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4 February 2016

Citizens Advisory Council  
c/o Katherine Hetherington Cunfer, Acting Executive Director  
P.O. Box 8459  
Harrisburg, PA 17105-8459

**In re: Comments on "Assessment of the Effects of Subsidence (Act 54) Report 2008-2013", an Internal Workgroup Review of the 4th Act 54 Report**

Dear CAC Members:

This letter provides comments on the above-referenced assessment dated 16 November 2015. That report was prepared by an internal workgroup in the Department and recently was shared with the Citizens Advisory Council, which posted it on its website.

These comments have been prepared by me as a public service and not on behalf of any client or interest group. My comments are based on my more than 30 years as a private-sector environmental consultant who has been closely involved with the Department's environmental and mining regulatory programs and policies on behalf of permit applicants, appellants, environmental protection groups, and the Department itself (see list of selected reports and comment letters in Attachment 1). In particular, I have read and reviewed each of the Act 54 reports prepared to date.

In accordance with Section 18.1 of Act 54, the Department is responsible for preparing a report every five years to determine the effects of underground coal mining subsidence on surface structures and features and on water resources. Although the Department utilized the services of the University of Pittsburgh (Pitt) to prepare the \$600,000 *4th Act 54 Report* on its behalf, at the end of the day it is the Department's report and it must represent the Department's views.

The subject Workgroup assessment takes issue with, and even disputes in part, some of the findings and recommendations of the Department's *4th Act 54 Report*. Yet the Department and University researchers held regular meetings throughout the course of the preparation of the *4th Act 54 Report*<sup>1</sup>. Thus, there was ample opportunity to correct misperceptions about the regulatory process and the operations of the Mining Program. A near-final draft of its product was provided to the Department by the University in May 2014, more than 6 months before it was released to the public. The

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<sup>1</sup> Following the public release of the *4th Act 54 Report*, Schmid & Company submitted a Right to Know Law (RTKL) request to the Department seeking a copy of all records and data associated with the preparation and compilation of the *4th Act 54 Report*. We received some, but not all, of the records we had requested.

issues and clarifications raised in the subject Workgroup assessment are matters that should have been addressed by the Department and incorporated into the final document, not matters to be brought up one year later. This suggests that the *4th Act 54 Report* may not yet be finished.

The Workgroup assessment repeats or summarizes many of the recommendations already provided in the *Act 54 Report*, along with some comments raised by members of the public. Workgroup "recommendations" are vague and weakly worded, and they lack any timeframe commitments for follow-through. The Workgroup's stated objective is to eventually develop and implement some ill-defined "work plan", to be implemented by the Department and then assessed in the next Act 54 Report. However, since we already are halfway through the 5th Act 54 assessment period, it is virtually impossible that any meaningful evaluation of an as-yet unwritten work plan could be completed for the 5th Act 54 Assessment.

My comments below generally follow the order in which matters are raised in the Workgroup assessment.

## **Pg 2 - Key recommendations**

The list of "key recommendations" is missing at least one very important item that was mentioned in numerous comments on the *4th Act 54 Report*:

- The Department and/or the mining industry need to develop a model to accurately predict stream *flow loss* impacts (similar to the model being used to predict stream *pooling* impacts)

For many years Chapter 89.35 has stated that, for every underground mining operation:

*"the operation plan shall include a prediction of the probable hydrological consequences of the proposed underground mining activities upon the quantity and quality of groundwater and surface water within the proposed permit [area], adjacent [areas] and general areas under seasonal flow conditions..."*

Despite this clear regulatory requirement, such predictions are not being done for the longwall mines that are destroying water resources in the Commonwealth.

## **Pg 3 - Objective**

The objective of this Workgroup assessment is stated thus:

**This [Workgroup] report will be reviewed by DEP executive management to consider and provide guidance on development and implementation of a work plan. The next [5-year] report will include an assessment on the extent to which DEP followed through on the work plan.**

That is simply unacceptable. A Work Plan should have been developed already (the *4th Act 54 Report* was released more than a year ago), but since it was not, it must be developed ASAP. What's needed are specific timeframes set out for accomplishing specific tasks. Plus, there needs to be an active, ongoing evaluation of progress --- the CAC should ask the Department to report back on its progress with every specific Work Plan task every 2 or 3 months (at minimum) and update the Work Plan accordingly.

