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April 8, 2016

Joby P. Timm
Forest Supervisor
George Washington and Jefferson National Forests
United States Forest Service
5162 Valleypointe Parkway
Roanoke, VA 24019

Re: Mountain Valley Pipeline, LLC
FERC Docket No. CP16-10-000
Responses to Comments

Dear Mr. Timm:

On March 9, 2016, the United States Forest Service ("Forest Service") submitted comments to the Federal Energy Regulatory Commission ("Commission" or "FERC") with respect to Mountain Valley Pipeline, LLC's ("Mountain Valley") certificate application in FERC Docket No. CP16-10-000. Mountain Valley submits herewith responses to the Forest Service's comments.

This submittal includes public information and privileged information. The attachments that include privileged and confidential information are labeled "Contains Privileged Information – Do Not Release." Mountain Valley requests that, pursuant to 18 C.F.R. § 388.112 and other applicable regulations, the Forest Service and the Commission treat the privileged information as non-public. The person to be contacted regarding the request to treat these materials as non-public is Paul Diehl, (412) 395-5540 or pdiehl@eqt.com.

If you have any questions, please do not hesitate to contact me at (412) 553-5786 or meggerding@eqt.com. Thank you.

Respectfully submitted,

Mountain Valley Pipeline, LLC

Matthew Eggerding
Counsel, Midstream

Attachments

cc: FERC Docket No. CP16-10-000 and service list
Jennifer Adams, Forest Service
Paul Friedman, FERC
Lavinia DiSanto, Cardno, Inc.
Doug Mooneyhan, Cardno, Inc.

Mountain Valley Pipeline, LLC
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Responses to Forest Service Comments on Final FERC Resource Reports
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Request: USFS-1

General Comment – 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.

Response:

Maps and figures that show federal lands have been revised as requested. The attachments are organized by FERC Resource Report, and include maps and figures originally included in the Resource Reports filed with the FERC application in October 2015, and subsequent updates and additions prepared to respond to the December 24, 2015 FERC information request. Only those figures and maps that show federal lands have been revised. Attachments include:

- Attachment USFS-1a Revised Maps and Figures for Resource Report 1
- Attachment USFS-1b Revised Maps and Figures for Resource Report 2
- Attachment USFS-1c Revised Maps and Figures for Resource Report 4 [Contains Privileged Information – Do Not Release]
- Attachment USFS-1d Revised Maps and Figures for Resource Report 6
- Attachment USFS-1e Revised Maps and Figures for Resource Report 7

Additional revised maps and figures are also included in responses to applicable data requests as noted in responses to applicable requests (e.g., Request USFS-170 regarding Resource Report 10).

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Request: USFS-2

Plants

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.

Response:

Comment noted.

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Request: USFS-3

Archaeology

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.

Response:

Comment noted. Mountain Valley is currently conducting the archaeological survey within the Jefferson National Forest.

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Request: USFS-4

Water Withdraw

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.

Response:

Mountain Valley has no proposed locations for water withdrawal or discharge in the Jefferson National Forest. Additionally, Mountain Valley has no proposed locations for surface water withdrawal or discharge within the East River-New River, Sinking Creek-New River or Upper Craig Creek HUC-10 watersheds. The nearest proposed water withdrawal location upstream of the Jefferson National Forest is at Indian Creek, part of the Indian Creek watershed in the Middle New sub-basin, approximately 9.6 miles from the Jefferson National Forest. Any water withdrawn from this location for hydrostatic testing will be discharged at an upland location within the Indian Creek watershed. The nearest proposed water withdrawal location downstream of the Jefferson National Forest is at the Roanoke River, part of the Roanoke River watershed in the Upper Roanoke sub-basin, approximately 7.8 miles from the Jefferson National Forest. Any water taken from the Roanoke River for hydrostatic testing will be discharged in an upland location within the Roanoke River watershed.

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Request: USFS-5

Water Withdraw

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

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

Response:

a) Water will be required in the Jefferson National Forest during construction of Mountain Valley only for dust suppression. The anticipated water need is up to 1,000 gallons per day within the Jefferson National Forest.

b) Water for dust suppression will be sourced from municipal water. If surface water sources are required, either Indian Creek, upstream of the Jefferson National Forest, or the Roanoke River, downstream of the Jefferson National Forest, will be utilized.

c) See the response to sub-part (a).

d) Water used for dust control purposes will be discharged evenly via sprayers along the active construction right-of-way. This water will be conveyed to the construction site via 1,000-gallon water trucks. The discharge rate will be low enough such that erosion and sedimentation will not occur as a result. No erosion control measures, beyond those that are included in Mountain Valley's Erosion and Sedimentation Control Plan, are anticipated to be necessary for dust suppression.

e) One1,000-gallon water truck will deliver water to worksites in the Jefferson National Forest per day during construction as needed. These trucks have an approximate vehicle weight of 33,000 lbs. The water load will be approximately 8,350 lbs per truck, for a total estimated load of 41,350 lbs.

f) No water will be hauled out of the Jefferson National Forest for discharge.

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Request: USFS-6

Proposed Crossing of the Appalachian National Scenic Trail

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.

Response:

Figure 1.11-1(Attachment USFS-6a), topo map 36 (Attachment USFS-6b), and alignment sheets 215, 216, and 217 (Attachment USFS-6c) have been updated to clearly identify the location of the ANST and NFS tract boundaries where information is available. Also attached is a preliminary conventional bore profile shows the location of the Mountain Valley Pipeline crossing of the ANST (Attachment USFS-6d). Mountain Valley has requested from the Forest Service copies of legislative maps referenced in certain comments. Mountain Valley may submit a supplemental response to this comment after receipt and review of the material.

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Request: USFS-7

Proposed Crossing of the Appalachian National Scenic Trail

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.

Response:

Mountain Valley adopted Alternative 200 into its proposed route filed with FERC on October 23, 2015.

Mountain Valley Pipeline, LLC
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Request: USFS-8

Proposed Crossing of the Appalachian National Scenic Trail

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.

Response:

Boundary and property ownership information included in Mountain Valley's mapping is based on current GIS data obtained from the Forest Service. Mountain Valley has requested from the Forest Service a copy of NPS ANST Segment Map 492 as referenced in the comment. Mountain Valley may submit a supplemental response to this comment after receipt and review of the material.

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Request: USFS-9

Proposed Crossing of the Appalachian National Scenic Trail

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 Wilderness 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.

Response:

Additional shading and labeling has been added to revised Figure 1.11-1 included in Attachment USFS-6a. Boundary information included in Mountain Valley's mapping is based on current GIS data obtained from the Forest Service. Mountain Valley has requested from the Forest Service a copy of the official legislative map as referenced in the comment. Mountain Valley may submit a supplemental response to this comment after receipt and review of the material.

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Request: USFS-10

Proposed Crossing of the Appalachian National Scenic Trail

Figure 1.11-2 –the legend does not capture the special shading on NFS lands. Brush Mountain should be shown as Brush Mountain Wilderness 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.

Response:

Additional shading and labeling has been added to revised Figure 1.11-2 included in Attachment USFS-10. Boundary information included in Mountain Valley's mapping is based on current GIS data obtained from the Forest Service. Mountain Valley has requested from the Forest Service a copy of the official legislative map as referenced in the comment. Mountain Valley may submit a supplemental response to this comment after receipt and review of the material.

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Request: USFS-11

Proposed Crossing of the Appalachian National Scenic Trail

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.

Response:

See the response to Request USFS-6.

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Request: USFS-12

Proposed Crossing of the Appalachian National Scenic Trail

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.

Response:

Mountain Valley hired Rummel, Klepper and Kahl LLP (RK&K), a design engineering firm that has expertise in trenchless crossing methods, to assess the different trenchless crossing options for the Appalachian National Scenic Trail. The two trenchless crossing methods considered were conventional bore and horizontal directional drill (HDD). The conventional bore method was determined to be feasible and the HDD method was determined not to be feasible due to site-specific engineering constraints. Mountain Valley asked RK&K to further assess the specifics (such as location, length, route change, etc.) of the conventional bore options for the Appalachian National Scenic Trail. Mountain Valley examined the feasible conventional bore options and weighed the environmental impact, viewshed impact, and installation risks associated with each option. The selected conventional bore option is included in the updated alignment sheets in Attachment USFS-6c and preliminary bore profile in Attachment USFS-6d. The alignment sheet updates include aerial imagery, the 100-foot buffer for vegetation clearing on either side of the trail, and conventional bore as the proposed construction crossing methodology for the Appalachian National Scenic Trail.

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Request: USFS-13

Proposed Crossing of the Appalachian National Scenic Trail

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.

Response:

There will not be any above ground appurtenances within the Jefferson National Forest such as compressor stations, measuring stations, valve settings, rectifiers/anode beds, etc., although there will be minor above ground appurtenances that include test stations and line markers, which will be entirely contained within the operational right-of-way as required by the US Department of Transportation PHMSA code. Mountain Valley currently plans to utilize the existing Pocahontas Road. Mountain Valley intends to create four temporary truck turnaround areas along Pocahontas Road. No additional temporary extra work space will be necessary to bore the ANST. All work will remain within the proposed temporary right-of-way.

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Request: USFS-14

Proposed Crossing of the Appalachian National Scenic Trail

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

Response:

Mountain Valley will install the pipe via conventional bore leaving an approximate 100-foot undisturbed buffer on each side of the ANST. To complete a horizontal conventional bore, two pits will be excavated, one on each side of the feature. A boring machine will be lowered into one pit, and a horizontal hole will be bored to a diameter slightly greater than the diameter of the pipe at the depth of the pipeline installation. Mountain Valley will weld additional pipeline sections to the first section of the pipeline in the bore pit. The pipeline joints will then be jacked (pushed) through the bore to the opposite pit. This method avoids disturbance to the surface beneath the ANST between the entry and exit points of the bore. The preliminary conventional bore profile (Attachment USFS-6d) provides that the bore depth will be approximately 20 feet below the surface of the ANST. No drilling fluids are required for the conventional bore method.

If the first attempt to cross the ANST by conventional bore is unsuccessful, an offset will be made to the bore and a second attempt will be made to cross the ANST with a conventional bore within the approved temporary construction right-of-way. In the unlikely situation that two conventional bores are not successful, additional attempts to cross the ANST by conventional bore outside of the approved construction right-of-way will be made only following the necessary approvals from FERC and through consultation with the Forest Service. The open-cut crossing method is the last viable contingency option if a conventional bore of the ANST cannot be achieved successfully.

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Request: USFS-15

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.

Response:

The potential impact area analysis is described in the Resource Report 11 – Reliability and Safety on page 11-8. Evacuation guidelines would be based on a variety of site-specific items.

Mountain Valley Pipeline, LLC
Mountain Valley Pipeline Project
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Request: USFS-16

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

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

Response:

The possible causes of an unanticipated rupture of the pipeline could occur as a result of damage to the pipeline by third-party excavation or from a material defect of the pipeline. Material defects could include weld defects, longitudinal seam defects, material fatigue or corrosion. A fire or explosion would only occur if an ignition source is present at a temperature above 1,100 degrees Fahrenheit and when the natural gas concentration is between four and fifteen percent in the air.

Mountain Valley is committed to meeting the requirements of 49 CFR Part 192 in order to proactively mitigate such scenarios.

To mitigate the risk of third-party damage, Mountain Valley will comply with 49 CFR §192.614 and be a member of the One-Call systems in both West Virginia and Virginia. Mountain Valley is also committed to dispatching personnel through the One-Call systems as described in Section 11.3.5 of Resource Report 11. Furthermore, Mountain Valley will comply with 49 CFR §192.707 and install pipeline markers as required and stated in Section 11.1.4 of Resource Report 11.

To mitigate the risk of material defects, Mountain Valley will hydrostatically test and perform non-destructive examination of the pipeline prior to being placed in-service. Mountain Valley will adhere to the requirements in 49 CFR Part 192 Subparts J and L for hydrostatic testing and comply with non-destructive examination of welds in accordance with the requirements in 49 CFR §192.243. Mountain Valley's commitments to these requirements were also detailed in Resource Report 1. Mountain Valley will establish an Integrity Management Plan in accordance to the requirements of 49 CFR Part 192 Subpart O and will periodically inspect the pipeline for corrosion and other material defects.

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Mountain Valley Pipeline Project
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Request: USFS-17

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

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

a) sensitive resources in the area;

b) forest facilities, forest users, and Forest personnel; and

c) the potential for wildfires on NFS lands

Response:

Fires on the surface are not a direct threat to underground natural gas pipelines because of the insulating effects of soil cover over the pipeline. In the unlikely event that a fire was caused by a pipeline explosion, it is anticipated that any resources in the immediate vicinity at the time of an event would likely be lost. Mountain Valley has developed a Fire Prevention and Suppression Plan; this plan is included in the updated Plan of Development (see Attachment USFS-20). The Plan outlines procedures that would be employed in the case of a surface fire in the vicinity of the pipeline as well as in the rare instance of a possible event. Evacuation guidelines would be based on a variety of items that are site specific. See also the response to Request USFS-140.

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Request: USFS-18

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.

Response:

Mountain Valley prepared Resource Report 2 in accordance with the FERC Guidance Manual for Environmental Report Preparation (August 2002). The report was organized into four major sections: Sections 2.1, 2.2 and 2.3 discuss potential impacts from the Project and mitigation measures for groundwater, surface water and wetlands, respectively; Section 2.4 of Resource Report 2 describes groundwater resources specifically within Jefferson National Forest. Appendix 2-D of Resource Report 2 identified sites of potential contamination concern within 0.5-mile of the Project, while Appendix 2-E presented a Water Resources Identification and Testing Plan. The information requested by the Forest Service has been addressed in Resource Report 2.

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Request: USFS-19

Resource Report 1, Page 1-1, Section 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.

Response:

The overall purpose of the Project is to transport natural gas from Wetzel County, West Virginia, to an end-point at the Transco Zone 5 compressor station 165 (Transco Station 165) in Pittsylvania County, Virginia. At Transco Station 165, natural gas can be further transported to serve the growing demand by local distribution companies, industrial users, and power generation facilities all along the Eastern seaboard. The increasing natural gas demand by local and regional markets, and the Project shippers' contractual commitments for the entire capacity of the Project, are clear evidence of the need for the Mountain Valley Project.

Section 10.5.1 of Mountain Valley's Resource Report 10 describes the process that Mountain Valley used to identify its approximately 301-mile Proposed Route. Mountain Valley has attempted to avoid or minimize impacts on a number of environmental resources, particularly the significant natural resources of the National Forests, National Parks, the Appalachian National Scenic Trail, and the Blue Ridge Parkway, while also allowing for a constructible route. Mountain Valley evaluated a conceptual straight line alternative by which the pipeline would be constructed as a straight line between the Project start and end points. This conceptual straight line alternative would be about 199 miles in length, of which about 77 miles (almost 40 percent) would cross NFS lands. Measured perpendicular to this conceptual straight line alternative, continuous NFS lands would extend approximately 100 miles to the northeast and 130 miles to the southwest. In contrast, Mountain Valley's Proposed Route reduces the crossing of NFS lands from 77 miles for the conceptual straight line alternative to less than 4 miles. In addition, Mountain Valley evaluated a conceptual pipeline route to avoid all NFS lands. A map showing this conceptual route is included as Attachment USFS-19a. A table comparing the conceptual route to the proposed route using desktop data is included as Attachment USFS-19b.

