Control Revegetation and Maintenance Plan, May 2013.
7	FERC Env Info Request Report 7, Aug 11, 2015	#3	This request from FERC is not adequately addressed by MVP as they have not identified high water tables, compaction hazard or reclamation potential in the tables displaying the soils by milepost, Appendices 7-A1 and 7-A2. These are soil characteristics which are important in determining potential effects to soils from the project and location potential problem areas for reclamation/revegetation. The reader is referred to Section 7.2, Appendices 7-A1 and 7-A2 and Appendix 7-B, which do not contain the requested information.
7			MVP Final RR-7 does not use the same criteria as NRCS to assess erosion potential. NRCS uses K-factor, slope and rockiness; MVP uses slope, soil capability class. NRCS erosion hazard rating is the standard and should be used on NFS lands These ratings can be found in the NRCS Web Soil Survey website and SSURGO database.
7	7-17	7.3.1.1	The timing paragraph on this page states that MVP will attempt to complete final cleanup and install permanent erosion control measures in and area within 30 days after backfilling the trench in that area, weather and soil conditions permitting. This does not comply with FERC's 2013 edition of Upland Erosion Control, Revegetation and Maintenance Plan (UECR&MP), which MVP says it will follow on page 7-1 of Final RR-7. FERC's UECR&MP on page 20 says to complete final grading, topsoil replacement and installation of permanent erosion control structures within 20 days after backfilling the trench. A lot of erosion can occur within 10 days and the chance of a storm event happening while the area is very susceptible to erosion increases. Please be advised that the Forest Service may have requirements that exceed FERC's requirements.
7	7-18	7.3.1.2	The Forest Service, as the land management agency, requires that topsoil be segregated and used in the reclamation process on Forest Service managed land disturbed by this project. The Forest Service is not included in the list of areas where topsoil will be segregated automatically; please add the Forest Service to this list and ensure topsoil is conserved during construction as described in Section 7.3.1.2, RR-7. This stipulation should be added to Section 7.4, RR-7.
7	7-21	7.3.1.6	The last sentence on Page 7-20 beginning with "Unless…" says when grading is completed after the end of a seeding season the area will be seeded "by" the next available seeding season. This word "by" on first line of Page 7-21, is not correct, as this would lead to seeding out of season. Change "by" to "during" to make this statement read correctly.
8	3	Appendix 8-E	Consistency result for *FW-3: Prior to authorizing or re-authorizing new or existing diversions of water from streams or lakes, determine the instream flow or lake level needs sufficient to protect stream processes, aquatic and riparian habitats and communities, and recreation and aesthetic values.* states "N/A – standard refers to FS action". This is not true; the standard refers to any action,

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			including special uses. The consistency result should be "NO", since an instream flow analysis has not been done.
8	3	Appendix 8-E	Consistency result for *FW-4: Water is not diverted from streams (perennial or intermittent) or lakes when an instream flow needs or water level assessment indicates the diversion would adversely affect protection of stream processes, aquatic and riparian habitats and communities, or recreation and aesthetic values.* States "N/A. The Project will not withdraw water from streams located on Forest Service land". This is not currently true since section 2.2.4 does not specify where dust control suppression water will come from and an instream flow analysis has not been done.
8	8-21	8.3.1.1	The Forest Service understands that MVP's proposed route also crosses federal lands under the jurisdiction of the Army Corps of Engineers in West Virginia. The report needs updating to include this information.
8	N/A	8.5	We submitted a comment on Draft Resource Report 8 relating to the impacts of the pipeline on future use of prescribed fire as a management tool on NFS lands. A word search of RR8 reveals no such discussion. Prescribed fire is a very important tool in managing forests and woodlands to achieve our Desired Conditions set forth in the Forest Plan. In this context, it is a land use. We are concerned that the pipeline itself will impact the ability to use that tool by isolating areas that cannot be feasibly burned. Please evaluate if prescribed fire will still be a viable management tool allowed within and/or adjacent to the corridor in the EIS.
