Office of Oil and Gas
Diversified Gas & Oil Plugging Variance
Response to Comments

Dave McMahon (WVSORO)

1. Our interest and questions in assuring the variance decision are based on science, geology and engineering is heightened when we see that such a technical matter is the subject of a meeting of attendees listed on page 3 of the Diversified power point not just with the staff of the Office of Oil and Gas, but also with the Secretary. It is further heightened when the meeting is attended not just with Diversified's Production & Plugging Director, but also with General Counsel, COO, plus an industry expert consultant who was formerly head of IOGA and WVONGA and appointed by the Governor to the Oil and Gas Conservation Commission as the "public" member, and in addition a government affairs consultant.

DEP Response: This comment is outside the scope of the variance notice.

2. We agree with Steve Jobs as quoted in the Diversified power point about innovation. Our experience with the industry has been more about shortcuts to save money and turning blind eyes to consequences distant in time.

DEP Response: This comment is outside the scope of the variance notice.

3. If in fact the variance is granted, and if in fact it makes plugging cheaper, then the existing plugging enforcement agreement between Diversified and D.E.P. should be adjusted so that the same amount of money that would have been required to plug the number of wells in that agreement is used to plug a larger number of wells for the same money. Even at that, Diversified's disclosure to its investors have shown that after 15 years its wells will be at the end of their economic lives – meaning there will not be enough money to plug thousands and thousands of wells it has purchased and placed under West Virginia's wholly inadequate blanket bonds.

DEP Response: This comment is outside the scope of the variance notice.

4. The current plugging requirements which are based on engineering, geology and science, when followed, we know from long experience are working when followed. Any testing in the days of, or in the weeks or months immediately after, the plugging occurs does not mean that the proposal's modifications will stand the test of time over say 30, 50 or 100 years. And if they do not, then the well would need re-drilled and re-plugged by an operator that has disclosed that its then current wells will not be economic for more than 15 years which gives rise to the serious question whether it will be around then to fix the problem.

DEP Response: The proposed methodology anticipates that cement will be placed at well depths compliant with the current regulations but just through perforations in pipe to be left, as opposed to open holes (after pipe removed).

5. When we first saw the notice we assumed that plugging while leaving casing in the hole would be done by perforating at the bottom and then circulating cement down the inside of the casing left in place and filling it with cement as well as circulating cement back up the annulus between the casing and the outside wall of the well bore (or cemented in casing) to the surface. We could have given that serious consideration, though some concerns would have remained. But instead the proposal appears to be squeezing cement through only two or three perforations only at the level of cement plugs which is a much trickier and unreliable process.

DEP Response: The perforations must be established in a manner that will allow for fluid movement and plugs to be set at the appropriate depths. The plugs will be tagged to ensure they are at those depths.

6. We disagree with the illustrations in the power point presentation that shows that modern wells have their production casing cemented to the surface. In our experience of viewing casing plans, the surface casing is cemented to the surface by circulating cement, and the coal/intermediate string may be cemented to the surface the same way, but the production string (not referring to any production tubing) is only cemented-in at and above the production formation. And we have seen instances of gas being produced up that annulus to the surface – perhaps from leaks at the production cement level or from production from shallower un-cased formations. So it is understandable to cement the plug between the casing newly proposed to be left in the well and casing that has already been cemented in, but we do not regard it predictably safe to not pull any of the un-cemented production casing. And the proposal seems to indicate that Diversified wants to even leave the inner production tubing in the well! At the very least there needs to be a cement plug entirely across the hole (without interruption from any un-cemented casing left in the hole), and this needs to start well below the bottom of the last cemented casing. We know this is needed because of the not infrequent instances of drillers who originally drilled the well and did not do the cementing/casing properly. In particular drillers were know to not wait long enough for the cement to harden before continuing drilling. Other problems with the cementing of surface etc. casing could have occurred when large volume of water flowed in during cementing causing, for example, surface casing cement honeycombing etc. during drilling. So it is vital to have wall to wall cement below lowest cemented casing. That means pulling all the casing above that point. Having said that we still believe for other reasons set out herein that all un-cemented casing should be pulled.

