Comments and Responses, TWS, FOB, et.al. letter

TWS Comment 01: We believe that the Forest is involved in an ongoing violation of the ESA. A biological evaluation (BE) was prepared by the MNF for the initial drilling of the B-800 well but was delivered to the U.S. Fish and Wildlife Service (FWS) with the decision memo (DM) for the project after the decision had already been made. This failed to allow the FWS the opportunity to concur or engage in formal consultation with the Forest Service prior to the decision.

The Forest Service claimed that their decisions space, and hence opportunity to consult, was limited due to the split estate of the area in question. The FWS sought an opinion from the Office of the Solicitor of the Department of Interior. The Solicitor's opinion was that:

> "The Forest Service's conclusion that it has no discretionary involvement or control over Berry Energy's right to explore for and develop their mineral interests is incorrect…When the owner of the surface estate is the United States, as in this case, the government has the authority to regulate the use of the surface and impose conditions on that use…As a result of the Forest Service's discretionary involvement in establishing reasonable conditions and mitigation measures, the Forest Service must consult with the FWS if the action may affect listed species, pursuant to Section 7 of the Endangered Species Act."
>
> U.S. Department of the Interior Office of the Solicitor memorandum to Barb Douglas, from Kate Costenbader dated February 1, 2008, page 2.

When the Forest Service proposed the B-800 well pipeline (under a separate decision memo) they did engage in formal consultation with the FWS. But it appears the original ESA violation from the drilling of the well has yet to be addressed. This must be rectified now.

TWS Response 01: There was no violation of the Endangered Species Act associated with past decisions on Berry Energy's well site or pipeline, as explained below.

Qualified Forest Service biologists prepared a BE for the Berry Energy B-800 well drilling. The BE determined that the activity will have no effect on Cheat Mountain salamander, West Virginia northern flying squirrel, shale barren rock cress and Virginia spirea, and may affect, but are not likely to adversely affect running buffalo clover, small whorled pogonia, Indiana bat and Virginia big-eared bat (Decision Memo, Berry Energy, Inc. Gas Well B-800 Project, signed 11/2/2007 and Biological Evaluation, Monongahela National Forest, Berry Energy, Inc. Gas Well B-800, 11/2/2007). The ESA section 7 process is that formal consultation is not required for determinations of "no effect" or "not likely to adversely affect." The BE was forwarded to the U.S. Fish and Wildlife Service as is normally done as part of informal consultation.

In the case of the Berry Energy B-800 gas pipeline, the BE determined that the activity will have "no effect" on 6 species, "not likely to adversely affect" on 3 species, and "likely to adversely affect" on Indiana bat. This determination was based on the pipeline project's plan to clear trees during the months that Indiana bats are not in their hibernaculum. It is the last determination that required formal consultation with the U.S. Fish and Wildlife Service, as was appropriately completed for the Berry gas pipeline.

TWS Comment 02: Two important factors must be included (in formal consultation). The extent of the Big Springs Cave system is not entirely known or mapped in the area. According to the well report filed with the state of West Virginia, the B-800 well was drilled through three caves: open caves at 92 and 149 feet and a mud-filled cave at 164 feet. Whether these caves included the endangered Indiana bat or other bats is unknown, although the Big Springs Cave system is home to the Indiana bat and the surface area around both the B-800 well and the proposed land application site are home to a known Indiana bat hibernaculum and maternity colony.

Efforts to assess whether there was take of listed species will be complicated by the second factor that must be addressed. In the time between the initial drilling of the B-800 well, the construction of the B-800 well pipeline and the current proposal, a devastating illness known as white-nose syndrome (WNS) has been discovered in West Virginia in this part of the state. Bat mortality, including Indiana bats, is extremely high, which has prompted cave closures wherever the disease has been found. The FWS and bat experts have yet to determine the cause, a cure or a way to definitively stop its spread. The combined effect of the stress and potential mortality cause by WNS must be analyzed together with potential adverse effects from oil and gas activities. The Forest Service must prepare a biological assessment (BA) and enter into formal consultation with the FWS (Fish and Wildlife Service).
The piece-meal approach the Forest Service is taking to permitting Berry Energy development activities doesn't allow the FWS to adequately analyze the potential for take of listed species. The FWS needs to understand the entire likely development scenario in order to assess cumulative impacts and set terms and conditions. This is especially important now that white nose syndrome has been found in area bats; room for additional impacts without adverse effects and resultant take is extremely small.
We believe the Forest Service must prepare a Biological Assessment (BA) and enter into formal consultation with the FWS resulting in their issuance of a Biological Opinion (BO) before any further activities commence on or related to the use of the Berry Energy Gas Well B-800.

