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25 September 2012

Thomas Callaghan, Director  
Bureau of Mining Programs  
Department of Environmental Protection  
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400 Market Street  
Harrisburg, PA 17105 [tcallaghan@pa.gov](mailto:tcallaghan@pa.gov)

**In re: Fourth Act 54 Five-Year Review Report  
University of Pittsburgh Master Agreement (Contract No. 4400004037)**

Dear Mr. Callaghan:

The above-referenced Agreement, between the Department and the University of Pittsburgh, was handed out by you in conjunction with your presentation to the PADEP Citizens Advisory Council at its meeting on 18 September 2012. Extra copies were made available to members of the public in attendance, including myself.

You suggested to the CAC last week that this Fourth Act 54 Report will address and incorporate the specific issues and concerns that they and others have raised about the previous Act 54 Reports. It is my impression after reading this Master Agreement that that is not likely to happen without some additional consideration. This letter provides my comments and suggestions on certain tasks outlined in the Agreement. These comments are based on my professional experience during more than 30 years as a private-sector environmental consultant, during which time I have worked closely with the regulatory programs of PADEP and other state and federal agencies regarding impacts to wetlands and other water resources from mining and other development activities. During the past several decades I have carefully reviewed and provided comments on each of the previous Act 54 Five-Year Reports, as well as on numerous proposed revisions of PADEP mining regulations and technical guidance documents. I have also had the opportunity to examine closely the permit and regulatory files of many existing and proposed underground coal mines.

My comments below follow the sequence of the Master Agreement. These comments are provided as a public service and not on behalf of any client. I offer these comments in the spirit of being helpful to the Department and to the University. I share your desire to produce a report that meets the objectives of Section 18.1 in Act 54 to analyze and determine the effects of underground mining subsidence on structures, water resources, and other surface features. If this report can fill in gaps that previous reports have exposed, if it can paint a realistic picture of the impacts of underground mining, and if it can provide thoughtful recommendations on how the process can be improved going forward, then the public can be confident that it has received maximum value for the proposed \$603,000 budget.

## Pages 1-2 Sources of Information

Sources of information to be used by the University are listed in the “Objective” section. One source not listed is “monitoring reports”, which is something specifically mentioned in Section 18.1 of Act 54 to be used in these analyses. Both DMRs (discharge monitoring reports) and HMRs (hydrologic monitoring reports) contain valuable information about underground mine applications and operations and should be obtained and reviewed by the University. Mention is made that files and databases available at the California District Mining Office are to be used in preparing the review by the University. There is no mention, however, of related files or records kept in other PADEP offices such as the Southwest Regional Office in Pittsburgh, the Greensburg District Mining Office, or the Bureau of Waterways Engineering and Wetlands in Harrisburg. In my experience important relevant information related to underground mine operations is available from those offices regarding NPDES permits and monitoring, Chapter 105 permits, and Dam Safety permits that is unavailable at the CDMO. University staff previously showed no knowledge of such files, and are unlikely to use them for this review unless directed to do so by the Department.

## Task 3.0 Stream Impacts

The subtasks under this Task address stream flow loss and pooling. Tasks 5.0 and 6.0 also address stream impacts due to flow loss and pooling, and so it is unclear why these are set out as separate tasks.

Reported incidents of stream flow loss and pooling should be tracked by length of time to resolution, and also by the type of resolution.

Where the type of resolution and time to resolution differ for segments of a stream (i.e., if only 1,000 feet of an impacted 1,500 foot section of stream is restored), that should be reported, too.

**3.1 and 3.2** The University should be aware that “reported” incidents of stream flow loss and pooling (and probably other impacts) do not represent all of the actual impacts on water resources from underground mining. Pursuant to Technical Guidance Document 563-2000-655, mine operators are not required to “report” to PADEP all of the information that they are required to collect or monitor. All data that mine permittees are required to collect or monitor should be made available to the University and be fully analyzed as part of this report. I am reminded of this loophole by the reference in 3.1 to stream flow losses that are “longer than two weeks”. (As an aside: I do not know where that threshold comes from - is it tied to some regulatory requirement? A 2-week loss of flow in a perennial stream would be more noticeable and potentially more harmful than a 2-week loss of flow in an intermittent stream.) In TGD Section IV.1.d(v), stream flow measurements are to be collected on a weekly or daily time period depending upon how close undermining is to the stream. In practice, the CDMO allows operators to maintain those records in-house, and requires that they be provided only upon request. Thus, streams may experience flow loss for weeks or longer without those incidents being

reported. I have never encountered any of the weekly or daily flow monitoring data in a mine permit file at the CDMO. Apparently, such data are not being used to avoid or minimize impending impacts on streams or to verify predictions of impacts made prior to mining. The University should be charged with scrutinizing all monitoring data in compliance with Section 18.1 of Act 54.