DEP Response: The overarching premise with respect to this variance methodology is that the production casing is not cemented to the surface and that instead of pulling the uncemented casing, it would be perforated at the depths for which cement plugs are to be set and left in the hole. The illustration in the PowerPoint presentation for the modern wells shows cement outside the production casing from the well's total depth to a depth inside the next outer casing string, placed there during the construction phase. From there to the surface the casing is uncemented during the construction phase and during the plugging process that section of the casing has gel

and cement placed behind it to the surface. Further, tubing will not be left in the well and "bottom hole" plugs will be set as required inside the cemented portion of the production casing.

7. We do not know a good way to test as plugging occurs whether cement in the annulus is in the right place etc. without running logging tools down the inside of the casing; and from the illustrations it appears that plugging cement will also be left to harden inside the casing as the cement is squeezed into the annulus through perforations. That would make logging not possible. (And where Diversified proposes to leave the tubing in, is the cement pushed down the tubing and through perforations into the inside of the production casing and then through further perforations into the annulus? Or is the cement proposed to be pushed down the inside of the casing with perforation into the tubing and into the outside annuus? Either of those seem to more than double potential trouble. Certainly they do not propose to leave the inside of the tubing open? None of that seem practical/reliable.)

The only other test is to "tag" the cement plugs between the bentonite materials by lowering some kind of weighted tool until it seems it has hit the top of the cement plug at the appropriate planned depth. That is a very limited test. And the odds are not good of successfully lowering a weight only down an annulus between the casing and the earth, a matter of an inch or two wide, and hundreds of feet deep, far enough without being blocked by a small cave in or protrusion. So an early blockage during lowering will be dismissed as caused by such a problem, and the test to the top of the cement plug will not be successful.

DEP Response: Tubing will not be left in the well. Tagging of the plugs will be conducted by lowering tubing or a wireline tool inside the production casing and observing at what depth the weight is removed from the rig equipment, indicating that the tubing or tool has encountered the cement plug.

8. We did not have the resources, particularly at this time of year, to review the aspects and locations of the 10 wells proposed. Will part of the testing be testing nearby water uses and springs etc? There would seem to be a tension between selecting wells where there are nearby groundwater uses and springs so some level of testing can be done using those and the value of the damage to the groundwater use should the experiment not go well. Putting them where there is no nearby or down dip ground water uses would not seem to be a valid test, except for maybe the first one or three.

DEP Response: To the extent that the well to be plugged proposes a threat to ground water, that threat currently exists. The plugging itself does not create that threat. If the well is a "modern" well, the surface casing has been cemented to the surface during the construction. If the well is a "nonmodern" well, the surface casing has not necessarily been cemented to the surface but in those cases, the uncemented production casing will be pulled and cement plugs will be set at the appropriate depths.

9. All steel exposed to water and oxygen will rust eventually. It seems that the proposal will leave a string of steel casing and perhaps even production tubing from the production formation, up through other formations including formations with gas and water, to the surface/groundwater level. When the casing finally goes to rust, it would seem that it would leave porosity at least equal to sandstone or limestone that could allow gas to make its way up to shallower formations

including water tables. Again we consider the unreliability of early casing and cementing enforcement, and the fact that only a perfect job would leave the casing unexposed from top to bottom. And there are lots of down hole imperfections.

DEP Response: Under the proposed plugging methodology, the well will be filled with cement and bentonite gel meaning the casing will be "encased" in one or the other depending on the depth. Cement and gel are the materials currently used in well plugging.

10. We question, and this really is a question, whether it is cheaper to do a good job of what is proposed rather than a good job of current regulation. Does it save money on the size and power of the rig to pull the old casing, but require more powerful cement pumps etc. and then there is the cost of proper testing.

DEP Response: This comment is outside the scope of the variance notice.

11. We doubt that the increased traffic of trucking out and recycling the pulled casing is that much more of a burden on surface owners etc. if the road is properly prepared and reclaimed unless these operations are occurring 24/7, which has not been our experience with plugging.

DEP Response: This variance is fundamentally related to the plugging methodology itself as opposed to the amount of truck traffic accessing the site.

12. We reject that the Office of Oil and Gas has an inspector available to adequately oversee this proposal as set out in the power point. Right now there is one oil and gas inspector for every 7000 existing wells. If this is going to happen Diversified needs to find a way to fund an additional inspector, and make it an inspector that will not fear losing a job if h\that inspector finds problems or the funding runs out.

DEP Response: The Office of Oil and Gas will adjust staffing coverage as necessary to provide oversight on this project.