The conceptual route would add approximately 50 miles of additional pipeline and approximately 760 additional acres of impact during construction, nearly all of which would be on private lands. In addition, the conceptual route would include approximately 11 additional waterbody crossings and 15,000 feet of wetland crossings, including 6,000 feet of forested wetlands. Therefore, in accordance with FSM 2700 §2703.2, the Mountain Valley Pipeline Project cannot reasonably be accommodated by routing around the National Forest System lands. Crossing National Forest System lands in the Proposed Route is a determination that is not made based on attempting to achieve a lower cost or avoiding a less restrictive location. It is a determination that considers the route that has the least environmental and human impact as possible. By crossing less than 4 miles of the Jefferson National Forest, Mountain Valley has reduced the impact to the Jefferson National Forest to the greatest extent practicable and reduced the overall environmental impact while meeting the purpose and need of the Project.

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Request: USFS-20

Resource Report 1, Page 1-23, Section 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.

Response:

All restoration activities in the Jefferson National Forest will be completed to accepted federal, state, and local Best Management Practices and to the satisfaction of the Forest officer(s) in charge. In addition, as-built drawings of the segments crossing the Jefferson National Forest will be provided to the Forest Service. Any property disturbed or damaged within the project area in the Jefferson National Forest will be revegetated upon completion of installing the pipe and establishing the right-of-way. The Plan of Development (Attachment USFS-20) has been updated to include this language.

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Request: USFS-21

Resource Report 1, Page 1-66, Section 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.

Response:

The Project will cross approximately 3.4 miles of the Jefferson National Forest (JNF) where it crosses Peters Mountain between MPs 195.3 and 196.9 (1.6 miles), Sinking Creek Mountain between MPs 217.2 and 218.0 (0.8 mile), and Brush Mountain between MPs 218.4 and 219.4 (1.0 mile). Revised Table 1.11-1 below identifies construction and operation impacts of the Project in the Jefferson National Forest. With regard to boundary information, please see responses to Requests USFS-9 and -10.

There will not be any significant above ground appurtenances within the JNF such as Compressor Stations, Measuring Stations, Valve Settings, Rectifiers/Anode Beds, etc., although there will be minor appurtenances that include test stations and line markers, which will be entirely contained within the operational right-of-way as required by the US Department of Transportation PHMSA code..

Table 1.11-1 (Revised April 2016)

Land Requirements for the Mountain Valley Pipeline Project in the Jefferson National Forest

Facility	Land Required for Construction (acres)	Land Required for Operation (acres)
Pipeline a/	52.67	20.76
Additional Temporary Workspace (ATWS)	0.48	0.0
Access Roads	27.72	17.34
Totals	80.87	38.1

a/ Acreage based on 125-foot construction right-of-way and 50-foot permanent right-of-way. Does not account for reduced workspace in sensitive areas.

The Jefferson National Forest is managed under the Revised National Forest Land and Resource Management Plan (Forest Plan) completed in January 2004. The Forest Plan implements requirements of the Forest and Rangeland Renewable Planning Act (RPA), as amended by the

National Forest management Act (NFMA). The Forest Plan was evaluated under National Environmental Policy Act (NEPA) and the implementing regulations of NFMA {36 CFR 219}. The Federal Land Policy and Management Act (FLPMA) also guides special uses of the National Forest System. The NFMA, FLPMA, the Code of Federal Regulations and other laws, regulations, and guiding documents provide additional direction.

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Request: USFS-22

Resource Report 1, Page 1-66, Section 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.

Response:

Revised Figure 1.11-2 (see Attachment USFS-10) and revised alignment sheet 240 (Attachment USFS-22a) depict the same proposed route in the area of Craig Creek. As currently proposed, the pipeline will cross Craig Creek a total of four times. Mountain Valley is currently evaluating a possible route modification in this area to minimize impacts on Craig Creek. The initial proposed route through Craig Creek was a desktop design following Lidar Data until constructability could be vetted via field review. Upon the initial field review, routing personnel identified a route adjustment that would reduce construction impact to Craig Creek. The possible route modification, which shifts the proposed route south approximately 342 feet at its furthest point, may eliminate three crossings of Craig Creek. In addition to stream avoidance, the possible modification would provide a further reduction in impact to the Jefferson National Forest by reducing the pipeline footage through the Forest by approximately 327 feet. Mountain Valley is currently collecting environmental and civil data to determine the feasibility of the possible modification. See Attachment USFS-22b for a figure depicting the possible modification being evaluated.

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Request: USFS-23

Resource Report 1, Figure 1.11-12

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.

Response:

See the response to Request USFS-22.

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Request: USFS-24

Resource Report 1, 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.

Response:

Resource Report 1 is a project overview. Detailed discussions of existing resources, analysis of potential Project impacts, and measures proposed to avoid or reduce impacts are included in Resource Reports 2 through 11. For example, the results of the viewshed analysis is described in Resource Report 8. Additional viewshed analyses were also filed with FERC on February 26, 2016 in response to FERC's December 24, 2015 data request (see Attachment RR8-31 to that data response). See also the responses to Requests USFS-148 through 150.

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Request: USFS-25

Resource Report 1, Appendix 1B, Pages 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.

Response:

To date, Mountain Valley has used the digital information contained within the most recent GIS data provided by the Forest Service, including for the Peters Mountain and Brush Mountain Wilderness boundaries. Mapping has been updated to include wilderness area boundaries, see revised topo maps included in Attachment USFS-1a through 1e. To respond to this comment, Mountain Valley has requested from the Forest Service copies of official legislative maps referenced in certain comments. Mountain Valley may submit a supplemental response to this comment after receipt and review of the material.

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Request: USFS-26

Resource Report 1, Giles County Alignment sheet 1

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?

Response:

The aerial photography has been updated on alignment sheets 215, 216, and 217. See Attachment USFS-6c.

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Request: USFS-27

Resource Report 1, Alignment Sheets

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.

Response:

Attachment USFS-27 provides additional detail to the items in the Alignment Sheet Legend. Included in the table are columns that identify whether it is a physical entity/equipment (either existing or proposed) and whether it will remain after construction is complete. In addition, there is a column to capture comments/purpose/need, as applicable.

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Request: USFS-28

Resource Report 1, Page 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"?

Response:

The table should reference per calendar year. In addition, in response to comments received regarding the Mayapple School and Sunshine Valley School, these two areas along the proposed route were re-classed as Class 3 pipe. Please see a revised table 1.5-1 below.

Table 1.5-1
(Revised April 2016)

Schedule for Major Components of the Project a/

Pipe Class	Inspection/Patrol Interval
Highway and Railroad Crossings	
Class 1 and 2	7.5 months but at least twice each calendar year
	4.5 months but at least twice each calendar year
Class 3	4.5 months but at least four times each calendar year
All Other Locations	
Class 1 and 2	15 months but at least once each calendar year
Class 3	7.5 months but at least twice each calendar year

a/ Intervals comply with 49 CFR § 192.705. Regulations include intervals for Class 4 pipe; however, there will be no Class 4 pipe locations on the MVP Project and it was therefore not included.

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Request: USFS-29

Resource Report 1, Page 1.10, 1-52 to 1-53, 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, 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 traveled 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.

Table 1.10-1 should include all maintained corridors on the national forests that are visible 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.

Response:

The purpose of the cumulative impacts analysis is to identify and describe cumulative impacts that would potentially result from implementation of the Mountain Valley Pipeline Project. The inclusion of actions is based on identifying commonalities of impacts from other actions to potential impacts that would result from the Project. In order to avoid unnecessary discussions of insignificant impacts and projects and to adequately address and accomplish the purposes of this analysis, the cumulative impacts analysis for the Project was conducted using the following guidelines:

- A project must impact a resource category potentially affected by the Mountain Valley Pipeline Project. For the most part, these projects are located in the same general area that would be directly affected by construction of the Project. The effects distant projects are

in most cases not assessed because their impacts would tend to be localized and not contribute significantly to the impacts of the Project.

- The consideration of past and future projects that could potentially cumulatively impact the area of the Project was based on whether the impacts are short-term, long-term, or permanent. Most of the impacts related to the other projects would occur during the construction phase, and would be short-term impacts. "Past" projects were identified as those where impacts from construction and/or operation of the completed project continue to affect resources. "Present" projects are those currently under construction. Projects will be determined to be "reasonably foreseeable" when information about the project is publicly available.

Mountain Valley has identified approximately 90 existing maintained corridors within National Forest System lands that are within a 70-mile radius of Mountain Valley's proposed crossings of the Jefferson National Forest. Mountain Valley identified the corridors using publicly-available GIS data layers (ESRI and Ventyx). For purposes of this response, Mountain Valley assumed that all corridors are visible from the roads and paths indicated in the request. The listing of corridors, including the distance and direction from Mountain Valley's proposed crossings of the Jefferson National Forest, is included as Attachment USFS-29.

The requested inclusion of the corridors listed in Attachment USFS-29 does not provide a meaningful cumulative impacts analysis. The Mountain Valley Pipeline will not be within the "general area" of a large majority of the existing corridors listed in Attachment USFS-29. The effects of these distant projects are localized and would not contribute significantly to the impacts of the Project. In addition, the corridors identified in Attachment USFS-29 are all past construction projects, all of which have occurred in the relatively distant past. These corridors (and their associated construction projects) should be considered as part of the existing environment as they no longer contribute to direct impacts on resources in their vicinity. Moreover, the projects are far enough in the past where public data is no longer available.

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Request: USFS-30

Resource Report 1, Page 1.-61-62, Section 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.

Response:

Because alternatives would not be constructed as part of the Project, they would not result in cumulative impacts with the Proposed Route or any other project within the area of influence.

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Request: USFS-31

Resource Report 1, Page 1.-61-62, Section 1.10

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.

Response:

The purpose of the referenced section of Resource Report 1 is a general description. The results of the detailed analysis specific to potential impacts to scenery are included in Resource Report 8. See also the responses to Requests USFS-148 through 150.

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Request: USFS-32

Resource Report 1, Page 1.-61, Section 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.

Response:

Mountain Valley included information on the resources that could be affected by the Project and identified other projects that may contribute to cumulative effects on those resources. Detailed information on all of the other projects included in Table 1.10-1 is not publicly available at a level that allows for a detailed quantitative discussion.

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Request: USFS-33

Resource Report 1, Page 1.-62, Section 1.10

The section titled Vegetation, Wildlife and Habitat, and Aquatic Resources does not mention anything about aquatic resources.

Response:

An assessment of potential cumulative effect on aquatic resources is included below. It is also expected that FERC will evaluate potential cumulative effects, including on aquatic resources at a watershed level, in the Environmental Impact Statement.

Construction of the Mountain Valley Pipeline in the same timeframe as, and in close proximity to, other projects listed in Table 1.10-1 (as revised in in Mountain Valley's data response submitted January 27, 2016 as Attachment RR1-20) could result in cumulative impacts on aquatic resources. The potential for cumulative effects would be greatest where there are other linear projects that would require instream work in the same watersheds and during the same time frame as the Mountain Valley Pipeline. Most impacts will be temporary, occurring only during actual construction activity, but there is potential for long-term impacts if waterbodies and adjacent upland work areas are not properly restored and stabilized. Mountain Valley is not aware of any linear projects occurring in the same timeframe and in close proximity to the Mountain Valley Pipeline Project within the Jefferson National Forest.

Potential cumulative impacts on aquatic resources could result from increased sedimentation and turbidity during waterbody crossings, loss of stream cover and habitat, introduction of water pollutants, and directly mortality from instream work and/or entrainment in water pumps during dry crossings.

To the extent there are other projects being constructed in the same timeframe as, and in close proximity to, the Mountain Valley Pipeline Project, the potential impact on aquatic resources from each project, and thus cumulative impacts, would be minimized through the implementation of project-specific erosion and sediment control plans, and best management practices. This would include during construction as well as restoration of stream banks and adjacent work areas to ensure long-term protection of waterbodies and aquatic resources. The potential for cumulative impact would also be minimized due to the short duration of Mountain Valley's proposed in-water activities. If any of the other projects listed in Table 1.10-1 would also involve direct impacts on waterbodies, they would be required to obtain permits from the USACE and appropriate state agencies, and consult with the Forest Service, EPA, and FWS, as applicable.

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Request: USFS-34

Resource Report 1, Appendix 1-B

Each map should reference USGS quadrangle names.

Response:

The revised maps included in Attachment USFS-1a reference USGS quadrangle names.

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Request: USFS-35

Resource Report 1, Appendix 1-C

Typical drawings need to include cross section details for steep slopes

Response:

A typical drawing for construction on slopes running parallel to the pipeline, including steep slopes, is included as Attachment USFS-35.

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Request: USFS-36

Resource Report 1, Appendix 1-G

Project-Specific Erosion and Sediment Control Plan is absent from the report.

Response:

Mountain Valley submitted its Project-specific Erosion and Sediment Control Plans in response to a data request from the Federal Energy Regulatory Commission dated December 24, 2015. The plans were filed with FERC as Attachment General 1a-1 (West Virginia) and Attachment General 1a-2 (Virginia) on February 26, 2016.

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Request: USFS-37

Resource Report 1, Appendix 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?

Response:

Prescribed fires in the Jefferson National Forest will not affect pipeline integrity. When a prescribed fire is being planned by the Forest Service, communication with Mountain Valley's Operations should occur so the plastic surface line markers can be removed during the event and replaced when completed. The potential for a surface fire during operations was addressed in Resource Report 11 - Safety and Reliability on page 11-15. The paragraph included below is an excerpt from Resource Report 11 that specifically addresses this request:

> "In the event a fire was to occur on the surface in the vicinity of the pipeline, the presence of the pipeline would not increase fire hazards. Fires on the surface are not a direct threat to underground natural gas pipelines because of the insulating effects of soil cover over the pipeline. Soil is a poor conductor of heat with thermal conductivity values ranging from 0.44 to 1.44 Btu/ft-hr-°F. The heat capacity of most soils is 0.20 to 0.25 Btu/lb-°F. In one study, soil temperature from intense slash pile burns reached a maximum of only about 50°C (122°F) at a depth of about 24 inches directly under the burn piles (Massman et al. 2008). Based on the proposed burial depth of 24 to 36 inches, and the insulating effects of soil cover over the pipeline, forest fires would not affect pipeline integrity. In addition, additional burial depth would not be necessary to protect against damage by forest fires."

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Request: USFS-38

Resource Report 2, Page 2-22, Section 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.

Response:

The intent of the FERC Plan and Procedures is to identify baseline mitigation measures for minimizing the extent and duration of project-related disturbance on wetlands and waterbodies and enhancing revegetation. The FERC Plan and Procedures are used as the "industry standard" and adherence to them is required unless reasoning is offered as to why a variance is needed. In addition, Mountain Valley Pipeline will utilize its Project-specific Erosion and Sedimentation Control Plan as well as measures outlined in the Plan of Development.

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Request: USFS-39

Resource Report 2, Page 2-23, Section 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.

Response:

See the response to Request USFS-38.

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Request: USFS-40

Resource Report 2, Page 2-23, Section 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.

Response:

The first sentence in the cited paragraph ("Ground disturbance associated with typical pipeline construction is generally within 7-10 feet of the existing ground surface.") introduces the relevance of aquifer depth in relation to pipeline construction.