8	N/A	8.5	We submitted a comment on the Draft Resource Report relating to the impacts of the pipeline on Lands Suitable for Timber Production on NFS lands. A word search of RR8 reveals no such discussion. Commercial timber harvest is a very important tool in managing forests and woodlands to achieve our Desired Conditions set forth in the Forest Plan. In this context, it is a land use. We are concerned that the pipeline itself will impact the ability to use that tool by removing lands that are currently suitable for timber production or isolating suitable areas that cannot be feasible harvested. Please disclose the number of acres of lands suitable for timber production that will be removed from production by the pipeline, either directly or indirectly through isolation of currently manageable tracts, in the EIS.
8	8-40	8.4.3	**Peters Mountain Wilderness** – The narrative covers foreground views and distant views to the pipeline simultaneously, resulting in confusion as to whether distance alone accounts for the low to no visual impacts to the distant view of the pipeline, or whether vegetation that would mitigate the foreground view will also mitigate the distant view. The discussion about the potential views of the pipeline in the foreground and the potential views to the middleground should be provided as separate sentences or paragraphs. Furthermore, statements about screening vegetation should state whether that vegetation is evergreen or deciduous. If deciduous, MVP needs to assess whether the deciduous vegetation during leaf-off is dense enough to screen views of the pipeline.
8	8-40 and 260 of 260 in RR8	8.4.3 and App. 8F	**Appalachian National Scenic Trail (ANST) –** Information provided in this report is deficient about the process to choose the location and number of Key Observation Points for the ANST. The number of KOPs is likely insufficient. The report lacks a broader landscape topographic map depicting the proposed pipeline route and the ANST, making it impossible for the reader to get the big picture about the potential impacts and whether the visual assessment is adequate. A "seen area" area map is needed that includes national forest boundaries, topography, the ANST and the preferred route alternative, at a minimum. The photo provided in Appendix 8F for the ANST on Peters Mountain is not informative and is deficient for use in determining potential impacts to scenery as viewed from the ANST. The deficiencies include the horizontal cone of vision, the vertical/height of view included in the photograph, the leaf-on condition (clearly deciduous forest, so there is no evergreen visual screen) when the standard protocols for visual assessments is during the leaf-off season. As stated above, additional visual simulations are likely needed to demonstrate whether or not the SIOs would be met for the ANST with a 100 foot buffer of vegetation or not. Also, additional photo simulations may be needed for middleground and background views from the ANST.
8		8.4.3 Expansion or new sub-section needed	**Missing from this Report – Other Concern Level 1 Routes/Areas** – The USDA Forest Service's SMS requires that visual resource analysis occurs not only for special areas such as the national scenic trails, scenic byways, resorts, etc., but also for all "primary travelways and use areas." The guidance is provided on pages 4-8 and 4-9 of the SMS Handbook. MVP states that the USDA Forest Service's SMS protocols will be utilized for private lands as well as national forest and other public lands (Section 8.4 page 8-29 and Section 8.4.3 page 8-32).

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			At a minimum, the report is deficient in that it does not include visual analysis for highways U.S. 460, U.S. 11 or Interstate 81, all major interstate routes with a Concern Level of 1. A broad scale, landscape level map depicting not only roads and trails *crossed* by the pipeline, but also routes and viewing platforms not crossed by the pipeline but potentially within the seen area "viewshed" of the pipeline, so that readers can discern whether all primary, sensitive routes and areas have been considered and included in the report. These could be roads, trails, rivers and streams popular with kayakers or anglers, highly sensitive communities and primary summer home tracts, etc., with views to the national forest. These need to be taken into account during project level analysis, regardless of whether they are included in the forest-level SMS inventory. A higher level of ground-truthing occurs during project level analysis.
8	8-51	8.5.1	The report indicates there is a summary of land use impacts to USFS lands, however, there is no analysis of impacts in this section. In addition, this section should clarify if the 80.4 acre temporary construction right-of-way figure includes all ATWS, contractor yards, pipe storage locations, and other work spaces required on NFS lands during the construction phase.