TWS Response 02: The proposed land application site is not home to a known Indiana bat hibernaculum and maternity colony. The proposed land application site is located on non-calcareous (does not form caves) conglomeritic sandstone of the Pocono Group geology. It is

both stratigraphically below and lower in elevation than the calcareous, cave-forming rock members of the Greenbrier Group which host the Big Springs Cave and all other area caves. The proposed land application site is at least 6 miles from the Indiana bat maternity colony. As such, the proposed land application will not have an effect on known Indiana bat hibernacula or maternity colony. See also TWS Response 09.

As for WNS, it was discovered in West Virginia in late 2008, after the B-800 well drilling and pipeline. To date, WNS has not been detected in the Big Springs Cave or any other caves within or near the B-800 project area. The Forest Service has currently closed all caves on NFS lands in an attempt to reduce the spread of WNS. Although WNS has had substantial impacts to bat populations in more northern states, particularly New York, it has not been in West Virginia long enough to know what the extent or intensity of effects to bats will be in this state. Although we have considered the potential cumulative effects from WNS, it is important to note that this land application action is not predicted to contribute to any cumulative effects. The BE for this action has determined that proposed activities would have no effect on Indiana bat populations or their habitat.

Because natural gas development is highly conditional, there is no reasonably foreseeable development plan or scenario that we can analyze at this time. For instance, we do not know how much Berry Energy gas development would take place in the future, where the development would take place, or if and when the economic market would support development. For now, however, biological evaluation determinations for past and proposed Berry Energy development actions do not require or support formal consultation with the US Fish and Wildlife Service. (See TWS Responses 05, 06; Ford Response 02.)

TWS Comment 03: The Forest Service appears to be headed for its third decision memo (DM) on Berry Energy oil and gas development activities. To date the Forest Service has cited the following categorical exclusion for each activity associated with the Berry Energy development (drilling of the B-800 well and then separately, the construction of the B-800 pipeline):

> "Approval, modification, or continuation of minor special uses of National Forest System lands that require less than five contiguous acres of land." Cited as FSH 1909.15 Ch 31.2(3).

The biggest impediment to agency use of a CE is that the CE used above no longer exists. In 2008, the Forest Service finalized the move of its NEPA direction to the Code of Federal Regulations at 36 CFR 220. CEs are now at 36 CFR 220.6(e). The only possible CE for use in this case is at 36 CFR 220.6(e)(17). However, we believe the use of this CE would not be appropriate given the overall nature of Berry Energy's development plans.

TWS Response 03: You are correct that the Forest Service recently moved NEPA directives to the Code of Federal Regulations. Thank you for that reminder. The correct citation for the above categorical exclusion is now 36 CFR 220.6(e)(3), and we will use it in our Decision Memo for this project. This CFR exclusion has the same wording as did FSH1909.15 31.2(3). We do

not agree that the only possible CE for use on this project is 36 CFR 220.6(e)(17), which deals with the approval of a Surface Use Plan of Operations for oil and natural gas exploration and initial development activities. We are not approving a Surface Use Plan of Operations with this proposed action. We are deciding whether to continue and modify a minor use on NFS lands that was approved in the Decision Memo for the initial Berry B-800 gas well drilling.

TWS Comment 04: Continued use of DMs (Decision Memos) is disingenuous at best. The Forest Service has made no effort to detail or disclose reasonably foreseeable future actions. In addition, the agency has made no effort to discuss any potential effects, direct, indirect or cumulative in any of the comment letters for these activities, the present one included. All discussion and disclosure of any effects has only occurred in the DM after the decision has been made.
The use of the categorical exclusion and the failure to properly assess the effects on extraordinary circumstances has allowed the agency to inappropriately narrow its assessment of cumulative impacts. There is no cumulative effects analysis presented for public comment and the only effects analysis likely will be limited in scope and only available after the decision. There also isn't likely to be any assessment or disclosure of the cumulative impacts of the overall Berry Energy development plan.

This segmentation of the cumulative impacts analysis improperly ignores what are reasonably foreseeable activities – and impacts – beyond the currently proposed land application of fluids.

TWS Response 04: We believe we have considered known and reasonably foreseeable cumulative effects related to this proposed action, and that we have assessed potential effects on resource conditions that could lead to extraordinary circumstances. Scoping or Opportunity to Comment letters for CEs do not typically include assessments or discussions of effects because there are no Draft EIS or EA documents to accompany them. Instead we describe the proposed action and encourage the public to respond with any issues, concerns, or information that they may have with that action. Your response expressed concerns, which were reviewed by the responsible official, who also reviewed the BE, assessment of extraordinary circumstances, and other pertinent analysis information prior to signing the decision. We have considered and responded to your concerns and issues. These are normal procedures under the National Environmental Policy Act for public involvement with CE projects, although some CE categories do not even require an opportunity for comment. Please also see TWS Responses 05 and 06, and Ford Responses 02 and 03 regarding your concerns about cumulative effects.