It should be noted that the cased intervals refer to the aquifer zones that would be tapped and also generally to the zones where groundwater may be encountered. References to these zones are included in Sections 2.1.1.1 and 2.1.3.2 of Resource Report 2. Section 2.1.1.1 states that the major aquifers tapped are bedrock aquifers and that the shallowest aquifer zones tapped begin at a depth of about 50 feet. The references for this information are:

> USGS (U.S. Geological Survey). 1997. Ground Water Atlas of the United States: Segment 7- Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, Virginia, West Virginia. HA 730-L.
>
> USGS. 2001. Aquifer Characteristics Data for West Virginia. Water-Resources Investigations Report 01-4036. Prepared in cooperation with the West Virginia Bureau for Public Health, Office of Environmental Health Services. 2001.
>
> USGS. 2003. Aquifer Susceptibility in Virginia, 1998-2000. Water Resources Investigation Report 03-4278. Prepared in cooperation with Virginia Department of Health Office of Drinking Water. 2003.

Section 2.1.3.2 states that private water wells in the area of the Project are primarily completed in bedrock aquifers; and that the depths of the tapped aquifer zones range from 30 to over 400 feet, and water levels range from less than 10 feet to over 400 feet. The reference for this information is the USGS 2001 reference provided above.

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Request: USFS-41

Resource Report 2, Page 2-26, Section 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.

Response:

Typical blasting techniques used for pipeline construction can be viewed at the following location:

https://www.youtube.com/watch?v=L0xkvAtzk8M

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Request: USFS-42

Resource Report 2

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.

Response:

Mountain Valley is proposing to cross a floodplain within the Jefferson National Forest in the area of Craig Creek. The pipeline will be buried (open cut construction) in areas of floodplains and returned to pre-existing contours. Therefore, the Project would not cause displacement within the floodplain and is in compliance with 10 C.F.R. § 1022. As discussed in the response to Request USFS-22, Mountain Valley is evaluating a possible modification to the Proposed Route in the area of Craig Creek which will reduce construction in the floodplain within the Jefferson National Forest.

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Request: USFS-43

Resource Report 2 Page 2-51, Section 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 Forest wide 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 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.

Response:

See the response to Request USFS-4.

Withdrawals from these streams will be limited to a maximum of 10% of the streams' instantaneous flow as directed by the Virginia Department of Environmental Quality. See Attachment RR2-35 (Proposed Hydrostatic Test Water Use Summary Revised) to Mountain Valley's January 15, 2016 response to FERC's December 24, 2015 data request.

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Request: USFS-44

Resource Report 2 Page 2-51, Section 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.

Response:

See the response to Request USFS-5.

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Request: USFS-45

Resource Report 2 Page 2-51, Section 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.

Response:

See the response to Request USFS-5.

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Request: USFS-46

Resource Report 2 Page 2-51, Section 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.

Response:

There is no ATWS proposed within 150 feet of a stream within the Jefferson National Forest.

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Request: USFS-47

Resource Report 2 Page 2-51, Section 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.

Response:

See the response to Request USFS-22 with regard to Mountain Valley's evaluation of a possible route modification in the area of Craig Creek. If this possible route modification were adopted, the pipeline would not parallel or substantially parallel any waterbodies or riparian corridors within the Jefferson National Forest. Mountain Valley filed a revised Appendix 2-A-2 with FERC as Attachment RR2-17 on February 26, 2016 in response to FERC's December 24, 2015 data request.

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Request: USFS-48

Resource Report 2 Page 2-52, Section 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.

Response:

The transported gases through Mountain Valley Pipeline and associated hazards are discussed in the Resource Report 11 – Reliability and Safety. The gas quality is specifically discussed on page 11-2 of that report. The excerpt pertaining to gas quality from paragraph 3 on page 11-2 is as follows: "MVP has established a specific tariff to which shippers are required to adhere to. The tariff limits transportation of only natural gas with components consisting primarily of methane gas, which will be continuously monitored as discussed in more detail below. Exceeding the limits set by the tariff may result in the shipper's gas being shut-in with discontinued service and/or with associated financial penalties." The gas quality section of Mountain Valley's proposed tariff (Section 6.4) specifically addresses liquids: "The gas shall be dehydrated and free of water and hydrocarbons in liquid form at the temperature and pressure at which the gas is delivered."

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Request: USFS-49

Resource Report 2 Page 2-56, Section 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.

Response:

Although mechanical methods of removing bedrock are preferred, blasting may be conducted as needed to excavate the pipeline trench in some areas of shallow bedrock. Blasting for trench excavation will be considered only after all other reasonable means of excavation are determined to be unlikely to achieve the required results. If blasting is required in streams, Mountain Valley will adhere to the FERC Plan and Procedures and will develop a site-specific blasting plan to follow when blasting rock during an open-cut waterbody crossing. Use of controlled blasting techniques would limit rock fracture to the immediate vicinity of detonation along the trench line.

A description of short-term impacts that could result from stream crossings begins on page 2-52 of Resource Report 2, and continues through page 2-60. For example, the potential for short term impacts is introduced on page 2-52 with the statement:

> "Construction of the pipeline could result in minor, short-term impacts to waterbodies. These impacts could occur because of in-stream construction activities, use of access roads, or construction on slopes and riparian areas adjacent to stream channels. Clearing and grading of stream banks, removal of riparian vegetation, in stream trenching, trench dewatering, and backfilling could result in stream bank modification, increased sedimentation, turbidity, increase in temperature, and decreased dissolved oxygen concentrations."

The pages that follow the introduction include descriptions of potential short-term impacts that could result from the different waterbody crossing methods.

Mountain Valley does not anticipate long-term stream hydrology impacts. The pipeline trench within streams will be backfilled with native material, and stream beds and banks will be restored to pre-construction contours following trench backfill.

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Request: USFS-50

Resource Report 2 Page 2-51, Section 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.

Response:

There is no ATWS proposed within 100 feet of a stream within the Jefferson National Forest.

Mountain Valley Pipeline, LLC
Mountain Valley Pipeline Project
FERC Docket No. CP16-10-000

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Request: USFS-51

Resource Report 2 Page 2-52 - 2-53, Section 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.

Response:

A Sedimentation Analysis specific to lands crossed within the Jefferson National Forest was submitted to the Forest Service on January 27, 2016 as part of the Biological Evaluation. The analysis estimates the amount of sediment delivered to the outlet of the three subwatersheds crossed by the Project within the Jefferson National Forest. The sedimentation analysis was performed using guidance from the Forest Service. Eroded sediments were not modeled but it was assumed that sediment would be carried in a downstream direction. To assess the impact of potentially introduced sediments from construction in the context of the natural background, the sedimentation analysis used two treatments: (1) a baseline treatment that contains expected sediment loads under present conditions and (2) a proposed action treatment that calculates expected sediment with land use reclassified within the area disturbed by construction as a bare-soil land class. Impacts were assessed by calculating the potential percent increase of sediment to each watershed. For the three subwatersheds studied (Stony Creek, Clendennin Creek-Bluestone Lake, and Trout Creek-Craig Creek), modeled sediment increases over baseline are 65, 95, and 19 percent, respectively. However, this modeling does not account for use of erosion and sediment controls that would be in place throughout construction and restoration of areas disturbed. The use of sediment and erosion controls would significantly reduce the delivery of sediment into waterbodies. Also, the modeling represents the relatively short duration of bare soil during and immediately following active construction, and does not represent conditions following revegetation and reclamation.

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Request: USFS-52

Resource Report 2 Page 2-52 - 2-53, Section 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.

Response:

See the response to Request USFS-22.

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Request: USFS-53

Resource Report 2 Page 2-52 - 2-53, Section 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.

Response:

See the response to Request USFS-22.

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Request: USFS-54

Resource Report 2 Page 2-52 - 2-53, Section 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.

Response:

See the response to Request USFS-51. In addition, see the response to Request USFS-22 for a discussion of a proposed route modification under review in the area of Craig Creek.

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Request: USFS-55

Resource Report 2 Page 2-55, Section 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.

Response:

Mountain Valley will submit measures specific to the Jefferson National Forest in its final Plan of Development, which will be developed in coordination with the Forest Service. Per the FERC Plan, Mountain Valley will have at least one Environmental Inspector per spread. In addition, Mountain Valley has committed to participate in FERC's third-party monitoring program. The utilization of these measures will help ensure that impacts from erosion are minimized or avoided during construction of the pipeline.

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Request: USFS-56

Resource Report 2 Page 2-58, Section 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.

Response:

See the response to Request USFS-49. In addition, as discussed in the response to Request USFS-22, Mountain Valley is evaluating a potential route modification in the area of Craig Creek.

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Request: USFS-57

Resource Report 2 Page 2-61, Section 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 before 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.

Response:

Mountain Valley submitted a Nationwide Permit to the USACE, Norfolk District on February 25, 2016. No permanent impacts to wetlands or waterbodies were identified in the Jefferson National Forest.

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Request: USFS-58

Resource Report 2 Page 2-71, Section 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." 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.

Response:

There is no ATWS proposed within 100 feet of a wetland within the Jefferson National Forest.

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Request: USFS-59

Resource Report 2 Page 2-72, Section 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.

Response:

See the response to Request USFS-51.

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Request: USFS-60

Resource Report 2 Page 2-72, Section 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.

Response:

See the response to Request USFS-21. With the exception of the existing Pocahontas Road, all facilities will be revegetated as soon as practicable following construction, which will eliminate exposed soils.

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Request: USFS-61

Resource Report 3 Page 3.2.11 3.2.10 Appendix C, Section 3-23 and 3-24

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.

Response:

FERC can elect to address this comment in the EIS document. Herbicide use was discussed in the Resource Report 1 – General Project Description on page 1-43. The following excerpt from Paragraph 2 in Section 1.5 specifically addresses this request: "Unless requested by a land management agency, it is MVP policy not to use herbicides or pesticides to maintain the right-of-way or any of its Project facilities." Mountain Valley will abide by the Forest Service oversight of herbicide guidance and use if it is viewed as the best management practice for the Jefferson National Forest.

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Request: USFS-62/63

Resource Report 3 Through-out

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 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

Response:

See the response to Request USFS-51. Per the FERC Plan, Mountain Valley will implement measures to control unauthorized access of the pipeline right-of-way. These measures may include slash and timber barriers, large boulders, or other appropriate measures as approved by the Forest Service.

Request: USFS-64

Resource Report 3 Through-out

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.

Response:

See the response to Request USFS-51. Cumulative impacts within the Jefferson National Forest and private lands for current project activities were embedded within the sedimentation analysis. Information on past or reasonably-foreseeable future activities is not publicly available.

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Request: USFS-65

Resource Report 3 Page 3-12, Section 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.

Response:

Potential impacts from construction upslope of waterbodies are accounted for in the analysis. Sedimentation is unavoidable during instream pipeline installation. However, sedimentation impacts from upland construction activities will be aggressively controlled by the use of temporary and permanent sediment and erosion controls designed to avoid the movement of upland sediments into waterbodies. Impacts to aquatic biota and Forest Service sensitive species are addressed in the Biological Evaluation, which was submitted to the Forest Service on January 27, 2016. See also the response to Request USFS-64.

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Request: USFS-66

Resource Report 3 Page 3-10, Section 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.

Response:

There is no published data available to quantify impacts to these metrics. Impacts associated with the installation of the pipeline are anticipated to be temporary in nature based on the results of the sedimentation analysis and planned restoration of stream contours. In addition, Mountain Valley will utilize the FERC Plan and Procedures and its Erosion and Sedimentation Control Plans will minimize these temporary impacts.

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Request: USFS-67

Resource Report 3 Page 3-13, Section 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.

Response:

There is no ATWS proposed within 100 feet of a stream within the Jefferson National Forest. Mountain Valley will work to establish best management practices while crossing stream channels within the Jefferson National Forest.

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Request: USFS-68

Resource Report 3 Page 3-13, Section 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.

Response:

See the response to Request USFS-38.

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Request: USFS-69

Resource Report 3 Page 3-24, Section 3.2.11

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.

Response:

Construction activities can cause indirect impacts to vegetation, especially trees, beyond the Project right-of-way by damaging root systems that extend into the pipeline trench. Depending on the species, age, and soil characteristics, trees can spread their root systems up to 2.9 times beyond the dripline (Gilman 1988). A single trench can remove up to 50 percent of a tree's root system (Watson 1998), resulting in tree decline, premature falling, or death. The pipeline trench will be offset within the 125-foot-wide construction right-of-way, so that the edge of the pipeline trench will be approximately 35 feet from the closest standing trees along one edge of the construction right-of-way, and approximately 85 feet from the closest standing trees along the other edge.

Oaks tend to generate well on edges with good light and minimal litter cover. Because construction activities such as clearing, trenching, and backfilling associated with the pipeline are temporary and linear across the landscape, localized impacts to individual trees are possible but a widespread trigger of oak decline is not anticipated.

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Request: USFS-70

Resource Report 3 Page 3-30-32, Section 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.

Response:

Mountain Valley submitted a Migratory Bird Conservation Plan to the United States Fish and Wildlife Service on January 27, 2016 and to FERC on the same date as Attachment General 1h (Privileged) in response to the December 24, 2015 data request. A copy is included as Attachment USFS-70 (marked Contains Privileged Information – Do Not Release).

Mountain Valley is also currently conducting surveys for golden eagles within the project area, including on National Forest System lands. A flyover survey along the pipeline in Virginia, including the Jefferson National Forest, will also be conducted. The results of these surveys will be added to the Migratory Bird Conservation Plan.

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Request: USFS-71

Resource Report 3 Page 3-34, Section 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.

Response:

Mountain Valley will continue to work with the Wildlife Habitat Council.

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Request: USFS-72

Resource Report 3 Page 3-34 - 3-55, Section 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.

Response:

Resource Report 3, Sections 3.4 and 3.5, provide information on the proposed action, which is construction and operation of the proposed pipeline route. Resource Report 10 – Alternatives, describes impacts from the various alternatives evaluated by Mountain Valley, including alternatives that would affect the Jefferson National Forest.

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Request: USFS-73

Resource Report 3 Page 3-34 - 3-55, Section 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.

Response:

Additional surveys for bats are scheduled for completion in May 2016 in the Jefferson National Forest. Additional surveys for plants in the Jefferson National Forest are scheduled during 2016 and are expected to be completed by August 2016, as listed below. Surveys are not planned for alternative pipeline routes.

Additional Plant Surveys Scheduled for 2016 in the Jefferson National Forest		
Species	**USFS Described Habitat**	**Anticipated Survey Timeframe**
Hydrothyria lichen	Aquatic - in streams/springs/cascades.	Early August
A liverwort (*N. lescurii*)	Riparian - on peaty soil over rocks, usually in shade and associated w/ water, <3000'.	Early May
A liverwort (*P. sullivantii*)	Moist shaded rock outcrops, under cliff ledges, in crevices.	Early May
Nodding onion	Shale barrens, sandstone glades.	Early August
American barberry	Calcareous open woods, bluffs, cliffs, and along fencerows.	Early August
Shale barren rock cress	Shale barrens and adjacent open oak woods.	Early August
Piratebush	Open oak and hemlock woods.	Early May
Small spreading pogonia	Well drained, rather open, scrubby hillsides, oak-pine-heath woodlands, acidic soils.	June 15-30
Addison's leatherflower	Open glades & rich woods over limestone and dolostone.	Early May
Virginia white-haired leatherflower	Shale barrens, rocky calcareous woodlands	Early May
Bentley's coralroot	Dry, acid woods, along roadsides, well-shaded trails.	Early August
Tall larkspur	Dry calcareous soil in open grassy glades or thin woodlands.	Early August
smooth coneflower	Open woodlands and glades over limestone or dolomite.	June 15-30
Small whorled pogonia	Open, mixed hardwood forests on level to gently sloping terrain with north to east aspect.	June 15-30
Butternut	Well-drained bottomland and floodplain, rich mesophytic forests mostly along toeslopes.	Early May
Turgid gayfeather	Shale barrens, mountain hillside openings.	Early August
sweet pinesap	Dry oak-pine-heath woodlands, soil usually sandy.	Early May
Canby's Mountain lover	Calcareous cliffs and bluffs, usually undercut by stream.	Early May

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Request: USFS-74

Resource Report 3 Page 3-54, Section 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.