8	8-51	8.5.2	The Forest Service understands that the project crosses lands administered by the Army Corps of Engineers in West Virginia. Since the project crosses Federal lands administered by two or more Federal agencies (Forest Service and Army Corps of Engineers), the Bureau of Land Management (BLM) has jurisdictional authority to grant or renew rights-of-way or permits through the Federal lands involved under the Mineral Leasing Act of 1920. Therefore, this section should state that a right-of-way grant application across National Forest System lands will be submitted through the BLM.
8	8-53	8.5.4	The format for describing each of the management area prescriptions is somewhat inconsistent. For example, some describe the ROS standard for the M.A. and others do not.
8	8-54	8.5.4 SMS Complianc e	Generally, this report summarizes the USDA Forest Service's Scenery Management System (SMS) accurately. However, the part of the narrative pertaining to Scenic Classes is confusing. The SMS Handbook describes how inventoried scenic attractiveness, distance zones and concern levels are used to identify the relative value or importance of scenery for different areas using a range from Scenic Class 1 (highly valued) to Scenic Class 7 (low value, relative to other areas). This section of Resource Report 8 contains only Scenic Classes 1, 2 and 3. It should be stated whether areas of Scenic Classes 4 – 7 exist within the proposed project area. Furthermore, parentheticals contain the words "Very High, High, Moderate, Low". Clarification is needed about what these words represent. Are these the Scenic Integrity Objectives (SIOs) that exist within each of those Scenic Classes? If so, there is a discrepancy between the descriptions on page 8-53 (no Very High SIO in any management areas) and the description of Scenic Classes on page 8-54 (includes Very High for Scenic Classes 1 and 2). If these are references to the relative value of the landscape scenery that needs to be explained in the report and its source referenced (Final LRMP or inventory data of existing scenic integrity).
8	8-54	8.5.4 SMS Complianc e	The same concluding statements are made under Scenic Class 1, Scenic Class 2 and Scenic Class 3 (all national forest lands through which the proposed pipeline will pass). These are: • The project elements, the landform, vegetation patterns, and cultural features would still combine to provide the ordinary/common or high scenic quality for the areas. • The landscape has the ability to absorb the visual change. Resource Report 8 has not adequately substantiated either of those statements and has not followed the USDA Forest Service's SMS protocols that it claims earlier in the report will be followed. To do so, the descriptions of the site specific landscapes for each of the management areas (page 8-53) must provide more detail regarding the type and level of landscape variety and patterns that exist, and inform about the current level of intactness of the landscape character. The proposed project elements (including any new or expanded access roads and ATWS), need to be described in terms of anticipated changes they would introduce to the existing landscape character and intactness. The latter should be phrased in terms of visible changes to color, line, form and texture in contrast to the existing condition, as provided in the SMS Handbook and described Resource Report 8 section 8.4.3 on page 8-32 ("Contrast is an important assessment criterion on the visual impact assessment to measure the degree of physical change in the landscape with regard to how the change is seen by viewers. Contrast in the landscape is determined by the differences in form, line, color, texture, and landscape juxtaposition between the existing condition and the Project… Factors such as visual

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			dominance, degree of deviation from existing landscape character, and intactness of the landscape were considered in this comparison”). Section 8.5.4 needs to provide details about this assessment of contrast and the degree of physical change in the landscape and provide a determination based on the level of deviation defined for each SIO. A broad statement that the project meets the SIOs for each Management Area is deficient. Geographically specific (site specific) determinations are needed. Views can and often do change with movement along a route within a single management area, and that should be described in a narrative and displayed graphically. Secondly, there is concern about the broad application of the SMS principle of visual absorption capability. There is not sufficient detail in the description of the landscape character to indicate that a suitable degree of variety and pattern exists to visually absorb the addition of the proposed pipeline corridor (including what patterns, lines, forms, textures and/or colors currently exist that are similar to those that would be introduced by the project).