TWS Comment 05: While the Forest Service has discretion in determining the scope of a NEPA document, there are situations where an agency must consider several related actions in a single NEPA document – including for Berry Energy development activities in and around the Fernow Experimental Forest: the agency must prepare a single EIS where proposed actions constitute "connected actions," "similar actions," or "cumulative actions" (i.e., have cumulative effects – although note that though overlapping, the duty to prepare a single EIS is separate from

the duty to assess, in the first place, cumulative effects). 40 CFR § 1508.25. Connected actions include those that are "interdependent parts" of a larger action and "depend on the larger action for their justification." 40 CFR § 1508.25(a). One of the primary reasons for NEPA's requirement to evaluate "connected actions" in a single environmental document is "to prevent agencies from minimizing the potential environmental consequences of a proposed action (and thus short-circuiting NEPA review) by segmenting or isolating an individual action that, by itself, may not have a significant environmental impact." Citizens' Comm. to Save Our Canyons v. United States Forest Serv., 297 F.3d 1012, 1028 (10th Cir. 2002).

TWS Response 05: The 40 CFR 1508.25 reference used above applies to the scope of an Environmental Impact Statement (EIS) and what types of actions should be considered when one is doing an EIS. It does not address why one would choose to do an EIS in the first place, which is what the comment implies. Scope (i.e., looking at connected actions) may play a part in the process to help determine if there is potential for significant effects, but ultimately it is the significance of those effects that determines whether or not the NEPA analysis is documented and disclosed under an EIS.

We do not agree that all of the Berry Energy actions that have occurred thus far (drilling, pipeline, additional land application) were reasonably foreseeable as connected actions. Natural gas development is a high-risk, highly speculative, highly conditional business. If exploration is not fruitful, no development occurs. If a well is drilled and no gas is found, there is no need for a pipeline. If all the necessary fracturing occurs during the initial drilling, there is no need for additional fracturing. So, while it is easy to connect these actions after they occur, it would be impossible to confidently say beforehand that one event will reasonably lead to another. We do, however, account for these actions as they occur and we consider their cumulative impacts with each new proposed action. For this land application proposed action, we have once again assessed potential effects (including cumulative effects) to resource conditions that could lead to extraordinary circumstances, which would cause us to document those effects in an EA or EIS. We are not predicting that those known and potential effects will be significant in terms of context or intensity.

TWS Comment 06: In the Fernow Experimental Forest, Berry Energy's planned gasfield development of 8-10 wells with associated pipelines, related infrastructure and land application of hydraulic fracturing fluids are connected; even though the Forest Service has chosen to separate individual APDs, activities associated with individual wells, and associated infrastructure from the analysis, the operators have proposed them as elements of their planned gasfield and all of these are within and impact the Fernow Experimental Forest. At the present rate and pattern, this gasfield could be the subject of dozens of separate decision memos (DMs), without any consideration of connected actions or cumulative effects should the agency have its way. This would clearly violate NEPA.

Additionally, though we know from numerous records that Berry Energy plans 8-10 wells in the area, the Forest Service has provided no comprehensive map showing where these wells and well infrastructure would be located. It is not even clear that the MNF has any idea where this development might occur. This is especially troubling in light of concerns raised by Fernow staff about the effects to ongoing research, some of which has been decades in the making. Continuing this piecemeal approach would be deleterious to this research. Further, the tipping point at which all of these single activities would cumulatively adversely affect research activities and forest resources would never be known or disclosed.

Given this lack of knowledge, neither the public nor the Forest Service knows exactly how the planned gasfield will impact forest resource values. This prevents the agency from considering reasonable management alternatives that provide for development but limit the impacts of such development based on the area's non-mineral values. The Forest Service's segmented approach, as stated, obscures cumulative effects and precludes the consideration and, if necessary, adoption of management alternatives that transcend individual wells and account for the Fernow's important values.

The regulations define "similar" actions as those that "have similarities that provide a basis for evaluating their environmental consequences together, such as common timing or geography." Id. The regulations also provide that agencies ought to analyze such similar actions in a single impact statement when "the best way to assess adequately the combined impacts of similar actions or reasonable alternatives is to treat them in a single impact statement." 40 CFR § 15.08.25. In relation to the gasfield proposed for the Fernow Experimental Forest, this development is all proposed for the same area, with the same general timing – only the Forest Service has tried to separate individual activities, even for the same well, into separate decisions under NEPA.

TWS Response 06: Berry Energy has not submitted to the Forest any operating plans for the gasfield development of 8-10 wells with associated pipelines, related infrastructure and land application of hydraulic fracturing fluids. It would not be unusual for a company such as Berry Energy to develop long-range plans as a tool to allocate resources and attract investors; however, we would consider such plans speculative, given the nature of the gas development industry. As noted above in TWS Response 05, natural gas development is a high-risk, highly speculative, highly conditional business. One successful well does not necessarily lead to another. Dry wells are common on this Forest, averaging about 1 in every 2 attempts in new areas of development.