#### Task 4.0 Hydrologic Impacts

There is no mention here or elsewhere of the CHIAs (Cumulative Hydrologic Impact Assessments) which are supposed to be prepared for underground mine operations. Each CHIA (PADEP Form 5600-FM-MR0017, last revised 9/2009) would appear to be a good source of information for evaluating and analyzing hydrologic impacts in accordance with Act 54. The University should be directed to evaluate the findings provided in the Department's CHIAs and offer appropriate recommendations.

**4.1 and 4.2** While it seems laudable to suggest that the University will evaluate whether the data, methods, and frequencies of collecting data used by applicants are adequate to assess stream impacts, I would think that the Department should already know whether they are adequate. The public assumes that for the past 18 years the Department has been requiring applicants to submit whatever it needs to make proper assessments of impacts; otherwise, how does the Department justify issuing new permits? This 4<sup>th</sup> Act 54 Report is hardly the time to begin to determine the adequacy of these assessments. What criteria are University reviewers supposed to use to evaluate adequacy?

**4.3** I do not think there are many water supplies actually "within" streams, so perhaps this is meant to say "within the **watersheds of** five (5) pre-selected streams".

**4.4** The Technical Guidance Document (#563-2000-655) is unclear about, among other things, the period of time after which normal stream flow should have been expected to be restored. TGD Section IV.1.a)(iii)(A) says either "one year" or a "specified time period" and then references a 1994 study by Carver and Rauch (which concluded in part that "*recovery in some cases may take up to 2.3 years*"). The Agreement states that the TGD-predicted recovery period is "two to three" years, and that it will emphasize "streams with long-term flow loss (greater than 3 years)". This matter would be less confusing if the Department revised its TGD to be more clear on this point: is stream flow recovery expected in 1 year, 2.3 years, or 3 years? The University (or the Department) should determine whether the 18-year old study by Carver and Rauch remains valid technical guidance today, given the significantly wider and longer panels of modern longwall operations.

Restoring flow, however, is only part of a "resolution". According to TGD Section IV.1.a)(viii), a stream is considered "*fully recovered or fully restored if both of the following conditions are met*

(A) *Flow has returned to the normal range of conditions without the continued need for supplementation by a maintenance dependent augmentation source.*

(B) *The macroinvertebrate community has recovered to its pre-mining*

*condition, as indicated by .... at least 88% of the mean of the total biological scores recorded prior to mining.*

The latter condition (B) is critical to actual restoration of the pre-mining biological condition of any stream. The University should evaluate this required parameter in addition to the mere presence of streamflow. Abundant post-mining assessment data should be available by now in the Department's permit files.

#### Task 5.0 Stream Impacts - Flow Loss

**5.1** The University should simply be compiling existing data; it should not have to repeat these assessments, except as a check on accuracy, because they should have been completed already. If the University plans to *tabulate and report on* post-mining biological assessments already performed by permittees as required by the TGD, that's fine. If the Department expects University staff to actually perform the post-mining assessments, rather than just spot-check a few for accuracy, that is not appropriate. (The University obviously cannot do any new *pre*-mining assessments.)

**5.2** Any proposed evaluation by the University of the current condition of streams undermined prior to the use of the TGD will provide minimal useful information because there will be no pre-mining data against which to make any comparisons. This was a flaw in previous Act 54 reports and it is not a prudent use of taxpayer resources.

#### Task 6.0 Stream Impacts - Pooling

**6.1** If mitigation work on a stream has been "completed", that means PADEP has determined it to be successful (otherwise, it is still ongoing). The public has an expectation that PADEP is on top of this already, so it might be of interest to confirm whether mitigation work deemed completed by PADEP actually has been successful. Except to spot check a few for accuracy, however, University staff should not be expected to second-guess the Department's determinations of mitigation success.