Angie Rosser (West Virginia Rivers Coalition)

1. How long will the pilot project be monitored to show its effectiveness? We request long term monitoring be incorporated into the pilot project.

DEP Response: As contained in the pilot program order, included with this response, wells in the program will be monitored for leaks for a period of no less than 12 months. Additionally, program wells will remain on the bond of the company for a period of no less than 3 years from the completion of the work.

2. Who will be responsible for fixing the problem if the plugging technique is not effective in 50 years? We request bonding be put in place to make sure Diversified isn't able to walk away from a faulty plugging.

DEP Response: The determination of responsible party will be addressed consistent with the applicable law just as it is currently. As previously mentioned, program wells will remain on the bond of the company for a period of no less than 3 years from the completion of the work.

3. We question the effectiveness of this process and request an independent third-party expert on well plugging be consulted on its effectiveness to keep the well plugged long-term.

DEP Response: This is a pilot program which will be properly evaluated regarding the effectiveness of the proposed methodology.

4. It is unclear from the proposal whether impacts to groundwater resources have been considered. Are there private drinking water wells within the vicinity of the ten test wells? We request monitoring of private drinking water wells within a one-mile radius of the well to be plugged in the pilot project.

DEP Response: To the extent that the well to be plugged proposes a threat to ground water, that threat currently exists. The plugging itself does not create that threat. If the well is a "modern" well, the surface casing has been cemented to the surface during the construction. If the well is a "nonmodern" well, the surface casing has not necessarily been cemented to the surface but in those cases, the uncemented production casing will be pulled and cement plugs will be set at the appropriate depths.

5. What is the projected life-span of the well plugs? Leaving the steel casing in the well makes it subjected to rust and corrosion. We request more information on the long-term consequences of leaving the casing in the ground.

DEP Response: Under the proposed plugging methodology, the well will be filled with cement and bentonite gel meaning the casing will be "encased" in one or the other depending on the depth. Cement and gel are the materials currently used in well plugging. Cement will be required to be placed at appropriate depths both inside and outside of the casing to isolate fluid bearing formations.

6. While this procedure might save money for the company in the short term, who will be responsible in the long term if the pilot project fails. It will cost to company more money in the end to have to plug the well a second time. Or the company will file for bankruptcy and the burden to correct the failed project will fall on the taxpayers.

DEP Response: Safeguards currently exist in the pilot program requirements to better ensure the success of the plugging. It is to the detriment of all parties if the plugging is unsuccessful. If methodologies can be developed that provide for successful plugging at lower costs, more wells can be plugged. Certainly, getting more wells plugged is a positive for the State, but the plugging must result in proper zonal isolation.

7. Does the Office of Oil and Gas have adequate resources to provide oversight on this pilot project? What is the inspection frequency of this pilot project? The proposal states that one inspector will be dedicated to all phases of the pilot project. The DEP Office of Oil and Gas is already understaffed. Will that inspector be pulled away from other duties or will an additional inspector be hired to focus solely on overseeing this pilot project?

DEP Response: The Office of Oil and Gas will adjust staffing coverage as necessary to provide sufficient oversight of this project.

In conclusion, there is insufficient information to ensure the nearby residents and environment is adequately protected in this pilot project; nor is there any reassurance that the procedure is effective long-term.

DEP Response: The proposed methodology contains procedures and safeguards to minimize the likelihood of detrimental impacts and upon completion will be evaluated as to its effectiveness toward compliance with accepted and necessary plugging standards.

Danny Cook (Office of Miners' Health, Safety and Training)

1. The possibility that plugged wells containing voids could allow for gas migration into active mine workings especially when mining in close proximity of the wells.

DEP Response: It continues to be the intent of DEP that well construction and well plugging be conducted in a manner that does not jeopardize the safety of mining operations. The proposed methodology requires plugs to be set at depths consistent with the current requirements which are in place to provide for zonal isolation and prevent fluid/gas migration.

2. The possibility that wells plugged with all casings cemented in the well may not qualify for mine through reducing mineable coal reserves. These wells could not be reentered to plug according to MSHA 101-C Petition standards.

DEP Response: Existing well construction requirements in the statute mandate both surface (fresh water) and coal protection casing be cemented to the surface. Additionally, the variance, if approved, will not restrict coal entities regarding any rights they may currently possess under WV oil and gas statute or rule related to well plugging methodology.