## **Pg 7 - Report issues**

The Workgroup identified 95 issues which it grouped into 7 general themes, and makes 45 recommendations. The 95 issues are presented in a quasi-comment/response format, but clearly it does not constitute a typical comment/response document. Instead, the Workgroup **combined and summarized** some of the comments and recommendations into its own list of "issues", and **ignored** others, including some from the CAC. A Comment/Response document such as the Department typically prepares for proposed regulatory changes actually would have been much more useful.

## **Pg 8 - Wetlands**

The Workgroup states that according to the *4th Act 54 Report* "*DEP allows use of a grouping method for small wetlands*". It fails to note that the *4th Act 54 Report* characterized that method as "*seemingly random*". The Workgroup also recommends the use of multiple delineations of wetlands during the initial (presumably, premining) assessment in order to account for possible seasonal changes.

Both of those statements reflect an apparent ignorance of wetland delineation methods and processes. Neither grouping of wetlands nor multiple delineations is necessary or appropriate. The *4th Act 54 Report* is correct, unfortunately, in stating that "**The analysis and reporting on underground mining effects on wetlands is still in its infancy.**" This is a disgraceful situation some 20+ years after Act 54 was enacted, and reflects poorly on the low priority that the Mining Program places on wetland protection.

The Workgroup response to Issue #9 (page 24) in part reads:

**"The DEP is willing to consider input that would improve the [wetland] delineation and evaluation process."**

The Department must go beyond "considering" this matter. As a private consulting ecologist, I have been involved in wetland assessments and delineations for 3+ decades, and for many years now I have tried to offer the Department practical input on how to better protect wetlands in the context of underground coal mining. Accurate wetland delineation simply requires competent wetland delineators and common sense. Wetland delineations can be done accurately any time of year as

long as the ground is not covered with snow or ice. Competent wetland delineators take seasonal differences in wetness into account. The Corps of Engineers has an established, straightforward, no-fee process/procedure for checking the accuracy of wetland delineations for federal and State purposes. That process (known as a "Jurisdictional Determination", or JD) is widely used in conjunction with other types of development projects throughout Pennsylvania. There is no excuse for not taking advantage of the Corps JD process in conjunction with mining projects, especially since Department personnel lack the time and expertise to undertake formal review of wetland delineations.

### **Pg 11 - Use of best available science**

The Workgroup states:

**"The streams policy should be reviewed to assure it is up-to-date regarding the best science available..."**

This is an excellent suggestion. As pointed out in comments I prepared on behalf of the Citizens Coal Council<sup>2</sup>, **all** models and assumptions (the Peng model for pooling, the 35-degree angle of draw/RPZ, the 3 year allowance to determine whether a stream can recover naturally or must be repaired, whether longwall damage is predictable, whether planned longwall subsidence damage is preferable to unplanned subsidence damage, whether longwall damage is/can be controlled, etc.) should be reviewed, updated, and tested to ascertain if they are scientifically valid in light of current/modern longwall mining practices and the ever-increasing damage to water resources that is being documented in the coalfields. [See also RPZ discussion below.]

### **Pgs 8 and 12 - BUMIS**

On page 12, the Workgroup *clarifies* that the main GIS mining database known as BUMIS only contains information about *impacted* features, not about *all features* at risk from undermining. This apparently was a significant misunderstanding on Pitt's part, not only during this most recent assessment but during the 3rd Act 54 assessment which the University of Pittsburgh also assisted in preparing. Because the information in BUMIS is crucial to the Act 54 reviews, this fact is something the Department should have straightened out long before now. Why was Pitt unclear on that fundamental fact --- shouldn't the Department have become aware of this misunderstanding as it reviewed drafts of its Report?

This limitation in BUMIS must be changed. There is almost universal agreement that BUMIS needs to be improved, upgraded, or replaced. Clearly the Department should

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<sup>2</sup> Schmid and Company, Inc. 2015. Undermining the public trust: a review and analysis of PADEP's fourth Act 54 five-year assessment report. (Prepared for Citizens Coal Council.) Media PA. 65 p.  
[http://schmidco.com/Mar\\_2015\\_Undermining\\_the\\_Public\\_Trust.pdf](http://schmidco.com/Mar_2015_Undermining_the_Public_Trust.pdf)

be tracking all features at risk. The Workgroup says that to replace BUMIS "*would be a major undertaking involving years of planning and considerable cost*". But Pitt actually did create a new GIS database during preparation of the *3rd Act 54 Report*. Why was that GIS database not subsequently used by the Department or even by the University during the 4th Act 54 assessment? For some reason Pitt needed to create an entirely new GIS system during the 4th Act 54 assessment period. According to the Report (page II-2):