Response:

To date, no federally or state-listed species have been identified within the survey corridor within the Jefferson National Forest. Surveys are ongoing as outlined in the response to Request USFS-73. The Biological Evaluation will be updated as appropriate with results from these field survey data collected during 2016 and resubmitted to the Forest Service.

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Request: USFS-75

Resource Report 3 Page 3-55, Section 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.

Response:

Mountain Valley submitted a Biological Evaluation to the Forest Service on January 27, 2016. Additional information on biological resources is contained within that document. The Biological Evaluation will be updated as appropriate with results from field survey data collected during 2016 and resubmitted to the Forest Service.

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Responses to Forest Service Comments on Final FERC Resource Reports
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Request: USFS-76

Resource Report 3 Page 3-55, Section 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.

Response:

Mountain Valley has completed the requested vegetation survey and site index measurement. See Attachment USFS-76.

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Request: USFS-77

Resource Report 3 Page 3-56, Section 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.

Response:

See the response to Request USFS-73.

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Request: USFS-78

Resource Report 3 Page 3-56, Section 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 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.

Response:

See the response to Request USFS-76.

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Request: USFS-79

Resource Report 3 Page 3-57, Section 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.

Response:

See the response to Request USFS-73.

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Request: USFS-80

Resource Report 3 Page 3-57, Section 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.

Response:

A discussion of potential impacts to MIS along the proposed route, including site-specific impacts where identified from field survey, will be included in the revised Biological Evaluation. The revised Biological Evaluation will also include comparison of available desktop data on habitat and known occurrence for MIS along the proposed and alternative routes within Jefferson National Forest.

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Request: USFS-81

Resource Report 3 Page 3-57, Section 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.

Response:

See the response to Request USFS-73 regarding the schedule for outstanding surveys along the proposed route. A discussion of potential impacts to locally rare species and habitats along the proposed route, including site-specific impacts where identified from field survey, will be included in the revised Biological Evaluation. The revised Biological Evaluation will also include comparison of available desktop data on habitat and known occurrence for locally rare species along the proposed and alternative routes within Jefferson National Forest.

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Request: USFS-82

Resource Report 3 Page 3-57, Section 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.

Response:

See the response to Request USFS-73.

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Request: USFS-83

Resource Report 3 Page 3-57, Section 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.

Response:

See the response to Request USFS-80.

Request: USFS-84

Resource Report 3 Page 3-57, Section 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.

Response:

See the response to Request USFS-81.

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Request: USFS-85

Resource Report 3 Page 3-58, Section 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.

Response:

See the response to Request USFS-22 regarding a possible route modification in the area of Craig Creek that Mountain Valley is currently evaluating. In addition, see the response to Request USFS-51 regarding the sedimentation analysis submitted to the Forest Service on January 27, 2016 as part of the Biological Evaluation.

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Request: USFS-86

Resource Report 6 Page 6-1, Section 6.1

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 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.

Response:

Mountain Valley prepared Resource Report 6 in accordance with the FERC Guidance Manual for Environmental Report Preparation (August 2002). Although more detailed geologic mapping is available for scattered areas along the Project (including areas of the Jefferson National Forest), the mapping is not available in digital format and is not available for the entire area of the Project. Therefore, such information would be incomplete in terms of the overall analysis if presented in the Resource Report.

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Request: USFS-87

Resource Report 6 Page 6-4, Section 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).

Response:

Slope steepness along the pipeline route through the Jefferson National Forest is shown in Attachment USFS-87a. Slope percentage on Attachment USFS-87a represents an average slope over each tenth of a mile that Mountain Valley crosses the Jefferson National Forest. These maps were compiled using Mountain Valley's survey data. In general, as discussed in Resource Report 1, slopes up to approximately 15% will employ typical overland construction techniques, slopes between approximately 15% and 30-35% will employ down slope construction techniques, and slopes exceeding 30-35% will require down slope with winch construction. See also Attachments USFS-6a (revised Figure 1.11-1) and USFS-10 (revised Figure 1.11-2).

The only Mountain Valley access road in the Jefferson National Forest, Pocahontas Road, is an existing road. The road will require modifications that have not been finalized at this time. A map showing the slope steepness along the access road alignment is included in Attachment

USFS-87b. Slope percentage on Attachment USFS-87b represents an average slope over each tenth of a mile that Mountain Valley crosses the Jefferson National Forest.

No disposal sites for excess material are planned in the Jefferson National Forest as full bench construction is not anticipated in the Forest.

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Request: USFS-88

Resource Report 6 Page 6-15, Section 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.

Response:

The table below provides a summary of information presented in Resource Report 6 of identified geologic hazards specific to the area of the Jefferson National Forest, excepting seismic hazards. See also the response to Request USFS-94. Seismic hazards in the area of the Jefferson National Forest are addressed regionally in Section 6.4.1 of Resource Report 6 and in the responses to Requests USFS-89 through USFS-93.

Table USFS-88

Geologic Hazards within the Jefferson National Forest

Beginning Milepost	Ending Milepost	Length (miles)	Notes
Shallow Bedrock			
218.6	219	0.4	Bedrock is noted as 3.2 feet in depth and rock type note as dolostone and dolomite
219.2	219.4	0.2	Bedrock is noted as 3.2 feet in depth and rock type note as dolostone and dolomite
Sinkholes – no sinkholes are located within 0.25 mile of the pipeline.			
Caves – no caves are located within 0.25 mile of the pipeline.			

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Request: USFS-89

Resource Report 6 Page 6-17, Section 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.

Response:

The Giles County seismic zone (GCSZ), and the Pembroke fault zone (PFZ) are not defined by specific geographical boundaries, but rather are represented by an approximate distribution of historic earthquake epicenters, or by the approximate location of features that are assumed to be associated with faulting. GCSZ is no longer referenced by Peterson et al. (2014) in seismic hazards analysis; Mountain Valley included the GCSZ as a means of referencing the historically recognized seismic area. The PFZ is currently referenced for seismic hazards analysis by USGS (Petersen et al. 2014). The PFZ was identified from five extensional features bound by two grabens and a half-graben in terrace deposits from the New River. The causal fault, if any, remains unknown and uncharacterized. No paleoseismological studies have been reported near Pembroke, Virginia.

References:

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S., Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

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Request: USFS-90

Resource Report 6 Page 6-17, Section 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.

Response:

The Pembroke fault zone (PFZ) is deemed a Class B feature, characteristic of faulting or suggests Quaternary deformation, but either (1) the fault does not extend deeply enough to be a potential source of earthquakes, or (2) the currently-available geologic evidence is too strong to confidently assign the feature to Class C but not strong enough to assign it to Class A (Petersen et al, 2014). The PFZ was identified from five extensional features bound by two grabens and a half-graben in terrace deposits from the New River. The causal fault, if any, remains unknown and uncharacterized. No paleoseismological studies have been reported near Pembroke, Virginia. Mills (1985) found no evidence of seismic shaking, faulting, or surface rupture along the New River in 18 trenches near the Pembroke faults. Therefore, the PFZ is considered to be of non-tectonic origin, where fault trace fillings preclude sudden slip, but likely caused by dissolution of underlying carbonate bedrock (Crone and Wheeler, 2000). The prevailing theory is that the PFZ is representative of subsidence induced by collapse of a subsurface karst feature(s), not a seismic event (Crone and Wheeler, 2000; Wheeler, 2006).

Seismic design requirements for buried natural gas pipelines are not addressed in U.S. Department of Transportation 49 CFR Part 192 (Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards). However, accepted and proven practices for the

seismic design of buried pipeline systems are embodied in industry guidance documents that have been developed based upon project-specific design requirements developed for major pipeline projects. Current recommended methods for the seismic design and assessment of oil and gas pipelines is contained in guidance by the Pipeline Research Council International (Honegger and Nyman, 2004). In accordance with current building code requirements, the peak ground motion (up to 0.14g) predicted for the Project in the vicinity of the PFZ is associated with an annual probability of exceedance of approximately 1/2500 (Petersen et al, 2014), and based upon sites between class B (rock) and C (dense soil) that correspond to average shear wave velocity of 760 m/sec in the top 30 meters of soil.

The 1/2500 annual probability is the same approximate frequency of exceedance specified in U.S. building codes for the design of new buildings. The annual probability of exceedance is a conservative hazard definition for the Project considering the much greater direct safety and damage consequences associated with building collapse as compared to a gas transmission pipeline failure. For this reason, it is judged reasonable and appropriate to screen from further consideration those seismic hazards with an annual likelihood of occurrence less than 2 percent over a 50-year period (D.G. Honegger 2015a; Mountain Valley Pipeline Resource Report 6, Appendix 6-D.1).

The seismic hazards analysis filed by Mountain Valley with FERC for the Project adequately addresses risks associated with earthquake-induced ground motion.

References:

Crone, A. J. and Wheeler, R. L., (2000). Data for Quaternary faults, liquefaction features, and possible tectonic features in the Central and Eastern United States, east of the Rocky Mountain front. U.S. Geological Survey, Open-File Report 00-260.

Honegger, D.G., (2015a). Review of Potential Seismic Hazards Along the Proposed Route of the Mountain Valley Pipeline. September 19, 2015. Resource Report 6, Appendix D, Mountain Valley Pipeline.

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

Mills, H.H. (1985). Descriptions of backhoe trenches dug on New River terraces between Radford and Pearisburg, Virginia, June, 1981. U.S. Geological Survey Open-File Report 85-474, 63 p.

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S.,

Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

Wheeler, R. L., (2006). Quaternary tectonic faulting in the Eastern United States. Engineering Geology 82 (2006) 165– 186.

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Request: USFS-91

Resource Report 6 Page 6-17, Section 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. 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.

Response:

The noted reference to ridge top amplification is acknowledged, but the associated risks to the buried pipeline remain negligible. It is generally recognized that earthquake ground shaking alone does not pose a significant threat to the integrity of modern buried welded steel high-pressure pipelines. Accepted and proven practices for the seismic design of buried pipeline systems are embodied in industry guidance documents that have been developed based upon project-specific design requirements developed for major pipeline projects. Current recommended methods for the seismic design and assessment of oil and gas pipelines is contained in guidance by the Pipeline Research Council International (Honegger and Nyman, 2004).

References:

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

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Request: USFS-92

Resource Report 6 Page 6-17, Section 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.

Response:

The peak ground motion predicted for the Project (up to 0.14g) is based on the same approximate frequency of exceedance that is specified in U.S. building codes for the design of new buildings. As such, the Project seismic hazards analysis for potential threat to the integrity of modern buried welded steel high-pressure pipelines is conservative (e.g., maximizes the level of risk assessed). Accepted and proven practices for the seismic design of buried pipeline systems are embodied in industry guidance documents that have been developed based upon project-specific design requirements developed for major pipeline projects (see Pipeline Research Council International; Honegger and Nyman, 2004). It is beyond the scope of this Project to reproduce or attempt to update the probabilistic model presented by USGS (2014), or to provide a research-oriented assessment of historic earthquake ground motion estimates.

References:

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S., Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

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Request: USFS-93

Resource Report 6 Page 6-17, Section 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. 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"

Response:

Seismic hazards analysis for the Project were presented in the context of a probabilistic risk assessment, based on the most current USGS modeling data applicable to Virginia and, more specifically, southwest Virginia and southern West Virginia. Accepted and proven practices for the seismic design of buried pipeline systems are embodied in industry guidance documents that have been developed based upon project-specific design requirements developed for major pipeline projects (see Pipeline Research Council International; Honegger and Nyman, 2004). The peak ground motion (up to 0.14g) predicted for the MVP is the same approximate frequency of exceedance specified in U.S. building codes for the design of new buildings (and consistent with

the approximate, probabilistic recurrence period). As such, the Project seismic hazards analysis for potential threat to the integrity of modern buried welded steel high-pressure pipelines is conservative (e.g., maximizes the level of risk assessed). It is beyond the scope of this Project to reproduce or attempt to update the probabilistic model presented by USGS (Petersen et al., 2014), to speculate or model earthquake occurrence and distribution, or to provide a research-oriented assessment of historic earthquake ground motion estimates.

References:

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S., Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

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Request: USFS-94

Resource Report 6 Page 6-17, Section 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.

Response:

The geologic research documented in the several publications noted by the Forest Service regarding large rock block slumping on Sinking Creek Mountain and landslides in the general area, include speculation and interpretive observations, but no empirical evidence that mass wasting (either large block slumping, landslides, debris flow) directly resulted from seismic activity. Shultz (1993) suggested Pliocene Epoch as possible timing of movement, and noted that there is no evidence of recent-time movement.

A seismic event that may occur within the GSCZ or PFZ, or even beyond this region, at a magnitude great enough to induce ground motion that resulted in the degree of mass wasting observed by the researchers, appears to carry an extremely remote probability of occurrence over the timespan that is reasonable to review geologic hazards for the pipeline.

Mountain Valley assessed peak ground motion (0.14g) using the latest state-of-the-science tools from USGS (Petersen et al., 2014) and incorporated this into its pipeline design (see Resource Report 6 text, and Appendix D of Resource Report 6). The peak ground motion predicted for the Project is based on the same approximate frequency of exceedance that is specified in U.S. building codes for the design of new buildings. As such, the Project seismic hazards analysis for potential threat to the integrity of modern buried welded steel high-pressure pipelines is conservative (e.g., maximizes the level of risk assessed). Accepted and proven practices for the seismic design of buried pipeline systems are embodied in industry guidance documents that have been developed based upon project-specific design requirements developed for major pipeline projects (see Pipeline Research Council International; Honegger and Nyman, 2004). It is beyond the scope of this Project to reproduce or attempt to update the probabilistic model presented by Petersen et al. (2014), or to provide a research-oriented assessment of historic earthquake ground motion estimates.

Regarding seismic event triggering of slope displacement, Jibson and Harp (2012) noted:

> The [Mineral Springs] earthquake triggered no large, damaging landslides. The largest triggered landslide had a volume of perhaps 100 m^3; other triggered landslides ranged in volume from approximately 5 m^3 down to small rock fragments a few centimeters across. Strong shaking from shallow earthquakes of moderate magnitude is brief and tends to be concentrated in the higher frequency range; such shaking tends to trigger small, shallow landslides in brittle, weathered surficial material and is unlikely to trigger large, deep landslides.

Installation of the pipeline will be observed by professionals with commensurate and appropriate levels of geotechnical engineering experience and credentials such that field conditions encountered at the time of installation that may suggest susceptibility to landslides will be identified and mitigated (see Landslide Mitigation Plan). Overall, pipeline design and construction techniques will reasonably account for potential landslide or other forms of ground movement (triggered slope displacement, liquefaction, etc.).

References:

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

Jibson, R.W., and Harp. E.L., (2012) Extraordinary distance limits of landslides triggered by the 2011 Mineral, Virginia earthquake: Bulletin of the Seismological Society of America, v. 106, p. 2368-2377.