Consequently, we wait for a proper operating plan or a Notice and Application for a Well Work Permit from the State before we even consider we have a proposed action or try to determine what the connected actions may be. However, if Berry Energy came to us with operating plans for drilling 8 or 10 wells simultaneously, we would consider the potential cumulative effects of those actions, and they could be significant enough to lead us into documenting and disclosing

them under an EIS. We have not received this sort of information yet, and until we do, we have nothing to consider or analyze.

Finally, to infer that the Forest Service has **tried to** separate individual activities for the same well into separate decisions under NEPA is ludicrous. Besides the obvious documentation that we have sequentially responded to individual requests from the permittee, it would be counter-productive for us to intentionally string out our survey, analysis, and related NEPA obligations over three separate projects when it just makes more work for us.

TWS Comment 07: The agency has argued that use of the categorical exclusion is warranted because land application is a routine activity with known effects, and that no extraordinary circumstances exist that will be impacted by the application of hydraulic fracturing fluids. This is incorrect on a number of fronts. Land application of fracking fluids can hardly be said to be a routine activity with known effects on the MNF."

Secondly, the Forest can hardly argue that land application is a routine activity with which they have experience. Were that the case, the previous land application from the B-800 well should not have gone so horribly wrong. It is not clear if the previous pit draining and land application was carried out with the approval of the State Gas Well Inspector. Insufficient carbon may have been used to treat the fracturing fluids before they were applied on the land. An insufficiently sized area was used for the application so concentrations exceeded limits. Regardless, of how they occurred, significant impacts were the result. Had the Forest Service had more experience, staff would have better understood the need for adequate monitoring and oversight of operations and would have issued a permit for application over a far larger area."

The use of this categorical exclusion, "Approval, modification, or continuation of minor special uses of National Forest System lands that require less than five contiguous acres of land", is not appropriate here because the activity cannot be said to be minor when the Forest has so little experience with the activity. Categorical exclusions (CE) must be applied correctly: if the uses approved are not minor, have unknown effects and the particular forest (and decisionmaker) has little or no experience with said special use, then the use of the CE is not appropriate. That is clearly the case here.

Forest Service CEs are supposed to be used for activities with known effects. But the Forest Service cannot claim in this instance to know those effects, because of the experiment proposed on the Fernow. Fernow staff are preparing experiment protocols in order to engage in Forest Service Research branch short and long-term study of the effects of land application of hydraulic fracture fluids on forest resources. The agency cannot have it both ways."

If the effects are known, there is no need for the Research Station experiment and no need to expend limited research dollars in this way. However, if the effects are not known and the experiment would or could provide useful data, then the Forest Service cannot purport to know the effects of this activity and the use of the CE is inappropriate. If this is the case, preparation of an EIS is clearly called for.

TWS Response 07: The Forest Service's choice to categorically exclude the proposed use of land for land application of hydraulic fracturing fluids will be based on it meeting the criteria in 36 CFR 220.6. There is no requirement for the activity to be "routine". Please see TWS Response 04.

Nevertheless, land application of hydraulic fracturing fluids is a routine activity in West Virginia with land application carried out on most, if not nearly all, of the 1500 or so conventional wells (non-horizontal, non-Marcellus) permitted by the state each year (pers. com. David Belcher, West Virginia DEP, Office of Oil and Gas, 9/9/09).

As often as land application is conducted, it can hardly be referred to as an experiment. The planned Forest Service monitoring is a coordinated effort between Fernow and Forest staff to validate data on effects. Because the monitoring has a research component does not mean the land application is experimental.

Monitoring conducted at the first land application site provided an understanding about potential effects of land application (Monongahela National Forest, Monitoring and Evaluation Report For Fiscal Year 2008, September 2009, p 61-63). Discussion with WVDEP Office of Oil and Gas personnel and the findings of a Pennsylvania study (DeWalle and Galeone, 1990) have provided insight on how to avoid adverse effects that might occur during future implementation. These have been taken into account in the project design to use chloride loading criteria for determining the size of the area onto which fluids should be dispersed. Follow-up monitoring in May 2009 of soil samples collected by the Forest Service from the first Berry Energy land application site just under a year after land application, reveal little differences between metals (silver, beryllium, cobalt, chromium, iron, magnesium, nickel, antimony, thallium, and vanadium) between the area receiving land application and the area that did not. Several metals were present at higher levels in the area that did not receive land application (arsenic, barium, cadmium, copper, mercury, lead, selenium, and zinc).

TWS Comment 08: First of all, the Forest does not even know what chemicals or elements will be contained in the fracture fluid and likely will not know until after the application has occurred. They are unlikely to know the chemicals and associated concentrations until after a decision is made and this information will likely not to be disclosed to the public. They are therefore unlikely to be able to adequately assess the impact on flora, fauna and aquatic resources that might come into contact with the applied fluids.

TWS Response 08: The Forest has Material Data Safety Sheets on the materials used and amounts of materials used on the B-800 hydraulic fracturing. Information provided by Berry Energy indicates the same materials will be used, in similar concentrations, except that less acid overall will likely be used because of the nature of the formation being fractured (pers.comm. 9/10/09).