**"A major part of the Act 54 reporting work involved the construction of the [new] Act54GIS. Much effort was spent collecting available data, transforming and combining the data into user-friendly products for analysis, and updating the database as new spatial data became available."**

Two separate Act 54 GIS databases now have been created by Pitt at great expense to the Commonwealth, yet the Workgroup assessment never mentions them. Why can't the ACT54GIS database be used instead of, or as a way to improve upon or update, BUMIS? Why is the Act54GIS database not available to the public?<sup>3</sup>

### **Pg 13 - Stream impacts**

The Workgroup states:

**"We do not have the true value of affected stream length as a proportion of the total stream length."**

- Why not? The length of an affected stream is an important fact if the Department hopes to understand what is happening to streams, where, and under what conditions, and to properly evaluate if the damaged stream has been fully restored.

The Workgroup states:

**"The DEP can provide a more specific answer to the impact of underground mining on streams in the future."**

One certainly hopes so. But *when* exactly, and why should we have to wait any longer? The Department has produced four Act 54 Reports now, and yet the Department still has no clear understanding of the extent of damage to streams and other natural features like wetlands and groundwater. The Department needs to provide a specific action item and timetable for doing this. Longwall mine permittees are compiling at great expense detailed information on streamflow for every undermined stream. The Department should require that all stream monitoring data collected by mine operators in accordance with their permits be provided in some meaningful format to the Department.

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<sup>3</sup> In our Right To Know Law request to the Department (see footnote 1) we specifically requested a copy of the ACT54GIS database, or at least access to it. We did not receive it. Instead, we received an Excel file containing a "data dump" from BUMIS as of a specific date in time.

## Pg 14 - Irreparably damaged streams

The Workgroup states:

**"Considering the huge extent of underground mining in Pennsylvania at this time, irreparably damaged streams are the exception, with just five cases demonstrated in this Report."**

This statement is hopelessly and cynically misleading.

First, the *4th Act 54 Report* (see Table VIII-3) documented that there were 6 cases (not 5) of streams determined by the Department to have been irreparably damaged during the 4th 5-year period.

Second, those 6 determinations were made during December 2012, almost 5 years exactly after TGD 563-2000-655 became fully effective (Oct. 2007). That timing is important because that TGD, for the first time, had set a timetable of 5 years for how long operators could try everything "technologically and economically feasible" before a stream would be declared irreparably damaged. So in effect, those 6 streams potentially are just the leading edge of a wave of similar outcomes which existing monitoring information will allow to be assessed in the future.

Third, information in the *4th Act 54 Report* (details below) point to many more stream damages than just those six:

- Table VIII-1 lists the current status of the 55 stream segments where unpredicted impacts occurred during the 3<sup>rd</sup> Assessment period (all by longwall mining).

- Of the original 55, only 3 streams either had recovered on their own (2) or were repaired (1) as of the end of the 4<sup>th</sup> Assessment period.

- The final status of 35 cases from the 3<sup>rd</sup> Assessment period is listed simply as "resolved", which does **not** mean the stream damage was repaired or restored. Those damage cases typically were *resolved* on the basis of some written agreement between the landowner and the mine operator (which likely is subject to nondisclosure restrictions and probably involved no actual stream restoration at all). Indeed, at least 1 of the irreparably-damaged streams was classified as "resolved" because its status was "final" --- nothing can fix it, even though some mitigation elsewhere still was to be required for its loss.

- As a proxy for stream impacts during the 4<sup>th</sup> Assessment period, the Pitt reported the number and types of ongoing restoration efforts:

- 95 streams had augmentation installed (for flow loss impacts), 74 of them were active

- 57 streams received grouting (for flow loss impacts),

- 28 streams received gate cuts (for pooling impacts)

- 3 streams had liners installed (a last-ditch effort for a stream damaged by flow loss)

- Most streams undermined during the 4th Act 54 assessment period required some type of restoration efforts (even if not for its entire length).