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 Miscellaneous Investigations Series Map I-2370.

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S., Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

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Resource Report 6 Page 6-19, Section 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 dismissed as a "negligible risk".

Response:

The Project hazards assessment referenced potential active faults as those features that demonstrate movement in the Quaternary age (1.8 million years ago to present), and particularly faults showing movement in the Holocene Epoch (11,500 years to present). Such are considered to present a potential risk for seismic hazards to structures including natural gas pipelines. The Pembroke fault zone is deemed a Class B feature, characteristic of faulting or suggests Quaternary deformation, but either (1) the fault does not extend deeply enough to be a potential source of earthquakes, or (2) the currently available geologic evidence is too strong to confidently assign the feature to Class C but not strong enough to assign it to Class A (Petersen et al, 2014). The PFZ was identified from five extensional features bound by two grabens and a half-graben in terrace deposits from the New River. The causal fault, if any, remains unknown and uncharacterized. No paleoseismological studies have been reported near Pembroke, Virginia. Mills (1985) found no evidence of seismic shaking, faulting, or surface rupture along the New River in 18 trenches near the Pembroke faults. Therefore, the PFZ is considered to be of non-tectonic origin, where fault trace fillings preclude sudden slip, but likely caused by dissolution of underlying carbonate bedrock (Crone and Wheeler, 2000). The prevailing theory is that the PFZ is representative of subsidence induced by collapse of a subsurface karst feature(s), not a seismic event (Crone and Wheeler, 2000; Wheeler, 2006). Mountain Valley maintains the conclusion that there is negligible risk to the Project from an active surface rupture or fault.

References:

Crone, A. J. and Wheeler, R. L., (2000). Data for Quaternary faults, liquefaction features, and possible tectonic features in the Central and Eastern United States, east of the Rocky Mountain front. U.S. Geological Survey, Open-File Report 00-260.

Mills, H.H. (1985). Descriptions of backhoe trenches dug on New River terraces between Radford and Pearisburg, Virginia, June, 1981. U.S. Geological Survey Open-File Rpt 85-474, 63 p.

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S., Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

Wheeler, R. L., (2006). Quaternary tectonic faulting in the Eastern United States. Engineering Geology 82 (2006) 165– 186.

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Resource Report 6 Page 6-23, Section 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

Response:

Installation of the pipeline will be observed by professionals with commensurate and appropriate levels of geotechnical engineering experience and credentials such that field conditions encountered at the time of installation that may suggest susceptibility to landslides will be identified and mitigated (see Landslide Mitigation Plan). Accepted and proven practices for the design and construction of buried pipeline systems are embodied in industry guidance documents developed for major pipeline projects considering project-specific probabilistic seismic ground motion parameters (see Pipeline Research Council International; Honegger and Nyman, 2004). Mountain Valley assessed peak ground motion (0.14g) using the latest state-of-the-science tools from Petersen et al. (2014), which is based on the same approximate frequency of exceedance that is specified in U.S. building codes for the design of new buildings (see Resource Report 6 text, and Appendix D of Resource Report 6). As such, the Project seismic hazards analysis for potential threat to the integrity of modern buried welded steel high-pressure pipelines is conservative (e.g., maximizes the level of risk assessed).

Regarding seismic event triggering of slope displacement, Jibson and Harp (2012) noted:

> The [Mineral Springs] earthquake triggered no large, damaging landslides. The largest triggered landslide had a volume of perhaps 100 m^3; other triggered landslides ranged in volume from approximately 5 m^3 down to small rock fragments a few centimeters across. Strong shaking from shallow earthquakes of moderate magnitude is brief and tends to be concentrated in the higher frequency range; such shaking tends to trigger small, shallow landslides in brittle, weathered surficial material and is unlikely to trigger large, deep landslides.

Nonetheless, a seismic event occurring outside of the GSCZ or PFZ vicinity at a magnitude great enough to induce a triggered landslide in the area of Peters Mountain or Sinking Creek

Mountain, is reasonably considered to carry a veryremote probability of occurrence over the timespan of concern for geologic hazards associated with the pipeline.

References:

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

Jibson, R.W., and Harp. E.L., (2012) Extraordinary distance limits of landslides triggered by the 2011 Mineral, Virginia earthquake: Bulletin of the Seismological Society of America, v. 106, p. 2368-2377.

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S., Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

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Request: USFS-97

Resource Report 6 Page 6-23, Section 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: 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.

Response:

The geologic research documented in the several publications noted in the request regarding large rock block slumping on Sinking Creek Mountain and landslides in the general area, include speculation and interpretive observations, but no empirical evidence that mass wasting (either large block slumping, landslides, debris flow) directly resulted from seismic activity. Shultz (1993) suggested Pliocene Epoch as possible timing of movement, and noted that there is no evidence of recent-time movement.

If a seismic event occurred within the GSCZ or PFZ, or beyond this region, at a magnitude great enough to induce ground motion that resulted in the degree of mass wasting observed by the

researchers, such an event appears to carry an extremely remote probability of occurrence over the timespan that is reasonable to review geologic hazards for the pipeline.

Mountain Valley assessed peak ground motion (0.14g) using the latest state-of-the-science tools from Petersen et al. (2014) and incorporated this into its pipeline design (see Resource Report 6 text, and Appendix D of Resource Report 6). The peak ground motion predicted for the Project is based on the same approximate frequency of exceedance that is specified in U.S. building codes for the design of new buildings. As such, the Project seismic hazards analysis for potential threat to the integrity of modern buried welded steel high-pressure pipelines is conservative (e.g., maximizes the level of risk assessed). Accepted and proven practices for the seismic design of buried pipeline systems are embodied in industry guidance documents that have been developed based upon project-specific design requirements developed for major pipeline projects (see Pipeline Research Council International; Honegger and Nyman, 2004).

References:

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

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 Miscellaneous Investigations Series Map I-2370.

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S., Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

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Request: USFS-98

Resource Report 6 Page 6-32, Section 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.

Response:

The statement within Resource Report 6 was incorrect and should read, "Slope information along the Project is provided in Resource Report 1, Appendix 1-J."

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Request: USFS-99

Resource Report 6 Page 6-32, Section 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.

Response:

The reference in Resource Report 6, Section 6.4.3 (Landslides) should be "Radbruch-Hall, Colton, Davies, Lucchitta, Skipp, and Varnes 1982."

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Request: USFS-100

Resource Report 6 Page 6-34, Section 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, and 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.

Response:

Mountain Valley considered the local geology in Resource Report 6, Section 6.1.3. Detailed geologic maps with the pipeline route overlaid are presented in Resource Report 6, Appendix A,

Pages 35-36 and 40. Updated maps from Resource Report 6 as requested by the Forest Service are also included in Attachment USFS-1d. As stated in Resource Report 6, Section 6.4.3, "In both the folded Appalachians and the Blue Ridge Mountains, numerous slow-moving debris slides form in colluvial soil and scree that are particularly abundant on slopes underlain by sandstone and metamorphic rocks."

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Request: USFS-101

Resource Report 6 Page 6-34, Section 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 (%).

Response:

None of the locations listed in Table 6.4-6 of Resource Report 6 occur within National Forest System lands. A Landslide Mitigation Plan was filed with the FERC in a data response on February 26, 2016 as Attachment General 1k. This Plan provided an updated list of areas where the alignment crosses steep hill slopes, including three areas within the Jefferson National Forest as shown in the table below. Updated maps from Appendix 6-D.3 of Resource Report 6 are included as Attachment USFS-101. See also response to Request USFS-87.

Landslide Concern Areas Crossed by the MVP Pipeline					
Beginning MP	**Ending MP**	**Length Crossed (feet)**	**Slope (%) [a]**	**Signs of Recent Movement [b]**	**Notes**
195.4	196.7	1,800	18 - 26	No*	Within Jefferson National Forest
197.7	198.2	2,300	18 - 35	No*	Within Jefferson National Forest
218.3	219.7	1,200	25 - 40	No*	Within Jefferson National Forest

[a] Design slope is based on desktop and field review, or range from map analysis of alignment.
[b] Based on historical imagery.
* A field review of this site was performed.

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Resource Report 6 Page 6-36, Section 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.

Response:

The slope of the pipeline corridor was determined by calculating the change in elevation over a specified distance. Elevations were obtained from the civil survey and LiDAR data collected for the project.

Mountain Valley has defined steep slopes as (a) slopes that parallel the pipeline alignment and exceed 30% and (b) side slopes (i.e. slope direction perpendicular to the pipeline alignment) in excess of 10%-15% based on construction, operation, and geotechnical engineering experience in this region. Table 6.4-6 and Appendix 6-D.3 specifically address slopes that involve side hill construction or present other slope stability concerns.

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Request: USFS-103

Resource Report 6 Page 6-37, Section 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). 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.

Response:

Mountain Valley provided an overview of geologic conditions and associated hazards along the entire Project alignment, with more specific review conducted for steep slopes, in Resource Report 6, and identified potential mitigation measures in the Landslide Mitigation Plan filed with the FERC in a data response on February 26, 2016 as Attachment General 1k. Mountain Valley conducted field observations at the locations identified in the Landslide Mitigation Plan for potential slope stability issues including sites in the Jefferson National Forest specifically identified by the Forest Service. Installation of the pipeline will be observed by inspectors with commensurate and appropriate levels of geotechnical engineering experience and credentials such that field conditions encountered at the time of installation that may suggest susceptibility to landslides will be identified and mitigated (see Landslide Mitigation Plan). Overall, the pipeline design and construction techniques will reasonably account for potential for landslides or other forms of ground movement.

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Responses to Forest Service Comments on Final FERC Resource Reports
Dated March 9, 2016

Request: USFS-104

Resource Report 6 Page 6-37, Section 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.

Response:

Mountain Valley provided an overview of geologic conditions and associated hazards along the entire Project alignment, with more specific review conducted for steep slopes, in Resource Report 6, and included mitigation measures in the Landslide Mitigation Plan. Mountain Valley has conducted field observations at these steep hill slope sites for potential slope stability issues. Installation of the pipeline will be observed by professionals with commensurate and appropriate levels of geotechnical engineering experience and credentials such that field conditions encountered at the time of installation that may suggest susceptibility to landslides will be identified and mitigated (see Landslide Mitigation Plan). Overall, the pipeline design and construction techniques will reasonably account for potential for landslides or other forms of ground movement.

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Request: USFS-105

Resource Report 6 Page 6-37, Section 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.

Response:

See the response to Request USFS-104.

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Request: USFS-106

Resource Report 6 Page 6-37, Section 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.

Response:

See the response to Request USFS-104.

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Request: USFS-107

Resource Report 6 Page 6-37, Section 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).

Response:

Both geotechnical engineers and professional geologists worked together to develop the Landslide Mitigation Plan. During the field review, the team assessed the existing slope stability conditions throughout the pipeline corridor in the Jefferson National Forest. The results of the field review are included in the Landslide Mitigation Plan.

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Request: USFS-108

Resource Report 6 Page 6-37, Section 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 30x60o quadrangle, Virginia and West Virginia: U.S. Geological Survey I Map 2170A. 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 theGiles 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.

Response:

See the response to Request USFS-107.

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Request: USFS-109

Resource Report 6 Page 6-37, Section 6.4.33

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.

Response:

A Landslide Mitigation Plan was filed with the FERC in a data response on February 26, 2016 as Attachment General 1k. This information can be utilized by FERC in preparation of the DEIS.

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Request: USFS-110

Resource Report 6 Page 6-37, Section 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. 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.

Response:

Mountain Valley provided an overview of geologic conditions and associated hazards along the entire MVP alignment, with more specific review conducted for steep slopes, in Resource Report 6, and included mitigation measures in the Landslide Mitigation Plan. Mountain Valley is also conducting field observations at these steep hill slope sites for potential slope stability issues. Researching literature on surrogate landscapes is beyond the scope for this Project.

Installation of the pipeline will be observed by professionals with commensurate and appropriate levels of geotechnical engineering experience and credentials such that field conditions encountered at the time of installation that may suggest susceptibility to landslides or debris flows will be identified and mitigated (see Landslide Mitigation Plan). Overall, pipeline design and construction techniques will reasonably account for potential mass wasting.

Based on observations in Schultz (1993) that were referenced by the Forest Service, there appears to be an extremely low probability of occurrence for an event that would trigger such an extreme volume and extent of mass wasting within the Jefferson National Forest. Under such a remote and extreme event, there is no *a priori* construction mitigation option available for any form of infrastructure. Therefore, under such remote circumstances (e.g., extreme storm event), an operational mitigation program would ensue. That is, Mountain Valley will install remote

valve actuators and pressure sensors on all the mainline valves that would automatically shut-in the line as soon as a pressure drop is detected.

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.

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Request: USFS-111

Resource Report 6 Page 6-37, Section 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.

Response:

The particulars about slope stability issues on other pipelines crossing the National Forest System lands are not publically available. Mountain Valley has already addressed potential slope stability issues pertinent to its Project area. As part of the pipeline routing process, Mountain Valley field reviewed several routes within the Jefferson National Forest and avoided steep slope areas to the greatest extent possible. In addition, the Forest Service requested that Mountain Valley review three sites along the pipeline route in the Jefferson National Forest for slope stability. Mountain Valley's field teams walked the identified sites within the Jefferson National Forest and included its analysis of these sites in the Landslide Mitigation Plan. Mountain Valley's inspectors will monitor stability issues associated with pipeline construction.

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Request: USFS-112

Resource Report 6 Page 6-37, Section 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.

Response:

Floods and Other Stream Hazards
FEMA 100-year floodplains surround Craig Creek in the Jefferson National Forestt. There are no mapped FEMA floodplains surrounding Kimballton Branch, Curve Branch, Clendennin Creek, or the unnamed tributaries of these streams. There are no new access roads or other aboveground facilities proposed in the Jefferson National Forest that would affect flood storage capacity within FEMA flood zones. Mountain Valley will restore pipeline facility workspaces as closely as practicable to pre-construction contours, including the areas within FEMA flood zones. Restoration of pre-construction contours will preserve the existing condition of the FEMA flood zones and preclude the Project pipeline facilities from having adverse effects on flood storage capacity.

An analysis of potential erosion from pipeline construction within the Jefferson National Forest was described in the Sediment Erosion Analysis for the Mountain Valley Pipeline Route. See the response to Request USFS-151.

Stream banks would be returned to their preconstruction contours or shaped to a stable angle. Erosion control fiber fabric or matting would be installed on slopes adjacent to streams. On some banks, depending on site-specific conditions, fiber rolls may also be installed to stabilize bank toes. The stream banks will be re-seeded.

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Request: USFS-113

Resource Report 6 Page 6-37, Section 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.

Response:

Acid-Producing Rocks

In general, bedrock lithologies that are susceptible to producing acid rock drainage (ARD) and are generally observed in the Appalachian plateau and Valley and Ridge provinces (including the Jefferson National Forest) are coal and black shale. These sedimentary bedrock formations were likely derived from anoxic subaqueous depositional environments that incorporated iron-sulfide mineralogy. Mountain Valley will apply a Fusion Bonded Epoxy (FBE) coating to the external surface of the pipe in combination with cathodic protection to protect the pipe from the potential effects of ARD if such is encountered and until such time as the ARD-forming rock surrounding the pipe is no longer exposed to an oxygenated environment (i.e., until residual oxygen in the returned trench fill is consumed).

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Request: USFS-114

Resource Report 6 Page 6-31, Section 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.