**6.2** As in 5.1 above, if the University plans to *report on* post-mining biological assessments already performed as required by the TGD, that's fine, but University personnel should be provided with the post-mining assessments, not do them anew, except perhaps to perform a spot check on post-assessment site conditions.

#### Task 7.0 Wetland Impacts

Per the TGD, all wetlands within every longwall mine's underground permit area must be identified by field investigation of vegetation, soils, and hydrology. NWI mapping can be used as a *guide* for where certain wetlands may be expected, but is not accurate by itself to identify or delineate wetlands for regulatory purposes. Prior academic and regulatory reviews have documented the typical undermapping of wetlands in Pennsylvania by NWI, especially beneath forest cover.

**7.1** Mentions “vernal” as a type of wetland, but there is no such thing. Vernal pools are found in some wetlands, but they would not be characterized as such under the Cowardin Classification system. Nowhere have vernal wetlands been mapped in Pennsylvania, and PADEP does not request such information with coal mining applications, so University staff should not seek to identify this as a separate type of wetland, which would require extensive original field investigations.

**7.2** Wetlands typically are restored or replaced because of direct impacts associated with surface activities of underground mines, including restoration work along impacted streams. I am aware of no wetland in Pennsylvania that ever has been determined to have been impacted by full-extraction mine subsidence and then restored or replaced (mainly because no one has ever checked to identify such).

**7.3** Mine operators and others have opined in the past that subsidence creates more wetlands than it destroys. An assessment of the net gain or loss of wetlands due to mining-induced changes would be quite interesting if calculated by mine and by mining method. Presumably it would include wetlands planned to be impacted and wetlands planned to be created (or if created accidentally, at least there should be some formal assurance from the landowner that the accidentally created wetland will not be filled or drained, but will instead be protected from future disturbance; otherwise, it cannot reasonably be credited as a “gain”.). The University should be aware, however, that unless the Corps of Engineers had reviewed the entire area above an underground mine and issued a formal Jurisdictional Determination (PADEP does not have a comparable JD process) confirming the premining locations of wetlands and uplands, there can be no assurance that a wetland found postmining actually was “created” and was not already a wetland prior to mining. I know of no underground mine in Pennsylvania where the Corps has issued a JD for any area other than the land specifically proposed for surface facilities.

**7.3 and 7.4** Per TGD Section IV.2.d)(iv), each wetland inventoried prior to mining above full-extraction mining areas must be reassessed 12 months after mining beneath it. In all of the longwall mine permit files I have reviewed over the past five years, I have never once seen a “required” 12-month follow-up wetland assessment. I expect that the University will not have much data to record in the post-mining column unless they collect it themselves, which they should not have to do, apart from a few spot-checks by qualified individuals.

## Task 8.0 Water Supply Impacts

Act 54 established a zone of presumptive liability for water supply impacts based on a 35° angle of influence. It is not clear what evidence that standard was based on, but it now is about 20 years or more old. The authors of the 2<sup>nd</sup> Act 54 Report questioned the validity of that 35°-angle standard, suggesting that a horizontal distance of 328 feet from the edge of longwall panels would be more realistic. As far as I am aware, this

issue has yet to be adequately studied or resolved, although substantial damage has been recorded at distances greater than the presumptive standards suggest.

**8.1** The Agreement proposes to use the 35°-angle standard, presumably because that is how PADEP continues to keep its records. The University should examine relevant data and offer recommendations on whether the significantly longer and wider panels of modern longwall mines have changed the validity of the original 35°-angle standard, and whether the suggested 328 feet or some other distance would be a better indicator.

**8.2 and 8.3** Although not specifically stated, I assume that the types of “resolutions” and the time and status of each will be identified by the four categories listed in 8.1.

#### Task 9.0 Structure Impacts

**9.1 and 9.2** The University should evaluate structure impacts due to retreat/pillar removal mining (not mentioned), in addition to longwall (9.1) and room-and-pillar (9.2) mining. One of the problems with earlier Act 54 Reports (especially the First) was that retreat mining impacts were lumped with room-and-pillar mining impacts, thus overstating the actual damage from traditional room-and-pillar operations.