Fourth, **all** stream damages reported in the 3<sup>rd</sup> and 4<sup>th</sup> Assessment reports were associated with longwall mining --- none with room-and-pillar or retreat mining. For the

Workgroup to say that 5 or 6 irreparably-damaged streams is a small proportion considering all of the "*underground mining in Pennsylvania*" is to deliberately misrepresent the actual problem --- which is that all of the stream damages have been due to a handful of longwall mines in two counties in southwestern Pennsylvania.

## **Pg 15 - Longwall mining**

The Workgroup states:

**"The citizens have asserted that the process of longwall mining causes material damage. The existing laws and regulations allow for full extraction (including longwall mining). The DEP has no legal means to prohibit it ..."**

First, the fact that recorded stream damages are almost exclusively associated with subsidence from longwall mines (and not with the much more numerous room-and-pillar mines) is not based solely on citizens' assertions --- it is based on the data presented in all four of the Department's Act 54 Reports prepared to date.

Second, there is no need for the Department to *prohibit* longwall mining or any specific mining process. Yes, the existing laws allow for full extraction mining, but there also are existing laws and regulations in place to protect streams and their uses. Act 54 clearly states that it does not supersede the Clean Streams Law and other environmental protection laws, and those laws do not allow for irreparable stream damages. Such damage to streams also is contrary to Article 1, Section 27 of the Pennsylvania Constitution. What needs to be prevented or prohibited, however, is not the mining process, but the damage. Mine operators should be allowed to use any process they want to extract as much coal as possible as long as it is done in a way that does not damage streams.

The Workgroup states:

**"Longwall mining must be planned in such a way so as to prevent subsidence damage to aquifers and perennial streams."**

That *sounds* good, but unfortunately it is easier said than done, and because of that it is **not happening**. Instead, stream damages continue to occur, and in recent years some have been found to be irreparable.

One widely expressed misperception is that longwall mining involves "planned subsidence" which somehow is better or less damaging than "unplanned subsidence". Twenty years of Department-compiled data demonstrates that the premeditated subsidence of modern longwall mines is very damaging indeed. On the other hand, the Department's Act 54 reports show that properly designed room-and-pillar mines only rarely are associated with either subsidence or stream damage. The ever-increasing balance in the Department's Coal and Clay Mine Subsidence Insurance Fund (currently about \$100 million) is a testament to the paucity of claims being paid out for subsidence damage from abandoned underground coal mines.

Changes must be made (either to the TGD, or preferably to the regulations, or even to the law itself) to ensure that subsidence damage to aquifers and to *all* streams (not just perennial ones) is prevented, and that when it does occur, the mine operator is held responsible.

The Workgroup states:

**PADEP can "deny a permit ... if the DEP determines that the activity will cause severe, irreparable damage to the stream."**

Again, that *sounds* good, and theoretically it may be true. Unfortunately, there is no accurate model of method being used to predict when or where there will be severe, irreparable damage to a stream, and so permits are routinely issued. And then when severe, irreparable, unpredicted damage **does** occur to a stream, there is no consequence for the mine operator because there was no way to predict it.

The Department needs either to

- require accurate predictions of where severe irreparable stream damage will occur, or
- stop issuing permits to mine operators who caused unpredicted stream damage, at least until the stream(s) have been successfully restored to their premining flow and biological condition.

## **Pg 17 - Rebuttable Presumption Zone (RPZ)**

The Workgroup states:

**"While there are anomalies that can occur outside these boundaries, the workgroup considers the current guidelines as reasonable and scientifically valid."**

The *4th Act 54 Report* found that 25% of the impacted water supplies documented as having been damaged by mining were located outside the 35-degree RPZ --- one in four represents much more than "anomalies". Furthermore, impacted water supplies were found to be located as far as 85 degrees outside, more than double the RPZ. The Workgroup provides no support for its speculative "consideration" which flies in the face of the data presented in the Department's Act 54 reports. Whether or not the 35-degree RPZ might have been "*reasonable and scientifically valid*" when it first was proposed 25 or 30 years ago, there clearly is a need to verify whether it remains so today under current longwall mining technology which is significantly larger in scale than it was then.



## **Pg 20 - Data to assess stream impacts**

Workgroup recommendation #21 is:

**"Determine what data is needed to best assess streams potentially affected by mining. Produce a public explanation of the determination. Does frequency and reporting of stream flow data need to be revised?"**

This is the sort of vague recommendation that appears to be doing something in order to placate the public, but really is not. There is no timeline given. The most likely result might be a public explanation of data needed to assess stream impacts, but how or whether that might be translated into meaningful action is uncertain. The question (about whether the frequency and reporting of stream flow data needs to be revised) already was answered by the researchers from the University of Pittsburgh hired by the Department (their answer was "yes").