Response:

Pipeline construction in the Jefferson National Forest will be accomplished via typical overland construction techniques, as shown in Resource Report 1 Figure 1.4-1 – Typical Pipeline Construction Sequence and construction typical drawing MVP-1. Mountain Valley has included a new typical for down slope construction, including steep slopes, as Attachment USFS-35. No special excavation measures or cut and fill will be utilized on steep slopes.

Spoil material from trenching will be stockpiled along the right-of-way, as depicted in the referenced typical drawings. Additional protection measures will be taken on steep slopes, as described in Resource Report Section 1.4.1.2. This will involve compacting spoil material in lifts via rolling with bulldozers, and temporarily mulching the spoil piles to control washouts. Spoil piles will be separated at intervals of 50 feet by temporary water bars, which will serve to slow the flow of runoff down the right-of-way and divert it into straw bales or No. 3 aggregate. Mountain Valley plans to utilize the existing Pocahontas Road. The road and associated additional temporary extra workspaces may require modifications that have not yet been finalized.

No contractor yards, equipment staging/storage areas, or disposal areas for excess excavation or other materials are planned within the Jefferson National Forest.

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Request: USFS-115

Resource Report 6 Page 6-39, Section 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.

Response:

The statement in Resource Report 6 was incorrect and should read, "These techniques and other best management practices are outlined in the typical construction drawings included in Appendix 1-C1, Typical Construction Drawings, of Resource Report 1."

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Request: USFS-116

Resource Report 6 Page 6-39, Section 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.

Response:

Cut and fill or other special excavation measures are not anticipated within the Jefferson National Forest. Downhill construction will proceed in the same fashion as typical overland construction, but the equipment will be winched. Mountain Valley has included a new typical for down slope construction, including steep slopes, as Attachment USFS-35.

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Resource Report 6 Page 6-39, Section 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 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.

Response:

No cut and fill construction is anticipated along the pipeline right-of-way within the Jefferson National Forest. In practice, ridgetop construction such as that depicted on typical Drawing MVP-8 will not require substantial excavation – the typical is not to scale. Some material excavated from the ridgetop will be spread across the temporary right-of-way and some of the material will be stockpiled along the temporary right-of-way and replaced following construction. Following construction, the ridge will be re-contoured to approximate the original conditions. As stated in Resource Report 1, Section 1.4.1.2, "MVP will incorporate erosion and sediment control measures such as super silt fence, silt fence, sock filtration, erosion control socks, temporary and permanent water bars, ditch breakers, temporary mulch, and erosion control blankets as per Project design specifications based on slope."

As cut and fill is not anticipated within the Jefferson National Forest, the requested typical drawings, which are dependent on cut and fill construction, will not assist the Forest Service in its review of the Mountain Valley Project within the Jefferson National Forest. Mountain Valley has included a new typical for down slope construction, including steep slopes, as Attachment USFS-35. In addition, detailed descriptions for the three sites identified by the Forest Service within the Jefferson National Forest are included as part of the Landslide Mitigation Plan. Generally, additional water bars, trench breakers, and drains will be required in steep sections of pipeline construction to prevent slip issues. Mountain Valley's inspectors will monitor stability issues associated with pipeline construction activities with respect to both long-term and short-term slope stability.

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Request: USFS-118

Resource Report 6 Page 6-39, Section 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.

Response:

Cut and fill construction is not anticipated within the Jefferson National Forest. At the average grades encountered within the Jefferson National Forest, as shown in Attachment USFS-87a, Mountain Valley does not anticipate that trench backfill, which will be replaced to the original contours, will be unstable. Should the potential for unanticipated slope instability become apparent during construction or reclamation, Mountain Valley's geotechnical inspectors will formulate a plan to mitigate the slope instability.

As discussed in Resource Report 6, Section 6.6.1.2, "Where stability issues are identified, mitigation measures will be considered that include, realignment of the pipeline to avoid areas of instability, deepening the pipeline below surface instability, buttressing, surface and subsurface drainage, rock bolting/soil anchors, surface stabilization matting, and regrading slopes to stable configurations. In addition, maintaining proper drainage during construction and operation will help to maintain slope stability. The construction erosion and sediment control measures will be designed to avoid concentration of runoff onto or into steep areas prone to slope instability. Concentration of surface water will be discouraged through restoring the original grade as closely as practical and through use of water bars where necessary to divert surface flow off of the right-of-way."

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Request: USFS-119

Resource Report 6 Page 6-39, Section 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.

Response:

Mountain Valley plans to utilize the existing Pocahontas Road during construction. The road and associated additional temporary extra work spaces may require modifications that have not yet been finalized. Mountain Valley will continue to coordinate with the Jefferson National Forest regarding potential upgrades to Pocahontas Road.

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Request: USFS-120

Resource Report 6 Page 6-39, Section 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). 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).

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.

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). 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, 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.

Response:

Installation of the pipeline will be observed by professionals with commensurate and appropriate levels of geotechnical engineering experience and credentials such that field conditions encountered at the time of installation that may suggest susceptibility to landslides will be identified and mitigated (see Landslide Mitigation Plan). Overall, pipeline design and construction techniques, including temporary use of the pipeline right-of-way for construction activities, will reasonably account for potential landslide or other forms of ground movement (triggered slope displacement, liquefaction, etc.).

The Jefferson National Forest area is at risk for landslides and debris flows in its natural state. Debris flows may travel long distances downslope in this area and both landslides and debris flows may affect roads, structures, appurtenances, and waterways in the vicinity of the slope movement. Mountain Valley is implementing steep slope construction measures to minimize the potential for landslides and debris flows resulting from pipeline construction. These measures are reflected in Resource Report 6, Section 6.6.1.2.

> "On steep slopes, various measures will be taken in order to properly control erosion and sedimentation on the right-of-way. MVP's design specifications, based on slope severity and orientation, will incorporate measures such as super silt fence, silt fence, sock filtration, straw bales, temporary and permanent water bars, ditch breakers, temporary mulch, and erosion control blankets. Spoil piles from trenching operations will be staged along the side of the right-of-way and will be compacted via rolling with dozers on site as additional material is added. Once a soil pile is completed, it will be temporarily mulched to control washouts. Additionally, spoil piles will be separated at intervals of 50 feet by temporary water bars which will serve to slow the flow of runoff down the right-of-way and divert it into straw bales or No. 3 aggregate. Hay bales, silt fence, and super silt fence would be used to stop rocks from rolling off the right-of-way. Other measures such as erosion control blankets, temporary mulching, and sock filtration may be used."

As part of Mountain Valley's Landslide Mitigation Plan, which was filed in a data response with FERC on February 26, 2016 as Attachment General 1k, Mountain Valley investigated several sites within the Jefferson National Forest that were identified by the Forest Service. Detailed descriptions are included as part of the Landslide Mitigation Plan. The results for two sites located in the Forest Service-managed portion of the Jefferson National Forest are summarized below. Generally, additional water bars, trench breakers, and drains will be required in steep sections of pipeline construction. During construction, Mountain Valley will have geotechnical

inspectors present to assess construction activities with respect to both long-term and short-term slope stability.

MP 196.4 to 196.7 (Jefferson National Forest):
The pipeline in this area runs across a moderately sloped knob before following a moderately steep ridgeline downgradient. The adjacent side slopes are steep. The pipeline is crossed by a number of drainage ways as well as an existing road that parallels the pipeline from MP 196.5 to 196.7.

The field report noted that slopes were mostly silty sand with sandstone cobbles and boulders scattered throughout, and the soil type in the area was defined as Lily-Bailegap Complex or Nolichucky Very Stony Sandy Loam (NRCS Hydrologic Soil Group B). Some of the side slopes off the ridge were observed to have minor signs of gravitropism.

Water bars in conjunction with water stops and drains will be installed in the steeper downhill sections of the right-of-way.

MP 218.3 to 219.7 (Jefferson National Forest):
From MP 218.3 to MP 218.6, the pipeline corridor follows a generally flat profile. At MP 216.6 the pipeline takes a 90-degree turn south and climbs a steep ridge to MP 219.4. The section of pipeline running up the ridge has an average slope of 30% with side slopes ranging from 40% to 80% downslope to drainage ways. From MP 219.4 to 219.7, the pipeline corridor follows relatively flat or gently up sloping terrain with a gravel road crossing at MP 219.45.

This section was mostly vegetated by trees and shrubs but has occasional sandstone outcrops along the ridgeline. The topsoil was thin and underlying soil was gravelly with gravels composed of fragments of sandstone. Drainage areas from the ridge drain west into Craig Creek. The soil was classified as either Berks and Weikert or Berks and Weikert very stony (NRCS Hydrologic Soil Group B).

Due to the relatively shallow depth of bedrock in this area (approximately 2.75 feet bgs), it is anticipated that the pipe will be installed/embedded within the bedrock from MP 218.65 to the end of this area of concern. Water bars in conjunction with water stops and drains will be installed in the steeper downhill sections of the right-of-way.

No cut/fill slope modification is anticipated during construction within the Jefferson National Forest. A map of the right-of-way steepness is included as Attachment USFS-87a. Geotechnical inspectors will be present during pipeline construction to assess the stability of slopes in the project vicinity, including the stability of the backfill. Should instability become apparent during construction, the Mountain Valley geotechnical inspector and geotechnical engineer will formulate a plan to stabilize the slope.

Mountain Valley plans to utilize the existing Forest Service access road on Peters Mountain (Pocahontas Road) during construction. The road will require modifications that have not been finalized at this point.

The geologic research documented in the several publications noted by Forest Service regarding large rock block slumping on Sinking Creek Mountain and landslides in the general area, include speculation and interpretive observations, but no empirical evidence that mass wasting (either large block slumping, landslides, debris flow) directly resulted from seismic activity. Shultz (1993) suggested Pliocene Epoch as possible timing of movement, and noted that there is no evidence of recent-time movement. The pipeline route does not cross any areas mapped in publications as areas with large rock block slumping.

The probability of a seismic event occurring within or around the GSCZ or PFZ of a magnitude great enough to induce ground motion resulting in the degree of mass wasting observed by the researchers, appears to be more remote than would be reasonable to consider in a review of geologic hazards to the pipeline.

Mountain Valley assessed peak ground motion (0.14g) using the latest state-of-the-science tools from USGS (2014) and incorporated this into its pipeline design (see Resource Report 6 text, and Appendix D of Resource Report 6). The peak ground motion predicted for the Mountain Valley is based on the same approximate frequency of exceedance that is specified in U.S. building codes for the design of new buildings. As such, the Mountain Valley Pipeline seismic hazards analysis for potential threat to the integrity of modern buried welded steel high-pressure pipelines is conservative (e.g., maximizes the level of risk assessed). Accepted and proven practices for the seismic design of buried pipeline systems are embodied in industry guidance documents that have been developed based upon project-specific design requirements developed for major pipeline projects (see Pipeline Research Council International; Honegger and Nyman, 2004). It is beyond the scope of this Project to reproduce or attempt to update the probabilistic model presented by USGS (2014), or to provide a research-oriented assessment of historic earthquake ground motion estimates.

The probabilistic ground motion assessed for Mountain Valley Pipeline is associated with what would be reasonably considered a moderate seismic event. Regarding seismic event triggering of slope displacement, Jibson and Harp (2012) noted: “The [Mineral Springs] earthquake triggered no large, damaging landslides. The largest triggered landslide had a volume of perhaps 100 m3; other triggered landslides ranged in volume from approximately 5 m3 down to small rock fragments a few centimeters across. This is not surprising given the moderate magnitude of the earthquake. Strong shaking from shallow earthquakes of moderate magnitude is brief and tends to be concentrated in the higher frequency range; such shaking tends to trigger small, shallow landslides in brittle, weathered surficial material and is unlikely to trigger large, deep landslides.”

Installation of the pipeline will be observed by professionals with commensurate and appropriate levels of geotechnical engineering experience and credentials such that field conditions encountered at the time of installation that may suggest susceptibility to landslides will be identified and mitigated (see Landslide Mitigation Plan). In general, pipeline design will account for a reasonable degree of potential landslide or other forms of ground movement (triggered slope displacement, liquefaction, etc).

References:

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

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Request: USFS-121

Resource Report 6 Page 6-39, Section 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.

Response:

See the responses to Requests USFS-108 through 120. Mountain Valley provided an overview of geologic conditions and associated hazards along the entire Project alignment, with more specific review conducted for steep slopes, in Resource Report 6, and identified potential mitigation measures in the Landslide Mitigation Plan filed in a data response with FERC on February 26, 2016 as Attachment General 1k. Mountain Valley has conducted field observations at the locations identified in the Landslide Mitigation Plan for potential slope stability issues, including sites in the Jefferson National Forest specifically identified by the Forest Service. Installation of the pipeline will be observed by inspectors with commensurate and appropriate levels of geotechnical engineering experience and credentials such that field conditions encountered at the time of installation that may suggest susceptibility to landslides will be identified and mitigated (see Landslide Mitigation Plan). Overall, the pipeline design and construction techniques will reasonably account for potential for landslides or other forms of ground movement.

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Request: USFS-122

Resource Report 6 Page 6-41, Section 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.

Response:

A Landslide Mitigation Plan was filed as a data response with FERC on February 26, 2016 as Attachment General 1k. This information can be utilized by FERC in preparation of the DEIS.

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Request: USFS-123

Resource Report 6 Page 6-44, Section 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.

Response:

The seismic acceleration value of 0.28 g is applicable for evaluating risks to above-ground structures. In seismic zones, the Project is proposed for installation as a buried pipeline, so the 0.14g peak ground acceleration was used for hazards assessment.

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Request: USFS-124

Resource Report 6 Page 6-43, Section 6.6.1.3

See several comments on Section 6.6.4 Seismic Hazards, and revise this Section 6.6.1.3 as appropriate.

Response:

See the response to Request USFS-123 that addresses comments on Section 6.6.4 Seismic Hazards.

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Request: USFS-125

Resource Report 6 Page 6-43, Section 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.

Response:

See the responses to Requests USFS-115 through USFS-122, which address comments on Section 6.6.1.2.

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Request: USFS-126

Resource Report 6 Page 6-49, Section 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.

Response:

See the response to Request USFS-112, which addresses comments on Floods and Other Stream Hazards.

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Request: USFS-127

Resource Report 6 Page 6-49, Section 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.

Response:

See the response to Request USFS-113, which addresses comments on Acid-Producing Rocks.

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Request: USFS-128

Resource Report 6 Page 6-49, Section 6.6

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.

Response:

The discussion of geologic hazards included in Section 6.4 applies to both construction (see Section 6.6.1) and operation (see Section 6.6.2) of the pipeline. A Landslide Mitigation Plan was filed as a data response with FERC on February 26, 2016 as Attachment General 1k. The Plan includes numerous mitigation measures that, when implemented during construction, will also minimize the effects during operation.

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Request: USFS-129

Resource Report 6 Page 6-49, Section 6.4

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 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.

Response:

The geologic research documented in the several publications noted by the Forest Service regarding large rock block slumping on Sinking Creek Mountain and landslides in the general area, include speculation and interpretive observations, but no empirical evidence that mass wasting (either large block slumping, landslides, debris flow) directly resulted from seismic activity. Shultz (1993) suggested Pliocene Epoch as possible timing of movement, and noted that there is no evidence of recent-time movement.

If a seismic event occurred within the GSCZ or PFZ, or beyond this region, at a magnitude great enough to induce ground motion that resulted in the degree of mass wasting observed by the researchers, such an event appears to carry an extremely remote probability of occurrence over the timespan that is reasonable to review geologic hazards for the pipeline.