These are standard materials used in hydraulic fracturing of conventional wells (Non-horizontal, non-Marcellus or other tight gas formations). State regulations have allowed the land application of these hydraulic fracturing fluids so long as they meet certain chemical limits since the mid-1980s.

TWS Comment 09: The Forest has repeatedly acknowledged the presence of karst topography on the Fernow. We are concerned with the adverse impacts land application might have on the karst system in the area. Big Springs Cave is located near the eastern side of the project area, but is part of a larger cave system underlying this part of the Forest.

In fact, a Well Operator's Report of Well Work filed with the WV Department of Environmental Protection, Office of Oil and Gas on October 7, 2008, by Berry Energy for the B-800 well, notes on page 3 that during initial drilling and first fracture open caves were encountered at 92 and 149 feet and that a mud filled cave was encountered at 164 feet. Additionally, fresh water was encountered at 395'. This indicates there are likely abundant fractures, caverns and solution cavities existent within this karst structure and that it serves as a conduit for groundwater.

Land application of waste to soils overlaying such obviously rich karst structures creates the potential for seepage into the caves and caverns, thus altering the chemistry of such structures. The alteration of the chemistry could produce changes in the humidity level, which could in turn alter the temperature. Additionally, the air quality could be diminished if such toxic chemicals are introduced into a confined space.

Disturbance of cave habitat, including modification of delicately balanced air flow and temperature regimes has potentially already occurred. Indiana bats, in particular, can only hibernate successfully within a very narrow, specific temperature range, and have been known to abandon hibernacula when structural or other changes to the caves resulted in unsuitable temperatures.

It is our understanding that Berry Energy has asked state oil and gas regulators for a plug to be placed to access a shallower horizon in the current B-800 well. Additional hydraulic fracturing could force fracking fluids into formations that would increase the risk of adverse effects to groundwater resources. It could also result in greater risks of adverse effects on the cave system

and a higher likelihood of take under the ESA. These potential impacts must be analyzed and disclosed under NEPA.

TWS Response 09: The proposed land application site is located on non-calcareous (does not form caves), conglomeritic sandstone of the Pocono Group geology. It is both stratigraphically below and lower in elevation than the calcareous, cave-forming rock members of the Greenbrier Group which host the Big Springs Cave and all other area caves. Land application, therefore, will not result in fluids being placed on soils that overlay karst and will not affect the karst resources on the Fernow.

The commenters suggest that "modification of delicately balanced air flow and temperature regimes has potentially already occurred," presumably with the drilling of the B-800 gas well. Monitoring has not indicated such effects. Although not thoroughly analyzed in fiscal year 2008 monitoring since the temperature and humidity recorders were not retrieved until December 2008, a brief review of the data does not show temperature or humidity anomalies in Big Springs cave associated with the time of gas well drilling. In fact, monitoring of the Indiana bat population in Big Springs Cave in the 2008-2009 hibernating season, the winter after the B-800 well was drilled, found the highest number of Indiana bats hibernating in Big Springs Cave ever noted (Monongahela National Forest, Monitoring and Evaluation Report For Fiscal Year 2008, September 2009, p 55)

Although not part of the Forest Service's decision pertaining to land application, we note that hydraulic fracturing of the "Sycamore grit" is planned for a depth of 6600 feet (State of West Virginia, Department of Environmental Protection, Office of Oil and Gas, Notice and Application for Well Work Permit, API 47-93-00107, dated July 2, 2009). The casings that isolate the well bore from groundwater resources extend to 1289 feet deep, almost 900 feet deeper than any fresh groundwater encountered in the well bore. Therefore, at the deepest freshwater noted – 395 feet – there is steel casing cemented to rock on the outside of the well bore. At the void from 143 - 149 feet deep and the soft shale or mud-filled void indicated in the Well Operator' Report of Well Work, there are two steel casings cemented in place. At the void from 90 – 93 feet, there are three steel casings cemented in place. These casings isolate any hydraulic fracture fluids from voids and groundwater zones, and represent multiple protections to reduce risk of effects to groundwater, the cave system and any biological resources in potentially connected underground voids. They are consistent with West Virginia law which provides for such protection.

Comment and Response, WVDNR letter

WVDNR Comment 01: The West Virginia Division of Natural Resources would like to be sure that the project meets the requirements of state regulations for drilling and fracture fluids set forth by the West Virginia Division of Environmental Protection, Oil and Gas Division.

WVDNR Response 01: The decision for this project will be whether or not to concur with Berry Energy's proposal to use National Forest System land for land application of hydraulic fracture fluids, as shown in the approved State-issued well work permit. The Forest Service relies on WVDEP office of Oil and Gas for administering well work permits it issues, since the Forest Service has no enforcement authority for state regulations.