What really is needed, as a top priority, is a model to predict where and when streams are most likely to experience flow loss. Additionally, there need to be significant consequences to operators that cause unpredicted impacts. So far, the significant consequences of longwall subsidence have been borne by surface landowners, the public, and the environment --- but not by the longwall operators.

## **Pg 20 - Hillslope hydrology**

Workgroup recommendation #22 is:

**"Assess if additional info is needed in hillslope areas."**

The researchers from the University of Pittsburgh already made it quite clear that such information is needed. The *4th Act 54 Report* (page X-6) states:

***"Hydrologic changes occurring in hillslopes cannot be characterized as data simply do not exist to evaluate changes in hillslope hydrology. The University recommends that additional monitoring of changes to hillslope moisture status be added to the technical guidance..."***

Further dithering by the Department is unnecessary. Workgroup recommendation #3 (page 19) accepts without question Pitt's suggestion to shorten the time period when macroinvertebrate stream assessments should be conducted (contrary to the science-based procedure now in use, which was developed by the Department's and outside experts), so why does the Workgroup seem to question the need for additional information in hillslope areas? The real question here should be not "if" additional monitoring is needed, but how quickly can the Department implement it without further delay.

## **Pg 21 - TGD on stream protection**

Workgroup recommendation #38 states:

**"Review the streams policy (TGD 563-2000-655) to assess changes that need to be made."**

Even if they are excellent, any changes in policy or technical guidance will take time to implement and make it difficult to directly compare one Act 54 assessment period with another. Which is not to suggest that improvements to the TGD are not sorely needed or should not be made. The point is that the Department must not misrepresent possible new improvements in the TGD as a "silver bullet". The current TGD was adopted in 2005, following more than 3 years of public review and comment on several draft versions. There then were an additional 2 years allowed (until 2007) before all of its provisions became fully effective. During that entire time the Department repeatedly pointed to the changes being made to the TGD as "proof" that it was being responsive to those of us calling for greater stream protection. Yet the *4th Act 54 Report*, released more than 7 years after the TGD became fully effective, pointed out that the TGD's effectiveness still could not be accurately assessed because neither the mine operators nor the Department were faithfully or consistently applying its directives. No matter how good or well-intentioned they may be, new policies are useless if the Department cannot or will not implement them.

Similarly, the Department must not place too much hope or expectation on a stream study it is jointly funding with the US Geological Survey (USGS). That study ("Characterizing Natural Streamflow in Small Ungaged Watersheds") is not meant to provide any direct evaluation of the effects of underground coal mining on stream flow. Rather, its main objective is to provide reference/background information regarding the nature and variability of natural stream flow in unmined watersheds. Furthermore, that study is not scheduled to be completed until September 2017, so it likely will be some years *after* that before it will be of any practical use to the Department.

**These long-term efforts are laudable, but should not be confused with, or seen as a substitute for, specific short-term measures and improvements that have been identified by CAC and others and must be implemented as soon as possible.**

## **Pg 22 - Follow up needed in future report**

Workgroup recommendation #39 states:

**"Follow up on Brush Run (after the study period)."**

This was a recommendation in the *4th Act 54 Report* because attempted restoration of Brush Run already had been underway for 7.3 years without success. The same recommendation should be made for every damaged stream that had not been fully restored to premining conditions by the end of the 4th Act 54 assessment period.

## Pg 36 - Prediction of stream impacts

In partial response to Issue #69 the Workgroup states:

**"DEP focuses on prediction and prevention of problems.... According to CDMO, almost all of the problem stream cases were unanticipated effects. 100% accuracy of prediction is not a reasonable expectation."**

While perfection indeed may not be attainable, why not at least strive for 100% accuracy? One of the fundamental flaws of Act 54 is that it eliminated the 1966 Mining Law *prohibition* on surface damage and *allowed* damages to occur with the expectation that damages would be fixed. When you lower the standards, you get poorer results. The four 5-year Act 54 Reports demonstrate that all damages are **not** being fixed --- far from it. Indeed, damages are *increasing* in both numbers and severity, many structure and water supply damages are taking years to reach any resolution, many natural resource damages are not being adequately tracked, and some natural resource damages have been determined by the Department to be irreparable.