Mountain Valley assessed peak ground motion (0.14g) using the latest state-of-the-science tools from Petersen et al. (2014) and incorporated this into its pipeline design (see Resource Report 6

text, and Appendix D of Resource Report 6). The peak ground motion predicted for the Project is based on the same approximate frequency of exceedance that is specified in U.S. building codes for the design of new buildings. As such, the Project seismic hazards analysis for potential threat to the integrity of modern buried welded steel high-pressure pipelines is conservative (e.g., maximizes the level of risk assessed). Accepted and proven practices for the seismic design of buried pipeline systems are embodied in industry guidance documents that have been developed based upon project-specific design requirements developed for major pipeline projects (see Pipeline Research Council International; Honegger and Nyman, 2004).

References:

Honegger, Douglas G. and Nyman, Douglas J., (2004). Guidelines for the Design and Assessment of Natural Gas and Liquid Hydrocarbon Pipelines, Pipeline Research Council International, Inc., Catalog No. L51927.

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 Miscellaneous Investigations Series Map I-2370.

Petersen, M.D., Moschetti, M. P., Powers, P.M., Mueller, C. S., Haller, K. M., Frankel, A. D., Zeng, Y., Rezaeian, S., Harmsen, S. C., Boyd, O. S., Field, N., Chen, R., Chen, Rukstales, K. S., Luco, N., Wheeler, R.L., Williams, R. A., and Olsen, A. H., (2014). Documentation for the 2014 Update of the United States National Seismic Hazard Maps. U.S. Geological Survey Open-File Report 2014–1091.

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Request: USFS-130

Resource Report 6 Page 6-50, Section 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.

Response:

The statement should 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."

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Request: USFS-131

Resource Report 7; FERC Env Info Request Report 7, Aug 11, 2015, #13

FERC
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.

Response:

The following data response was submitted to FERC on January 15, 2016 regarding soil amendments.

> "There are no soil amendments proposed without a specific request from a landowner as to type and application rates…. A detailed seeding plan developed by the wildlife council specifically for the MVP project using tailored seed mixes for MVP native restoration is included in Resource Report 3 and specifically in Appendix 3-D Right-of-Way Seeding Plan, which was developed for MVP by the Wildlife Habitat Council."

If soil amendments are requested by the Forest Service, they will be reflected in the Plan of Development.

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Request: USFS-132

Resource Report 7 Env Info Request Report 7, Aug 11, 2015, #13

FERC

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.

Response:

An additional table detailing soil attributes was filed with FERC on January 27, 2016 as Attachment RR7-2. This table included acreages of permanent and temporary disturbance for all project areas in regards to; Prime Farmland, Compaction Potential, Water Erosion, Wind Erosion, Revegetation Potential, Hydric Soils, Shallow Water Table and Poor Drainage. This table used available data in the SSURGO database as described in the footnotes of the table. A subset of this data focused on the Jefferson National Forest is listed by milepost and acreage of Project component and is included as Attachment USFS-132.

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Request: USFS-133

Resource Report 7 N/A

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.

Response:

See the response to Request USFS-132.

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Request: USFS-134

Resource Report 7 Page 7-17, Section 7.3.11

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.

Response:

The sentence on page 7-17 should read: "To minimize the duration of soil disturbance, MVP will attempt to complete final cleanup and installation of permanent erosion control measures in an area within 20 days after backfilling the trench in that area, weather and soil conditions permitting." The timing for residential areas will remain at 10 days. Mountain Valley and the Forest Service will discuss cleanup requirements as part of the Plan of Development.

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Request: USFS-135

Resource Report 7 Page 7-18, Section 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.

Response:

Topsoil will be segregated as indicated in Section 7.3.1.2 of Resource Report 7. Section 7.4 of Resource Report 7 addresses the Jefferson National Forest. Mountain Valley will consult with the Forest Service regarding soil in the Jefferson National Forest. Topsoil segregation is addressed in the Plan of Development (see Attachment USFS-20).

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Request: USFS-136

Resource Report 7 Page 7-21, Section 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.

Response:

Comment noted. This statement should read as follows, "Unless requested by a landowner, areas will be seeded during the next available seeding season (Appendix 1-J)."

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Request: USFS-137

Resource Report 8 Page 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, including special uses. The consistency result should be "NO", since an instream flow analysis has not been done.

Response:

Mountain Valley does not plan to divert or withdraw water from any waterbody within the Jefferson National Forest for hydrostatic testing or dust control. Accordingly, Mountain Valley does not plan to conduct instream flow analyses within the Jefferson National Forest. Section 5.1 of the Plan of Development has been revised accordingly (see Attachment USFS-20).

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Request: USFS-138

Resource Report 8 Page 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.

Response:

See the response to Request USFS-137.

Mountain Valley Pipeline, LLC
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Request: USFS-139

Resource Report 8 Page 8-21, Section 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.

Response:

The Plan of Development, included herewith as Attachment USFS-20, has been amended to include the crossing of USACE-owned lands.

Mountain Valley Pipeline, LLC
Mountain Valley Pipeline Project
FERC Docket No. CP16-10-000

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Request: USFS-140

Resource Report 8 Page N/A, Section 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.

Response:

The presence of Mountain Valley Pipeline will not affect the Forest Service's ability to use prescribed fires in managing its lands. See the response to Request USFS-37.

Mountain Valley Pipeline, LLC
Mountain Valley Pipeline Project
FERC Docket No. CP16-10-000

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Request: USFS-141

Resource Report 8 Page N/A, Section 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.

Response:

The Land and Resource Management Plan (LRMP) for the Jefferson National Forest identifies 258,900 acres within the Forest that are suitable for timber production. The Project would cross five management areas as defined in the LRMP, as shown on figures included in Attachment USFS-141. Of these, two contain areas suitable for timber production; Management Prescription area 4J (Urban/Suburban Interface) and Management Prescription area 8A1 (Mix of Successional Habitats in Forested Landscapes). The LRMP identifies 1,900 acres of Management Prescription area 4J and 85,600 acres of Management Prescription area 8A1 as suitable for timber production. Construction of the Project would impact 14.1 acres within 4J and 52.4 acres within 8A1. During operation, maintenance of the operational ROW would result in a long-term loss of timber of 5.7 acres of 4J and 25.4 acres of 8A1. Therefore, assuming all of the impacted area is suitable for timber production, operation of the Project would impact 31.1 acres, or approximately 0.036 percent of the suitable timber production area within 4J and 8A1, and 0.012 percent of the total suitable timber production area within the Jefferson National Forest.

During operation of the Project, the pipeline right-of-way would not restrict potential future timber operations, and would not isolate currently manageable timber tracts. Mountain Valley would, however, require that operation of heavy equipment within the right-of-way such as log skidders be coordinated with Mountain Valley to ensure the integrity of the pipeline is maintained.

Mountain Valley Pipeline, LLC
Mountain Valley Pipeline Project
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Request: USFS-142

Resource Report 8 Page 8-41, Section 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 middle ground 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.

Response:

The following text has been prepared to supplement Resource Report 8 - Section 8.4.3:

Peters Mountain Wilderness - (Page 8-41, second paragraph)
Mountain Valley conducted a desktop viewshed analysis in July and September 2015. The analysis used a "seen area" map which incorporated topography and assumed bare-earth conditions (no vegetation screening) to identify locations within a 5-mile radius from which the cleared pipeline right-of-way would be visible. This analysis confirmed the pipeline right-of-way would not be visible from the boundary of Peters Mountain Wilderness. Additional visibility analysis was conducted as requested by Forest Service using a 60 foot elevation of the pipeline to provide for a very conservative analysis. The additional visibility analysis also concluded that there would be little to no visibility from the boundary of Peters Mountain Wilderness.

The majority of the vegetation between Peters Mountain Wilderness and the Project is deciduous. However, even with leaf-off conditions the vegetation is dense enough to screen views of the right-of-way. In addition, the intervening terrain provides the greatest screening between Peters Mountain Wilderness and the Project, as confirmed by the desktop viewshed analysis and field verification.

Mountain Valley Pipeline, LLC
Mountain Valley Pipeline Project
FERC Docket No. CP16-10-000

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Request: USFS-143

Resource Report 8 Page 8-40, Section 8.4.3 and Appendix 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 middle ground and background views from the ANST.

Response:

A "seen area" map was used to select the KOPs used in the visual analysis. A draft seen area map with suggested KOPs was submitted to Forest Service staff on July 30, 2015. On July 31, 2015 Forest Service staff requested that one additional KOP be added, which was addedto the analysis.

Seen area maps were prepared for two scenarios for the proposed route – as requested by the Forest Service, scenario 1 assumed no vegetation (bare earth) and also assumed the pipeline and cleared right-of-way surface would be at an elevation 60 feet above the ground surface. Scenario 2 assumed no vegetation (bare earth) and the pipeline would be buried (as proposed) and the cleared right-of-way would be at existing ground elevation (4 feet above actual ground surface for the purpose of preparing the seen area model). Copies of "seen area" maps are included herewith as Attachment USFS-143a.

In addition to seen area maps, Mountain Valley also prepared viewshed maps depicting views from selected KOPs. Viewshed maps assumed no vegetation (bare earth) and the pipeline buried and the right-of-way at true ground elevation. Viewshed maps were used to show where topography alone would screen views of the Project from the selected KOPs. Viewshed maps used for the visual analysis in the Jefferson National Forest are included in Attachment USFS-143b.

Mountain Valley Pipeline, LLC
Mountain Valley Pipeline Project
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The following text has been prepared to supplement Resource Report 8 - Section 8.4.3:

Appalachian National Scenic Trail – (Page 8-41, fifth paragraph)
The three representative viewpoints were chosen in consultation with Forest Service staff to represent varying distances from the pipeline as well as account for terrain between the viewpoints and the Appalachian National Scenic Trail. A "seen area" viewshed analysis was conducted from the representative viewpoints and showed there would be no visibility of the pipeline right-of-way from the selected points along the Appalachian National Scenic Trail. Additional visibility analysis was also conducted as requested by Forest Service using a 60 foot elevation of the pipeline to create a very conservative analysis. This additional visibility analysis showed a pipeline at 60 feet in height would be visible from viewpoints along the Appalachian National Scenic Trail; however, the Mountain Valley Pipeline will be buried. The desktop viewshed analysis was supplemented with field review. Field review shows that the deciduous vegetation is dense enough that even in leaf-off conditions the vegetation would screen views of the pipeline right-of-way from the Appalachian National Scenic Trail.

At the selected viewpoints used to evaluate potential views from the Appalachian National Scenic Trail the vegetation observed in the field is dense enough that even with leaf-off conditions the vegetation would screen views of the pipeline. The vegetation is primarily composed of oaks (chestnut, white, scarlet, Northern red, and Eastern black oak), with heights ranging from 30-60 feet.

Mountain Valley Pipeline, LLC
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Request: USFS-144

Resource Report 8 Page N/A, Section 8.4.3

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). 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.

Response:

A "seen area" map was developed to support the visual analysis. The seen area map identifies all areas within a 5-mile radius of the pipeline crossing of the Jefferson National Forest, thus providing a landscape level depiction of areas where the Project could be seen. See also the responses to Requests USFS-143 and USFS-148 and Attachment USFS-143a. The roads mentioned in this comment, including U.S. 460, U.S. 11, and Interstate 81 were not previously identified by the Forest Service as concern level 1 roadways, however these roadways are associated with viewpoints that Mountain Valley included in the existing visual analysis for major roadways, as discussed by individual KOPs.

Mountain Valley Pipeline, LLC
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Request: USFS-145

Resource Report 8 Page 8-51, Section 8.5.13

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.

Response:

As shown in Table 8.3-1 in Resource Report 8, land use impacted is primarily forest (over 99 percent during construction and operation).

The calculation of lands in the Jefferson national Forest affected during construction includes the temporary pipeline construction space, ATWS and temporary access roads; however, there are no contractor yards, pipe storage locations, or other work spaces required within the Jefferson National Forest during the construction phase.

Mountain Valley Pipeline, LLC
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Request: USFS-146

Resource Report 8 Page 8-51, Section 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.

Response:

Mountain Valley submitted a right-of-way grant application to the BLM on April 5, 2016. A copy of the revised SF-299 is included herewith as Attachment USFS-146.

Mountain Valley Pipeline, LLC
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Request: USFS-147

Resource Report 8 Page 8-53, Section 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.

Response:

Additional description of the ROS standards crossed by the Mountain Valley Project are included below using definitions from the Revised Land and Resource Management Plan for the Jefferson National Forest issued November 2014:

Semi-Primitive Non-Motorized (SPNM): Area characterized by a predominantly natural or natural-appearing environment of 2,500 or more acres. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is not permitted. There is a moderately high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk.

Roaded Natural (RN): Area characterized by a predominantly natural or natural appearing environment with a low probability of experiencing isolation from the sights and sounds of man. Interaction between users may be low to moderate, but with evidence of other users prevalent. Conventional motorized use is provided for in construction standards and design of facilities. Opportunities for both motorized and non-motorized forms of recreation may be provided.

Semi-Primitive 2 (SP2): Not a true recreation opportunity class. Semi-Primitive 2 areas surround and buffer SPNM or SPM areas on the Jefferson National Forest. They occur within a half mile of an open road but new permanent roads are prohibited. Interaction between visitors is low, but with evidence of other users prevalent. There is a low probability of experiencing isolation from the sights and sounds of man. Opportunities for both motorized and non-motorized forms of recreation may be provided.

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Request: USFS-148

Resource Report 8 Page 8-54, Section 8.5.4

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).

Response:

Clarifications to the referenced sections of Resource Report 8 include the following:

The parenthetical text following each Scenic Class lists the SIO values crossed by the Project within each Scenic Class Area.

For Scenic Class 1 Areas, parenthetical should include (Very High, High, and Moderate SIO).

No Scenic Class 4, 6, or 7 Areas are crossed by the Project. A Scenic Class 5 Area is crossed and a description is below:

Scenic Class 5 (Low SIO) Areas. The pipeline crosses 0.22 mile consisting of one area of the JNF inventoried and classified as having Low public value. The area is inventoried as the 8A1 MA. These are a typical mix of Successional Habitats in Forested Landscapes. The landscape character of this area retains a natural, forested appearance. A mid- to late-successional forest greater than 40 years of age dominates the landscape. With the introduction of Project elements, the landform, vegetation patterns, and cultural features would still combine to provide common or low scenic quality in these areas, therefore, the total acreage of land classified as Scenic Class 5 would not be affected by the Project.

The following sentence has been revised to include "Very High":

SIO Compliance. The pipeline would be buried underground and not visible, although the cleared and maintained pipeline right-of-way would contrast with the landscape character in Very High, High, Moderate, and Low SIO areas where there is not existing cleared utility rights-of-way.

GIS data obtained from the Forest Service was used to determine the Scenic Classes and SIOs crossed by the Project. The relative value of the landscape affected was obtained from the SMS handbook and from field assessment.

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Request: USFS-149

Resource Report 8 Page 8-54, Section 8.5.4

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 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).

Response:

Section 8.5.4 of Resource Report 8 is a general discussion of the management areas crossed within the JNF. A site-specific discussion of contrast levels is provided by KOP. See also the responses to Requests USFS-152 and -158.

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Request: USFS-150

Resource Report 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.