Comments and responses, G. Monk and M. Schaffnit letter

Monk Comment 01: A feature of fracture flowback is its high chloride concentration, a result of the use of hydrochloric acid in the first phase of fracturing operations. Flowback also can be contaminated by the chemicals used in fracturing or their degraded components, and elements from the fractured formation – generally heavy metals such as barium and lead, and in some cases Naturally Occurring Radioactive Materials (NORM). The treatment program of the General Permit does nothing to eliminate the chloride concentration, assumes hydroxide treatment and settling will deal with heavy metals, and ignores NORM. Chemical analysis required by the state ignores metals of concern such as barium, lead and cadmium.

"Our own testing has shown that concentrations of chloride allowed by the state, at heavy loads, will kill or injure woodland vegetation. The state's General Permit has no consideration of load for chloride so that even a relatively low concentration, if applied on too small an area in too large a volume, will have serious negative effects on the environment. We believe this is the cause of vegetation death in the 2008 Berry Energy landspraying operation at B-800." A further concern is that hydrochloric acid used for fracturing a sandstone or limestone formation will become calcium chloride. Most studies that we're familiar with focus on the biologic effects of sodium chloride, not calcium chloride. It's possible that a high concentration of calcium chloride might have unforeseen negative effects," citing an EPA document titled, *Ambient Water Quality Criteria for Chloride – 1988* (page 2) which states "chlorides of potassium, calcium, and magnesium are generally more acutely toxic to aquatic animals than sodium chloride."

The commenter recommends using loading criteria for chloride rather than just a concentration criteria for landsprayed waste. This would mean that there would be a limitation of the amount of chloride deposited per acre.
The formula would be:

$$\frac{\text{(Barrels of waste) X (chloride concentration in mg/l) X 0.00035}}{\text{(load in pounds)}} = \text{acres}$$

Load limitations found in other locales include 340 lbs/acre in Wisconsin for industrial sludge and 400 kg/ha in Saskatchewan (356 lbs/acre) for landsprayed drill waste.

Arkansas bases their load requirements on the conductivity of the liquid and that would be an alternative option.

Monk Response 01: Implementation of the planned land application will include applying a chloride load not to exceed approximately 0.17 kilograms per square meter (1517 pounds per acre). This load comes from the findings of a study done in central Pennsylvania in 1985-1986 (DeWalle, David R. and Daniel G. Galeone. 1990. One-Time Dormant Season Application of

Gas Well Brine on Forest Land. J. Environ. Qual. 19:288-295.) which concludes that, based on this limited study, "…one-time, dormant season applications of brine at rates of about 0.17 kilograms per square meter would appear feasible…" to avoid impacts on forest vegetation. The study also indicates that overall impact of the application on forest vegetation was small for both 0.69 kilograms per square meter (6155 pounds per acre) and 0.17 kilograms per square meter (1517 pounds per acre). The Pennsylvania study was used because of its similarity to the project area's climate and vegetation.

Monk Comment 02: The commenter suggested that a loading requirement or some other measure should be used for sodium, which often appears in high concentrations in fracture flowback, though monitoring of sodium isn't required under the General Permit. Sodium can have negative effects on soil and vegetation. The chloride load formula found above can be used substituting sodium concentration for chloride. Saskatchewan has a load limitation of 250 kg/ha for drill waste to be landsprayed (223 lbs/acre).

Caustic soda or soda ash should not be used for hydroxide treatment
because their use will elevate the sodium concentration of the liquid waste to be landsprayed.

Monk Response 02: The operator plans to use hydrated lime, not caustic soda or soda ash, to treat the flowback fluids to raise their pH to meet the General Permit requirement.

Planned monitoring of the flowback fluids by the Forest Service prior to land application includes analysis for sodium concentration.

Monk Comment 03: The state doesn't require analysis of heavy metals before or after hydroxide treatment. We believe that laboratory analysis of heavy metals should be made before landspraying. If the total concentration for arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, vanadium and zinc is more than 5 mg/l, then loading requirements should be determined for these metals.

Monk Response 03: Planned monitoring of the flowback fluids by the Forest Service prior to land application includes analyses for total arsenic, cadmium, chromium, copper, lead, mercury, nickel, silver, vanadium and zinc, as well as aluminum, antimony, barium, beryllium, iron, manganese, selenium, strontium, and sodium.

Monk Comment 04: We suggests that Berry Energy's performance under the General Permit at the B-800 well site in 2008 was lacking on two points. For the category 4 pit expedited discharge that they performed, Berry used an inadequate amount of required activated carbon. Their math was seriously off. Instead of the required 417 lbs of activated carbon, Berry used 150 lbs according to the Discharge Monitoring Report Berry Energy filed with the state. Because of this and other reasons we have little reason to trust the information on the Discharge Monitoring Report. The other problem was brought about by the state's General Permit. We believe that

vegetation death caused by the landspraying was not the fault of Berry Energy but of the General Permit. Nonetheless, if and when Berry noticed negative effects on vegetation during landspraying in 2008, they should have stopped landspraying immediately.