8		Table 8D	The data displayed in this table indicates that MVP analyzed only the “nearest” potential view between project components and the viewing platform. The nearest location of a travelway or area may not be the part that would have the greatest impact on its scenery. Intervening geology or evergreen vegetation may block the view at the nearest location, but further out along that same travelway there could be a clear view to the project area. The table should be updated to include whether other portions of travelways listed, further from the proposed project area, may also have a view of the project area. A “seen area” analysis needs to be provided that displays where primary viewing routes and areas, on and off the national forest, may potentially view the proposed project components. Those that lie within five miles, per the MVP process (the FS definition of background is actually four miles to infinity), should be included in Table 8D. Since MVP states it will use the FS process for private lands (up to three miles), those sites that meet the definition of “primary travelway or area” captured in the “seen area” analysis should also be added to the table. Some travelways may have views to the project area from multiple distance zones (foreground, middleground, and/or background). This needs to be revealed in Table 8D.
8		Consistency Analysis with FLRMP document	This document is inserted into RR8, but it is not identified as an Appendix to that document. The page numbering starts at 1. It seems that it should either be a Section of Resource Report 8 with continued page numbering from Resource Report 8, or it should be identified as an Appendix to Resource Report 8.
8	18 & 19	Consistency Analysis with FLRMP	**Consistency with FW-154 and FW-158 for ANST.** – As provided in comment to Section 8.4.3 and Appendix 8F Visual Simulation related to the ANST, the claim that the proposed project meets the SIO has not been adequately substantiated. The narrative in this FLRMP consistency review document does not provide any additional information that would substantiate the claim that any of the standards for M.A. 4A are met including the SIO of High.
8	19	Consistency Analysis with FLRMP	**Consistency with FW-161, FW-162 and FW-163 Regarding ROS** - Resource Report 8 is deficient with regards to addressing the Recreation Opportunity Spectrum and the ROS standards for each management area. There is no analysis provided for ROS and no indication of potential impacts to not meeting the ROS, as stated in the Consistency Analysis document for FW-161. A narrative describing the impacts to the settings under the recreation opportunity spectrum, using the guidance provided in the USDA Forest Service’s “1986 ROS Book” is needed in Resource Report 8. It should be accompanied by a map or table clearly depicting the ROS standards and anticipated outcome of ROS inventory changes as a result of this project.
8	21	Consistency Analysis with FLRMP	**Consistency with FW-183, FW-184 and FW-185 Regarding SIOs** – The MVP response to each of these standards is “Yes” and that a project level analysis ***will*** be conducted. However the Resource Report 8 narrative in Section 8.5.4 states that the SIO’s will be met, implying that the project level SIO analysis is complete. There is a discrepancy between these two portions of Resource Report 8. If the project level analysis is complete, per Section 8.5.4, then it is deficient as described in response to other sections (above) and in my general comments provided below. The finding that the project

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			is consistent with the FLRMP by meeting SIOs has not yet been determined and the document should not indicate, at this point, "Yes".
8	21	Consistency Analysis with FLRMP	**Consistency with FW-186, Mitigations to Protect Scenery -** The MVP response is deficient in describing where and how the openings in the canopy created by the centerline corridor, ATWS, and road accesses will be shaped, oriented, and edges feathered to reduce the impacts to scenery. There is no indication from the description of the final centerline corridor of 50' that MVP is willing or able to shape the opening or feather the edges. If MVP does intend to incorporate this mitigation measure, a description of how and where they will employ this mitigation should be included.
8	21	Consistency Analysis with FLRMP	**Consistency with FW-189, Mitigation to Protect Scenery -** The MVP response demonstrates a misunderstanding or error in their interpretation of the intent of this standard. The intent is that the proponent must find a means to eliminate or minimize the height of slash after the removal of the trees. MPV needs to describe how they will meet this standard or change their determination regarding consistency with it.
8	22	Consistency Analysis with FLRMP	**Consistency with FW-193, Mitigation to Protect Scenery –** The MVP response addresses only the ANST, but the standard applies to locating bare mineral soil out of view from view of all concern level 1 and 2 travelways, where practical. This standard refers to log landings, roads, and bladed skid trails. It is not clear which of these features might be utilized during the removal of trees from the proposed pipeline corridor. The primary purpose of the standard is to make practical attempts to locate mineral soil out of view, therefore the focus should not be on the specific methods utilized.