There is no incentive for any accurate prediction of stream flow loss. Certainly by now the mine operators, if not the Department, after many years of collecting and monitoring stream flows in real time as undermining occurs (monitoring data that the Department ignores because it does not require the operators to submit it), have a reasonably good understanding of which streams and under what conditions they are likely to experience flow loss and be especially difficult to restore. As noted above in my first comment (page 2), prediction of hydrologic consequences is not just a good idea --- it is a long-standing regulatory *requirement* that is not being applied.

## Pg 39 - Pooling

The Workgroup states:

**"Pooling is an easy-to-correct situation in most cases and is not a major issue. Unexpected pooling occurs only a few times a year. Such cases are handled as they are documented."**

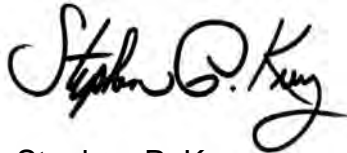
It is plausible that it would be easier to correct pooling impacts (where the water still is present, but is trapped behind an unsubsidized gate) than it is to correct flow loss impacts (where the hydrology of not only the stream but also its surface and groundwater inputs have been disrupted). The *4th Act 54 Report* noted that it takes on average 682 days (1.9 years) for mine operators to begin restoration of streams impacted by pooling. It did not calculate the average length of time to conduct the pooling restoration work itself or assess its effectiveness in restoring biological conditions afterwards. For a formerly free-flowing stream to experience pooling for even two years, however, should be viewed by the Department as a significant impact rather than as "not a major issue".

This Workgroup assessment is typical of the Department's weak response following each of the Act 54 Reports to date. The pattern is tiresomely predictable: acknowledge that there may be some problems, give vague assurances that things are being done to correct them, promise that the next five-year Report will show improvements, and hope that the public has been placated enough to turn its attention to non-mining matters. Perhaps the real intention of the Department is to further delay any meaningful action until the remaining coal has been mined out --- which this *4th Act 54 Report* noted will occur in only a few more decades.

Thank you for the opportunity to provide these comments.

I would be willing to meet with members of the CAC and/or the Department to discuss these comments in greater detail or to help develop ideas for specific practical changes that could be made to improve environmental protection in the context of underground mining.

Yours truly,

A handwritten signature in black ink, appearing to read "Stephen P. Kunz". The signature is written in a cursive, flowing style with a large, prominent "S" at the beginning.

Stephen P. Kunz  
Senior Ecologist

Attachment

cc: PADEP Bureau of Mining Programs

## ATTACHMENT 1

### SELECTED EXAMPLES OF SCHMID & COMPANY INVOLVEMENT IN PADEP MINING PROGRAM REGULATIONS, POLICIES, PERMIT APPLICATIONS, AND REPORTS