Monk Response 04: The commenter's opinion about a previous project is noted. However, the comment is not about the current proposed action.

Monk Comment 05: We recommend that if land application is to take place, that the following requirements be instituted:
1) Prior soil testing of application area before landspraying.
2) A census of numbers and species of plants in a marked portion of the land application area. The census should include numbers of members and species of plants so that after application is completed an effective determination of the effects of application can be made.
3) We believe it would be good decision, before application of flowback fluids, to make a trial application in a much smaller area according to gallons per square feet determined by the loading computations. It might be possible through a trial application to foresee if problems with the land application are likely to occur.
4) If, during application of fluids, the operator or Forest Service determines there is a problem, the application will be halted with the option that fluids be disposed of in another manner than landspraying.
5) After application of fluids, the soil in the application area should be tested to determine the negative effect, if any, of the landspraying.

Monk Response 05: The Forest Service's Fernow Experimental Forest staff plans to monitor the proposed land application area pre and post treatment, including soil testing and vegetation census.

Because the planned land application will occur during the vegetation dormant season, provided the fluid analyses results do not indicate high concentrations of constituents, it is not likely that there would be visible effects to vegetation. As such, a trial application is not practical in this case. Berry Energy has advised that if the fluids testing or other characteristics of the flowback fluid indicate a problem, they will not land apply it.

Monk Comment 06: We have a further concern brought about through our examination of drilled well sites in our area (Putnam and Kanawha Counties). We've observed instances where solid pit waste was inadequately disposed of (the state gives no guidance) resulting in soil cover of only a couple of inches. We believe that the former pit area of B-800 should be off bounds for trucks and other vehicles and that this area of the site would be inappropriate for the location of tanks for fluids.

Monk Response 06: The B-800 buried pit solids are located under the recontoured, revegetated sloping portion of the well site, which is not being used to support production equipment or any

other gas production facilities or uses. The current activity Berry Energy has planned will not impact the previously used drill pit area.

Comments and Responses, Mark Ford Letter

Ford Comment 01: Thanks you for the opportunity to comment on additional hydraulic fracturing of the B-800 gas well located on the Fernow Experimental Forest.

Ford Response 01: The proposed action is not additional hydraulic fracturing of the B-800 gas well, but use of National Forest land for the land application of fluids that would result from that fracturing. The well operator has the legal right to do additional fracturing if needed. The disposal of resulting fluids was the trigger for additional analysis.

Ford Comment 02: Based on: 1) the inappropriate previous use of a Categorical Exclusion (CE) which did not regard the presence of an experimental forest and associated research plots, close proximity of a Congressionally mandated wilderness area, and the presence of a hibernacula and cave system hosting the endangered Indiana bat as extraordinary conditions; 2) the probable violation of the Endangered Species Act sections 7 from lack of NEPA analysis and subsequent required mitigation and sections 9 from puncturing at least two voids (cave channels) in the Karst during drilling; 3) the probable violations of the Clean Water Act associated with ground discharge of the first fracturing attempt along with the post-hoc memo to the B-800 file allowing the trenching of Elklick Branch contradictory to the pipeline plan of boring underneath, I believe a full NEPA analysis and associated Environmental Impact Statement will be necessary before additional hydraulic fracturing of B-800 can occur.

Ford Response 02: We disagree that the use of a CE was inappropriate for this or previous Berry Energy actions in the Fernow. To quote 36 CFR 220.6(2), "The mere presence of one or more resource conditions does not preclude use of a categorical exclusion. It is the existence of a cause-effect relationship between a proposed action and the potential effect on these resource conditions, and if such a relationship exists, the degree of the potential effect of a proposed action on these resource conditions that determine whether extraordinary circumstances exist." The Decision Memos for the Berry Energy actions in the Fernow state that the potential effects on resource conditions would be minor or non-existent and can be categorically excluded from documentation in an EA or EIS.

The analysis for the Biological Evaluation determined that the well-drilling action would "not likely adversely affect" the Indiana bat. No adverse effects to federally listed species were documented during or after well drilling operations. Please see TWS Responses 01 and 09.

No known violations of the Clean Water Act occurred as a result of the well drilling operations, subsequent ground discharge, or the trenching of Elklick Run. All State-required permitting procedures were followed.

We do not agree that an EIS is warranted for this proposed action of land application of fracturing fluids. The rationale for categorically excluding this action from documentation under an EIS will be included in the Decision Memo for this project.

Ford Comment 03: In particular, this re-fracturing represents one of several reasonably foreseen connected events/actions (i.e., well and discharge acreage and pipeline) that added together also would have precluded the use of the Categorical Exclusion(s) for the well and for the pipeline and certainly now precludes any use of that planning tool for this action.