8			Resource Report 8 lacks a clear map of the proposed route(s) for the MVP pipeline. This is needed to help readers ascertain the adequacy of the number and location of Key Observation Points, and whether the visual simulations in Appendix 8-F include the best direction of view or whether a different direction or multiple directions are needed. The Forest Service recommended that a visible or "seen area" analysis be prepared for a distance of five miles from the proposed pipeline centerline. There is no mention of the use of this important analysis tool in Resource Report 8. A "Seen Area Analysis" map for the pipeline crossing of national forest lands should be included in Resource Report 8 as a method used to select Key Observation Points. Resource Report 8 lacks a table of Key Observation Points, which should be included. A table should display all KOPs along with elevation, direction of view(s), a description of the view including predominant vegetation in the foreground and middleground (if visible during leaf off) and any distinguishable natural or cultural features, whether the KOP was within the "seen area", the line of sight direction to one or more pipeline segments, the line of sight distance to the pipeline segment(s), and whether photo or visual simulations were prepared. Forest Service trails, including the Appalachian National Scenic Trail, some Forest Service roads, and all public roads are open and used year round. Scenic Integrity Objectives need to be met during winter "leaf off" season. It is not clear whether the assessment for meeting SIOs considered this. Visual simulations in Appendix 8F only include summer, leaf-on season. Wherever MVP states in Resource Report 8 that there is vegetation that screens views of the pipeline, additional information is needed including whether the vegetation is evergreen or deciduous. If deciduous, a statement is needed with regards to the density of the vegetation and its capacity to block or screen views during leaf-off. Wherever MVP states in Resource Report 8 that viewing distance mitigates the visual impact, that distance should be specified.
8	32	Appendix 8-E	Consistency result regarding Riparian Corridors states "N/A. The Project will not cross this management prescription". This is not true; According to table 2.4-1 (Waterbodies crossed on the Jefferson National Forest) the project crosses 29 streams on the forest, and thus riparian corridors. A consistency review needs to be completed for all of the Standards in Management Prescription 11- riparian corridors. In addition, there is no discussion regarding the Federally Listed Fish and Mussel Conservation Plan, of which this project crosses several watersheds that are included in that plan.

RR# Or Plan Name	Page #	Section #	Comment
8	General		A portion of the route on NFS lands is within the Chesapeake Bay watershed. MVP should determine how this project impacts the U.S. EPA's Chesapeake Bay Total Maximum Daily Load (TMDL) pollution limits in the cumulative effects analysis.
10	10-9	10.5.1	The report states that one of MVP's primary objectives with respect to pipeline routing was to avoid (if possible) or minimize crossings of national forest. The report, however, does not identify or discuss any routes that avoid National Forest System lands. MVP should identify and discuss one of the early route(s) in their routing process that avoided NFS lands and reasons why that alternative(s) was not considered. As discussed in a previous comment, Forest Service Manual 2700, Special Uses Management (FSM 2700), §2703.2 describes Forest Service policy relating to the use of National Forest System lands (NFS). §2703.2(2) states to authorize use of NFS lands only if: a) the proposed use is consistent with the mission of the Forest Service to manage NFS lands and resources in a manner that will best meet the present and future needs of the American people; b) the proposed use cannot reasonably be accommodated on non-NFS lands. §2703.2(3) goes on to state not to authorize the use of NFS lands solely because it affords the applicant a lower cost or less restrictive location when compared to non-NFS lands. Therefore, in MVP's discussion of alternatives, they should clearly articulate why the project cannot reasonably be accommodated off NFS lands. This discussion should not cite lower costs or less restrictive locations as the sole purpose of crossing NFS lands.
10	10-9	10.5.1	The report is deficient in displaying an alternative that avoids the Jefferson NF or in providing information about why an alternative that avoids the Jefferson NF is not possible. In Section 10.5.1, a primary MVP objective is identified as avoiding (if possible) the national forests. There is a description of an initial attempt to avoid all cities and towns, the NFs, the NPS, and the ANST, which resulted in a corridor 2,362 miles long. There is no description of any additional attempts to develop a specific alternative or alternative modification that avoids the Jefferson NF.