Response:

A "seen area" map was used to select the KOPs used in the visual analysis. A draft seen area map with suggested KOPs was submitted to Forest Service staff on July 30, 2015. On July 31, 2015 Forest Service staff requested that one additional KOP be added, which was added to the analysis. The analysis in Resource Report 8 incorporates the input received to date from the Forest Service. A revised Table 8-D is included as Attachment USFS-150. With regard to the distance, see Request USFS-158, where the Forest Service recommended that a visible or "seen area" analysis be prepared for a distance of five miles from the proposed pipeline centerline.

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Request: USFS-151

Resource Report 8 Consistency Analysis

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.

Response:

The Jefferson National Forest Land and Resource Management Plan Consistency Review was included as Appendix 8-E to Resource Report 8.

A revised Consistency Review, with edits to address comments received from the Forest Service in this data request, is included herewith as Attachment USFS-151.

Mountain Valley Pipeline, LLC
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Request: USFS-152

Resource Report 8 Consistency Analysis

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.

Response:

The conclusions in Resource Report 8 - Section 8.4.3 were based on viewshed analysis, field analysis, and desktop studies. The standards for MA 4A are met because the Project would not be visible from selected KOPs on the ANST. Field notes on changes to form, line color, and texture in the form of contrast are shown on the visual contrast rating worksheet forms, included as Attachment USFS-152, and discussed briefly in Section 8.4.3 for each visual resource area. A "seen area" map also supports the conclusions. See also the responses to Requests USFS-143 (including Attachments USFS-143a and USFS-143b) and USFS-151 (revised consistency analysis).

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Mountain Valley Pipeline Project
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Request: USFS-153

Resource Report 8 Consistency Analysis

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.

Response:

Recreational Opportunity Spectrum (ROS) Classes crossed by the Mountain Valley Pipeline, using definitions from the final EIS for the Revised Land and Resource Management Plan for the Jefferson National Forest, are described below:

Semi-Primitive Non-Motorized (SPNM): Area characterized by a predominantly natural or natural-appearing environment of 2,500 or more acres. Interaction between users is low, but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is not permitted. There is a moderately high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility, and self-reliance through the application of woodsman and outdoor skills in an environment that offers challenge and risk.

Roaded Natural (RN): Area characterized by a predominantly natural or natural appearing environment with a low probability of experiencing isolation from the sights and sounds of man. Interaction between users may be low to moderate, but with evidence of other users prevalent. Conventional motorized use is provided for in construction standards and design of facilities. Opportunities for both motorized and non-motorized forms of recreation may be provided.

Semi-Primitive 2 (SP2): Not a true recreation opportunity class. Semi-Primitive 2 areas surround and buffer SPNM or SPM areas on the Jefferson National Forest. They occur within a half mile of an open road but new permanent roads are prohibited. Interaction between visitors is low, but with evidence of other users prevalent. There is a low probability of experiencing isolation from the sights and sounds of man. Opportunities for both motorized and non-motorized forms of recreation may be provided.

A narrative describing the impacts to the settings under the ROS is included below:

MA 2 – Upper James River

ROS Classes crossed by the project roads and pipeline include RN and SP2 (See Figure USFS-153R_1 included in Attachment USFS-153). An amendment changing the pipeline right-of-way to prescription area 5C (Utility Corridor) would likely not require a change in ROS classification. To determine the ROS classes affected by prescription area, the temporary construction right-of-way was used (125 feet wide), which would result in 14.37 acres of RN affected and 14.12 acres of SP2 be affected.

Prescription Area	RN (acres)	SP2 (acres)
4J – Urban/Suburban Interface	0	14.12
6C – Old Growth Forest Communities – Disturbed Associated	4.82	0
8A1 – Mix of Successional Habitats in Forested Landscapes	9.55	0
Total	**14.37**	**14.12**

MA 3 – New River

ROS Classes crossed by Project roads and pipeline right-of-way include RN, SP2, and potentially SPNM (See Figure USFS-153R_2 included in Attachment USFS-153), with general management guidelines as described above. The Project would meet RN standards. A review may be needed to determine if Project-related safety improvements are consistent with management goals for the area in SP2. If so, an amendment changing the pipeline right-of-way to prescription area 5C would not require a change in ROS class. The pipeline right-of-way appears to skirt the edge of SPNM. Pipeline-related improvements to Mystery Ridge Road would likely not be consistent with SPNM management standards as the temporary road improvements would lead to establishment visible human presence. If an amendment to the FS changes the pipeline right-of-way to a utility corridor, the ROS class would likely change to SP2 to reflect the use quality of the area. As no permanent roads would be constructed, the corridor would be consistent with this ROS Class. This would affect 0.07 acres of RN, 21.26 acres of SP2 and 2.86 acres of SPNM, and would result in 2.86 acres being converted from SP2 to SPNM (See the table below).

Prescription Area	RN (acres)	SP2 (acres)	SPNM (acres)
1B – Recommended Wilderness Study Areas	0	0	2.86
4A – Appalachian Trail Corridor	0	4.41	
8A1 – Mix of Successional Habitats in Forested Landscapes	0.07	16.85	0
Total	**0.07**	**21.26**	**2.86**

In addition to the pipeline right-of-way, Project actions in MA 3 would include road improvement activities. Area affected was calculated using the temporary construction impact area of up to a 40 foot width. Road work is assumed to be consistent with ROS RN classification, as well as SP2 (with the understanding that some post construction restoration of the road may be required to adhere to the SP2 standards). (See the table below).

Prescription Area	RN (acres)	SP2 (acres)	SPNM (acres)
6C – Old Growth Forest Communities-Disturbance Associated	2.25	0	0
8A1 – Mix of Successional Habitats in Forested Landscapes	21.80	3.67	0
Total	**24.05**	**3.67**	**0**

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Request: USFS-154

Resource Report 8 Consistency Analysis

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 is consistent with the FLRMP by meeting SIOs has not yet been determined and the document should not indicate, at this point, "Yes".

Response:

The Consistency Analysis has been revised to clarify that the Project-level analysis has been performed, and additional detail and clarification added. See Attachment USFS-151. The conclusions in Resource Report 8 - Section 8.4.3 were based on viewshed analysis, field analysis, and desktop studies. The standards for MA 4A were met because the Project would not be visible. Field notes on changes to form, line color, and texture in the form of contrast are shown on the visual contrast rating worksheet forms, included as Attachment USFS-152, and discussed briefly in Section 8.4.3 for each visual resource area. A "seen area" map, as provided to and commented on by Forest Service staff in July 2015, also supports the conclusions. See also the response to Request USFS-143 and Attachments USFS-143a and USFS-143b.

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Request: USFS-155

Resource Report 8 Consistency Analysis

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.

Response:

In accordance with FW-186, Mountain Valley will shape and feather the edges of the cleared right-of-way and work space in High and Moderate SIO areas as needed to meet the SIO. The exact locations where this will be implemented will be determined through ongoing analysis and consultation with the JNF. See also the revised consistency analysis included in Attachment USFS-151.

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Request: USFS-156

Resource Report 8 Consistency Analysis

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.

Response:

Mountain Valley will work with the Forest Service to identify concern level 1 or 2 travelways that are crossed by the pipeline within the Jefferson National Forest. See also the response to Request USFS-144. Any slash piles taller than 2 feet that would be visible within a 100–foot zone of a concern level 1 or 2 travelway within the Jefferson National Forest would be removed by Mountain Valley or its contractors and hauled to a disposal site outside of the Jefferson National Forest. See also the revised consistency analysis included in Attachment USFS-151.

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Request: USFS-157

Resource Report 8 Consistency Analysis

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.

Response:

As noted in the comment, the Land and Resource Management Plan states that this effort should be implemented where practicable. During construction, bare soils will likely be visible at all surface crossings. Mountain Valley will make efforts to reduce construction activity visibility from these routes where practicable, such as delaying the clearing of the construction right-of-way immediately adjacent to roadsides if possible to maintain vegetation screening as long as possible, or use of temporary seeding of the construction work area where adjacent to a roadway crossing.

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Request: USFS-158

Resource Report 8 N/A

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.

Response:

Maps of the proposed pipeline route are included with Resource Report 1 – Project Description. A "seen area" map was used to select the KOPs used in the visual analysis. A draft seen area map with suggested KOPs was submitted to Forest Service staff on July 30, 2015. On July 31, 2015 Forest Service staff requested that one additional KOP be added, which was added to the analysis. Site photography was taken during leaf-on conditions, however analysis and text has been provided which includes a discussion of leaf-off conditions. The conclusions in Resource

Report 8 - Section 8.4.3 were based on viewshed analysis, field analysis, and desktop studies. The standards for MA 4A were met because the Project would not be visible. Field notes on changes to form, line color, and texture in the form of contrast are shown on the visual contrast rating worksheet forms, included as Attachment USFS-152, and discussed briefly in Section 8.4.3 for each visual resource area. See also response to Request USFS-143 and Attachment USFS-143a and USFS-143b.

A table of KOPs was included in Appendix 8-D of Resource Report 8. It has been revised to include most of the additional information requested in this comment (see Attachment USFS-150). The table does not include a description of the view including predominant vegetation in the foreground and middleground, and any distinguishable natural or cultural features since this information is provided in the narrative. See also the response to Request USFS-150.

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Request: USFS-159

Resource Report 8 Page 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.

Response:

Mountain Valley is not aware of available mapping that identifies Management Prescription 11 - Riparian Corridors within the Jefferson National Forest and therefore identified this as not applicable. Mountain Valley will work the Forest Service to identify if and where this management prescription is affected. If riparian corridors are affected, it is possible the Project would not meet the current standards for this management prescription. Review of the standards indicates that the project may be consistent following discussion with the Forest Service on requirements to meet Standard 11-056 and further clarification of Standard 11-003. In addition, the federally endangered James spinymussel is known to occur in Craig Creek upstream of the proposed crossing locations. Mountain Valley is evaluating a potential route modification that would reduce impacts on Craig Creek (see the response to Request USFS-22).

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Request: USFS-160

Resource Report 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.

Response:

The Mountain Valley Pipeline crosses about 2.2 miles of the Chesapeake Bay watershed (CBW) between mileposts 217.2 and 219.4. At this location the watershed is within the upper reaches of Segment-shed No. 38, and the Hydrologic Unit Code (HUC) Upper James Watershed (HUC8 No. 02080201) and the Trout Creek-Craig Creek Subwatershed (HUC12 No. 020802011001). At this location the pipeline is about 3 miles from the uppermost limit of the CBW, and over 200 miles from the tidally influenced waters of the James River in Richmond, Virginia. Construction would affect approximately 33 acres within the Chesapeake Bay watershed, and during operation approximately 13 acres of the restored pipeline right-of-way would be within the watershed.

During construction and operation of the pipeline, including for the 2.2 miles within the CBW, Mountain Valley will implement measures from its E&SCP, the FERC Upland Erosion Control, Revegetation and Maintenance Plan (FERC Plan), and the FERC Wetland and Waterbody Construction and Mitigation Procedures (FERC Procedures). A primary objective of the E&SCP, FERC Plan, and FERC Procedures is to minimize impacts on surface water quality, including from sedimentation. This is accomplished by completing work within a waterbody crossing within 24-48 hours, and immediately restoring banks and installing and maintaining sediment and erosion controls to prevent sedimentation from surface runoff. The intent is to limit introduction of sediments to surface waters from pipeline construction to a short-term event during the actual waterbody crossing, similar to a natural storm event. Once the crossing is complete, immediate bank stabilization and right-of-way restoration measures, including establishment of permanent revegetation within all disturbed areas, would prevent long-term or ongoing sedimentation. Because of the above, it is expected that the project will not have a measureable impact on the TMDL within Chesapeake Bay.

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Request: USFS-161

Resource Report 10, Page 10-9, Section 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.

Response:

See the response to Request USFS-19.

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Request: USFS-162

Resource Report 10, Page 10-9, Section 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.

Response:

See the response to Request USFS-19.

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Request: USFS-163

Resource Report 10, Page 10-12

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.

Response:

See response to Request USFS-21.

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Request: USFS-164

Resource Report 10, Page 10-28, Section 10.6.4

There is no Brush Mountain West Wilderness. There is a Brush Mountain Wilderness, and a Brush Mountain East Wilderness.

Response:

Comment noted.

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Request: USFS-165

Resource Report 10, Page 10-54, Section 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.

Response:

Comment noted. As listed in the Table of Contents for Resource Report 10, Figure 10.6-16 is contained in Appendix 10-A.

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Request: USFS-166

Resource Report 10, Page 10-56, Section 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.

Response:

Mountain Valley has conducted a detailed visual analysis of the potential visual impact to users of the Appalachian National Scenic Trail and concludes that there will not be a significant visual impact. The detailed analysis was done in consultation with the Forest Service staff. This analysis is documented in Resource Report 8 of Mountain Valley's application to FERC. See also responses to Requests USFS-143 through -149, -152, and -153.

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Request: USFS-167

Resource Report 10, Page 10-56, Section 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.

Response:

See the response to Request USFS-14.

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Request: USFS-168

Resource Report 10, Appendix 10B

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.

Response:

See revised Appendix 10B (Appalachian National Scenic Trail Crossing Alternatives Maps) included herewith in Attachment USFS-168a. Revised Appendix 10C (Blue Ridge Parkway Crossing Alternatives Maps) is included herewith in Attachment USFS-168b.

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Request: USFS-169

Resource Report 10, Appendix 10D

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.

Response:

Tables 10-D-1 and 10-D-2 describe minor route changes made to previous versions of the Mountain Valley Pipeline route that were made during the FERC pre-filing process. Changes described in Table 10-D-2 have already been incorporated into the proposed pipeline route and are part of the proposed project evaluated in Resource Reports 1 through 11 of the FERC application. Therefore, the route modifications described in Table 10-D-2 do not change the area of the Jefferson National Forest impacted.

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Request: USFS-170

Resource Report 10, Appendix 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.

Response:

Revised alternative maps are included herewith in Attachment USFS-170. All maps have unique figure numbers and naming conventions.

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Request: USFS-171

Resource Report 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.

Response:

The tables included with Resource Report 10 are intended to be reviewed alongside the respective text description and map showing each alternative. Each alternative is described in text and shown on a graphic according to its location (by pipeline start and end milepost) along the proposed route. Environmental data for each alternative is described and compared only against the "corresponding segment" of the proposed route. For some major alternatives (e.g. Route Alternative 1) the corresponding segment of the proposed route is the entire proposed route, while smaller variations (e.g. Blake Preserve Variation), the corresponding segment is a very short length of the proposed route. The intent of providing these individual comparisons is to allow analysis and decisions based on the specific resource impacts most relevant for each alternative. The full range of alternatives evaluated in Resource Report 10 are shown in the Table of Contents and on Figure 10.5-a, Pipeline Alternatives Overview Map, included in Appendix 10-A.

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Request: USFS-172

Resource Report 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.

Response:

As part of its FERC application, Mountain Valley submitted a proposed route and compared this route to numerous alternatives. In order for a complete alternatives analysis, all alternative routes must be compared to the proposed route to determine if an alternative route may provide a significant environmental advantage over the proposed route. A detailed alternatives analysis was filed with Resource Report 10. In addition, Mountain Valley provided information on alternatives as requested by FERC in their December 24, 2015 data request on January 15, 2016, January 27, 2016, and February 26, 2016. In addition, Mountain Valley has evaluated a conceptual route that avoids all National Forest Service lands and compared it to the proposed route (see the response to Request USFS-19).