##### General

- All impacts and resolutions should be reported by mining method (longwall, room-and-pillar, or retreat) within each mine and then summarized by mining method.
- One of the fundamental assumptions of Act 54 was that surface features damaged by underground mine subsidence would be repaired or replaced. In cases where repair or replacement could not be accomplished, the Act made allowance for monetary compensation instead. It would be informative to report the impacts in each major category (structures, water supplies, land, streams, wetlands) in terms of whether the final resolution of damage was repair, replacement, or monetary compensation, or whether it was any number of other outcomes such as purchase of damaged property, private agreement, demolition or removal of damaged structure/water supply, resolution pending, or no resolution.
- Another assumption of Act 54 was that “planned” subsidence was better than unplanned subsidence (because the damage from planned subsidence is more predictable and immediate, and thus can be repaired in a timely manner). The University should evaluate how often subsidence damage is predicted, how accurate those predictions are, and how incidents of “predicted” damage compare with unplanned damage incidents in terms of type of final resolution and time to resolution. The University should be aware, however, that the only damage to hydrology that ever is “predicted” is stream pooling, and that the predictions of subsidence-related pooling are based on a model (Peng 1994) that now is 18 years old, and that may or may not be applicable to the significantly wider and longer panels of modern longwall mines. Stream flow loss is never predicted, but often

occurs. Wetland hydrology loss likewise is never predicted, and since it is never investigated by follow-up assessments, its extent is unknown.

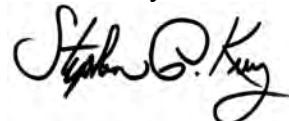
- The University should compare impacts and resolutions by mining method during the fourth Act 54 5-year period with comparable impacts and resolutions during the third Act 54 period, inasmuch as it will have reviewed much of the same information during both periods. It would be informative to also include the first two Act 54 periods in the comparison, but comparable data from those earlier periods may not be available.

For additional related comments, I direct your attention to the Schmid & Company analysis of the Third Act 54 Five-Year Review Report (which can be read or downloaded from here: <http://www.schmidco.com/17April2011SchmidAct54Analysis.pdf>) For your convenience, I have attached to this letter the “Recommendations” section of that analysis.

I hope that these comments will be useful to the Department and to the University as you move forward with this analysis. Each of the previous Act 54 reports suffered from critical data gaps and from an apparent lack of understanding how to measure and assess the damages inflicted on the residents and resources of the coalfields by high-extraction underground coal mining. Hopefully, the experience gained over the last 18 years, combined with the comments and concerns raised time and again by the CAC and others, will result in an analysis this time that fully meets the objectives of Act 54.

If you have any questions, please feel free to let me know.

Yours truly,



Stephen P. Kunz  
Senior Ecologist

Attachment

cc: Steve Tonsor (University of Pittsburgh)  
William Plassio (California District Mining Manager)  
John Walliser (Citizens Advisory Council)

serious effort undertaken to correct its deficiencies. It is unacceptable to continue to rely on the false hopes repeated in each of these Act 54 Reports -- that things might be better in the next five-year period. The Report's own statistics show that impacts are getting worse, not better, as time passes.

#### XIV SUMMARY AND CONCLUSIONS

This third Act 54 Review Report compiles and presents an enormous amount of information about underground coal mines and mining during the five-year period from August 2003 to August 2008. A lot of data essential to an analysis of the impacts of underground coal mining, however, either were not available or were not reviewed. As a result, this Act 54 Report fails to adequately address wetland impacts, water quality impacts, Special Protection waters, and the actual extent of impacts to streams, among other issues. Nevertheless, this Act 54 Report once again highlights the destructive nature of underground coal mining on land, structures, and water supplies. It illustrates that impacts are being mitigated in only a partial and piecemeal fashion.

More so than previous Act 54 reports, this third Report documents clear differences of impacts between the longwall mining method and the room-and-pillar method. Longwall mining was shown to cause many more, and more significant, impacts to surface features, and their times to final resolution are significantly longer, than room-and-pillar mining. Despite accounting for less than 50% of the area undermined during the five-year review period, longwall mining was responsible for 100% of the reported impacts to streams, 95% of the land impacts, and 94% of the impacts to structures.

The unspoken conclusion of this Act 54 Report is that longwall mining as currently practiced in the Commonwealth of Pennsylvania is a highly destructive technology that is not compatible with environmental protection, landowner protection, or taxpayer protection. The good news coming out of this third Act 54 Report is that underground coal mining can be and is being done with minimal impact to surface structures, streams, and landscapes in Pennsylvania, but only using room-and-pillar, not longwall, methods.