10	First= 10-12	Multiple	Errors in earlier Resource Reports are duplicated here – the proposed route appears to impact some NFS lands between MP 169.9 and MP 180, so total mileage is larger than 3.4 miles.
10	10-28	10.6.4	There is no Brush Mountain West Wilderness. There is a Brush Mountain Wilderness, and a Brush Mountain East Wilderness.
10	10-54	10.6.16	One example of improper references. Figure 10.6.16 does not appear in Resource Report-10, but rather in Resource Report-10, Appendix 10-B. Better references would facilitate review.
10	10-56	10.6.17.1	Per earlier comments, a much more detailed description of a much more detailed analysis must be conducted and documented. Forest Service field review, including a very basic visual analysis, in October 2015 found that the proposed ANST crossing will result in a significant visual impact to users of the Appalachian National Scenic Trail. This unsupported statement raises questions about other weakly-supported statements in the Resource Reports package.
10	10-56	10.6.17.1	The proposed crossing of the ANST is a horizontal bore beneath the trail. MVP needs to provide alternatives and/or a contingency plan in the event the bore is not successful.
10, App 10-B	---	---	This entire appendix needs significant reworking and addition of detailed notes. For example, the sheet with 4 pictures labelled "Appalachian National Scenic Trail at Proposed Route Crossing Location" should be geo-referenced, dated, with directions shown and locations of proposed bore pits identified. The half-sheet satellite views and map views need vicinity mapping, and need to show federal land boundaries, and Wilderness boundaries, and include a legend. For example, the sheet titled "Columbia Gas of Virginia Peters Mountain Variation Appalachian Trail Crossing" does not provide enough context for this reviewer to identify where it actually is located.
10, App. 10-D	Table 10-D-2	---	Significant additional explanation of this table is needed. Calling a shift of "east up to 1300 feet" between MP 194.3 – 197.0 a "minor route modification" needs explanation. It may, in fact, shift the pipeline into a federal Wilderness, or shift the proposed pipeline crossing of the ANST to include some NPS-acquired lands. Similarly, a statement that a "shift northeast up to 14,441 feet" between MP 213.1 – 221.8 could impact entirely different areas of NFS lands, including a difference federal Wilderness. It is impossible for this reviewer to understand what is meant by this entire table. It appears that it may significantly change the area of NFS lands potentially impacted, necessitating completely different field surveys and review.

RR# Or Plan Name	Page #	Section #	Comment
10		App 10A	**Alternative Routes Maps:** The pages containing maps in this Appendix do not have page numbers. Ability to reference specific maps would be improved by the addition of page numbers for the entire Appendix. Most of the maps do not graphically indicate lands owned by the national forest. For people interested in potential impacts to the Jefferson NF, these maps are not very informative. NF ownership should be delineated or displayed graphically on the maps at (in the .pdf document as page # of 151) pages 87-90, 92, 96, 116-117.
10		Tables	**General Comment:** The tables for the different alternatives are confusing. The data for the proposed route varies from alt to alt and when compared to different alt modifications when it seems to the average reader that the proposed route data would remain constant in each table. At a minimum, MVP should add a note to each table describing the segment of the pipeline involved. However, the big picture for the entire pipeline gets lost to the reader who is trying to compare one alternative to another if the pipeline is broken down by segment. For improved clarity about the alternatives, it would be helpful if MVP adds a table that includes all of the alternatives and the data for the entire pipeline proposal.
10	General		FERC regulations at § 380.12(l)(1)(2)(ii) requires identification and consideration of route alternatives that avoid impact on sensitive environmental areas and presentation of sufficient comparable data to justify the selection of the proposed route. The report consistently cites a one-to-one relationship of mileage to environmental impact as the primary comparable data. This approach does not measure the environmental effects of different alternatives sufficient for the Forest Service to make an informed decision on whether or not the proposed route would result in the least amount of impacts to National Forest System lands when compared with other alternatives. We understand that MVP remains in process of conducting environmental surveys and look forward to additional comparable data being provided for review.