- Kunz, Stephen P. 1999a. Comments on draft final Chapter 86 Mining Regulations. Letter to David C. Hogeman, PADEP Bureau of Mining and Reclamation, dated 22 February 1999. Schmid & Company, Inc. Media PA. 6 p.
- Kunz, S. P. 1999b. Comments on proposed consolidated application form for bituminous mining operations. Letter to Thomas Callaghan, PADEP Bureau of Mining and Reclamation, dated 21 April 1999. Schmid & Company, Inc. Media PA. 13 p.
- Kunz, S. P. 2000. Comments on revised consolidated underground mining application form. Letter to J. Scott Roberts, PADEP Bureau of Mining and Reclamation, dated 13 December 2000. Schmid & Company, Inc. Media PA. 8 p.
- Kunz, S. P. 2001a. Comments on supplementary report on *The Effects of Subsidence from Underground Bituminous Coal Mining on Surface Structures and Features and Water Resources*. Letter to Susan Wilson, PADEP Citizens Advisory Council, dated 20 April 2001. Schmid & Company, Inc. Media PA. 6 p.
- Kunz, S. P. 2001b. Comments on final consolidated underground mining application form. Letter to Susan Wilson, PADEP Citizens Advisory Council, dated 30 April 2001. Schmid & Company, Inc. Media PA. 2 p.
- Kunz, S. P. 2001c. Comments on D'Appolonia report: *Remote Sensing of Forestland Above Longwall Mines*. Letter to Susan Wilson, PADEP Citizens Advisory Council, dated 10 July 2001. Schmid & Company, Inc. Media PA. 8 p.
- Kunz, S. P. 2002a. Comments on draft Technical Guidance 563-2000-655. Letter to Harold Miller, PADEP – Bureau of Mining and Reclamation, dated 1 May 2002. Schmid & Company, Inc. Media PA. 17 p.
- Kunz, S. P. 2002b. Comments on: *Study of the Effects of Longwall Mining on Streams, Wetlands, and Riparian Areas* (by Earth Sciences Consultants, Inc., December 2001). Letter to Susan Wilson, PADEP Citizens Advisory Council, dated 3 May 2002. Schmid & Company, Inc. Media PA. 12 p.
- Kunz, S. P. 2005a. Comments on draft Technical Guidance Document 563-2000-655 surface water protection - underground bituminous coal mining. Letter to Harold Miller, PADEP – Bureau of Mining and Reclamation, dated 23 March 2005. Schmid & Company, Inc. Media PA. 8 p. <http://www.schmidco.com/TGD%20-655%20Comments%2023%20March%202005.pdf>
- Kunz, S. P. 2005b. Comments on the second Act 54 five-year report. Letter to Susan Wilson, PADEP Citizens Advisory Council, dated 21 April 2005. Schmid & Company, Inc. Media PA. 20 p.
- Kunz, S. P. 2005c. Follow-up comments on draft TGD 563-2000-655. Letter to Harold Miller, PADEP – Bureau of Mining and Reclamation, dated 9 May 2005. Schmid & Company, Inc. Media PA. 4 p.

- Kunz, S. P. 2012. Comments on the fourth Act 54 five-year review report University of Pittsburgh master agreement (Contract No. 4400004037). Letter to Thomas Callaghan, Director, PADEP Bureau of Mining Programs, dated 25 September 2012. Schmid & Company, Inc. Media PA. 11 p.
- Kunz, S. P. 2015. Comments relating to the 4<sup>th</sup> Act 54 five-year assessment review of Pennsylvania Coal Alliance comments to CAC. Letter to Michele Tate, PADEP Citizens Advisory Council, dated 10 April 2015. Prepared on behalf of Citizens Coal Council. Schmid & Company, Inc. Media PA. 9 p.
- Schmid, James A. 2012. Recommendations to expedite the Department's underground bituminous coal mine permit application reviews. Letter to John J. Stefanko, Deputy Secretary, PADEP Office of Active and Abandoned Mine Operations. Schmid & Company, Inc. Media PA. 17 p.
- Schmid & Company, Inc. 2000. Wetlands and longwall mining: regulatory failure in southwestern Pennsylvania. Prepared for the Raymond Proffitt Foundation. Media PA. 83 p. <http://www.schmidco.com/Wetlands%20and%20Longwall%20Mining%202000.pdf>
- Schmid & Company, Inc. 2010a. A need to identify "special protection" status and apply existing use protections to certain waterways in Greene and Washington Counties, Pennsylvania. Prepared for Citizens Coal Council, with support from Buffalo Creek Watershed Association and The Foundation for Pennsylvania Watersheds. Media PA. 95 p. (plus 80 p. appendices)  
[http://www.schmidco.com/Schmid\\_Co\\_SpecialProtectionStatus\\_26\\_April\\_2010.pdf](http://www.schmidco.com/Schmid_Co_SpecialProtectionStatus_26_April_2010.pdf)
- Schmid & Company, Inc. 2010b. Protection of water resources from longwall mining is needed in southwestern Pennsylvania. Prepared for Citizens Coal Council, Washington PA, with support from the Sierra Club. Media PA. 195 p.  
<http://www.schmidco.com/Final%20Report%2026%20July%202010.pdf>
- Schmid & Company, Inc. 2011. The increasing damage from underground coal mining in Pennsylvania: a review and analysis of the PADEP's third Act 54 report. (Prepared for Citizens Coal Council.) Media PA. 50 p.  
<http://www.schmidco.com/17April2011SchmidAct54Analysis.pdf>
- Schmid & Company, Inc. 2012. Independent technical review of proposed Donegal Mine, Butler County, Pennsylvania. Prepared for California District Mining Office and Office of Active and Abandoned Mine Operations on behalf of Rosebud Mining Company. Media PA. 74 p.
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