Ford Response 03: We do not agree that all of the events/actions referenced above were reasonably foreseeable. Natural gas development is a high-risk, highly conditional action. If exploration is not fruitful, no development occurs. If a well is drilled and no gas is found, there is no need for a pipeline. If all the necessary fracturing occurs during the initial drilling, there is no need for additional fracturing. So, while it is easy to connect these actions after they occur, it is virtually impossible to say with confidence beforehand that one event will reasonably lead to another. We do, however, account for these actions as they occur and we consider their cumulative impacts with each new proposed action. For this proposed action, we have once again assessed potential effects (including cumulative effects) to resource conditions that could lead to extraordinary circumstances, which would cause us to document those effects in an EA or EIS. We are not predicting that those known and potential effects will be significant in terms of context or intensity. See also Ford Response 05, below.

Ford Comment 04: Analyses for this additional hydraulic fracturing and associated land application must determine if any relevant federal statutes apply. Indicating that the mineral rights are severed from public ownership and that the USDA Forest Service therefore has little control over these matters and/or that West Virginia statutes and regulations only apply with no deference to federal authority is a legal fiction. Continually saying that does not make it so. Moreover, that notion wholly was dismissed by USDI Solicitors in early 2008 in direction given to the USDI Fish and Wildlife Service West Virginia field office and by USDA Office of General Council in fall of 2008 to USDA Forest Service employees, including yourself, at a meeting in Milwaukee to discuss oil and gas issues.

Ford Response 04: This action's compliance with applicable federal statutes will be documented in the Decision Memo for this project. It is not fictional to say that the private mineral rights Berry Energy is exercising were severed from public ownership, and that situation puts more constraints on federal regulatory control than if the rights were owned by the federal government.

Ford Comment 05: Analyses for this additional hydraulic fracturing and associated land application must determine what the possible extent of vegetation damage will occur from land application of these waste fluids. Under- and overstory mortality of woody vegetation from the first application of B-800 wastes was significant. Because this is now a reasonably foreseen

result, I believe analyses determining impacts to the biota and disclosure of the chemical constituency of the fluids will be required.

Ford Response 05: The first application of B-800 pit fluids was coordinated with the Fernow staff and completed using State-approved procedures and parameters for fluid application. Although the first application resulted in the mortality of a few dozen trees over approximately ½ acre, these effects were not considered "significant" in the context of the project. For our 1991 and 2006 Forest-wide analyses of potential disturbance created by mineral development projects, we calculated that the average land disturbed or converted to another use by a gas development operation would be around 15 acres. Thus far, the Berry Energy B-800 well-drilling, access road, pipeline, and first land application site have disturbed an estimated 10 acres, or about a third less than predicted for the average operation.

Potential effects to woody vegetation from land application are being considered for this land application proposed action, and we are applying lessons learned from the previous application to help ensure that woody vegetation mortality does not occur again. Less fluid would be applied over a much greater area, in part to validate a study that was done in Pennsylvania (DeWalle and Galeone 1990) under similar circumstances with no major effects. Thus, we do not agree that woody vegetation mortality is a reasonably foreseeable result of this proposed action. Indeed, we predict that the much lower rate of application with this action will result in no tree mortality and will not contribute to past cumulative effects from Berry Energy activities in this area. The total physical disturbance from all of these activities should remain at approximately 10 acres.

Ford Comment 6: Analyses for this additional hydraulic fracturing and associated land application must determine what the potential impacts could occur to wildlife as a result of being exposed to a fluid retention pit with caustic, high-pH, high sodium content. What will be the impact to woodland salamanders (Family: Plethodontidae)? Is there any chance that the fluid retention pit will serve as an attractant to foraging endangered Indiana bats? Although the probability might be low, the consequence, if that were to occur, would be considerable and therefore must be analyzed. Under the auspices of the Migratory Bird Treaty Act, what measures will be use to prevent the fluid retention pit from becoming a possible mortality agent for avifauna? As I recall, no precautions were taken for the first fluid retention pond, although the Monongahela National Forest pre-action claimed it would do so.

Ford Response 06: A biological evaluation was completed for this project. Speak to threatened or sensitive salamander species using findings in Terry's BE.

Other woodland salamanders may be adversely affected by land application within the 3-acre area. The decision maker considered this and other resource condition information in determining whether extraordinary circumstances related to a proposed action warrant further analysis and documentation in an Environmental Assessment or Environmental Impact Statement (36 CFR 220.6(b).

The flowback fluids from hydraulic fracturing will be directed to closed tanks. A small plastic-lined pit is planned on the existing working area (flat portion) of the B-800 well pad for the purpose of collecting and retaining fluids or other materials that may be released from equipment, or from making connections during the hydraulic fracturing. This pit is not expected to be present with quantities or for a long enough time to attract wildlife.

No adverse effects to wildlife species were observed from the original fluid retention pit. That pit has since been covered and reclaimed. There would be no similar fluid retention pit for this proposed action. As explained in the paragraph above, fracturing fluids would be retained in closed tanks on site until land application.

Other comments in this letter were found to be non-substantive because they were either repetitive, beyond the scope of this project, or unsubstantiated opinion.