This Act 54 Report raises, for the third time in a row, important issues about the regulation of underground coal mining that must be addressed by the CAC, the General Assembly, and the Governor. These issues include the inadequacy of pre-mining baseline data in coal mine permit applications; unacceptably long times to final resolution of impacts caused by underground mining, but particularly by longwall mining; a failure to address regional or cumulative hydrologic impacts; and a failure to address impacts to public and community resources as well as private resources.

#### XV RECOMMENDATIONS

Given the absence of recommendations from this third Act 54 Report, this section summarizes the obvious needs for improvement of PADEP efforts to regulate underground coal mining to protect the residents of the coalfields and the environment.

If these recommendations are implemented timely, they will enable a much different and more informative story to be told in the next Act 54 five-year assessment report. Most of these recommendations address the responsibilities of PADEP. Others will require action by the Governor and the General Assembly. A few address the authors of the next five-year Act 54 report and any PADEP staff responsible for overseeing their work product.

- This third Act 54 Report provides some limited discussion of the RPZ (rebuttable presumption zone) and the 35° angle of influence. It fails, however, to draw any appropriate conclusions. The second Act 54 report addressed this issue in detail, and made the recommendation that a fixed distance from the edge of mining (it recommended 328 feet) rather than the Act 54-mandated 35° angle would be more appropriate for determining potential liability for water supply impacts, and it recommended additional study and consideration of the issue. This remains a critical area for further study, not only for water supply impacts but for impacts to structures and other features. We recommend that this issue be seriously investigated for immediate strengthening of PADEP regulations, in time for results on the ground to be analyzed in the next Act 54 report.
- Information specific to the length of streams impacted during the review period (in addition to stream impact incidents) must be collected by PADEP and analyzed in future Act 54 reports. We recommend that mine-specific data be compiled on the length of streams impacted, the nature of those impacts (flow loss, pooling, pollution, etc.), and the resolution status of those impacts.
- Much greater attention needs to be paid to water quality impacts from underground mining. Section 18.1 mandates that the five-year review be used to determine the effects of deep mining on “water resources.” Stream flow and potable water system impacts have received some attention, but direct and indirect water quality impacts from subsidence and from pollutant discharges largely have been ignored. We recommend that all water resource impacts be recorded routinely by PADEP and made available for analysis in the next report.
- Electronic collection and storage of data -- from permit applications, monitoring records (DMRs and HMRs), enforcement files, mine maps, and other sources -- need to be standardized and modernized using electronic data storage and GIS (geographic information system) technology. This would provide the basis for meaningful hydrogeologic modeling and assessment, would provide close to real-time identification of impacts, and would allow for quicker, more efficient, and more effective Act 54 analyses and reporting. We recommend that PADEP update its archaic record-keeping system immediately, so that data will be accessible electronically for the next five-year report and for public inspection. We recommend that particular attention be given by PADEP to collecting and compiling all data by mining method, so that impacts from longwall and from room-and-pillar operations can be clearly distinguished and so that the knowledge gained can be routinely used by PADEP to protect the public and its resources in its permit decisions.

- All pre-mining and post-mining monitoring data on streams, springs, wells, and wetlands should be used to prepare mine-specific databases or models of local surface water and groundwater flow patterns. These datasets can be used to compare pre- and post-mining conditions and to determine what specific changes (if any) occurred as a result of mining. As more and more data are developed from each mine experience, a regional model can be developed which will provide a powerful and accurate tool for analyzing and predicting changes to the hydrologic system. Every new application, as well as PADEP staff, would then benefit from the cumulative experiences of all prior mining. We recommend that data collection specifically targeted to hydrologic modeling be implemented immediately by PADEP, so that the results can be evaluated in the next five-year Act 54 report.
- The Act 54 Reports should always follow up unresolved impacts from previous periods. This was done to some extent in this third Report. We recommend that future reports focus in detail on any unresolved impacts left over from prior reporting periods.
- Data sources must not be restricted to BUMIS and other selected PADEP files and to mine operators' records. The relevant literature (including prior Act 54 Reports) and the affected public also must be consulted when preparing future Act 54 reports. We recommend that every future report include a review of the relevant literature and an investigation of public complaints recorded during the review period, along with their resolution.
- Every future five-year assessment should discuss findings regarding impacts in the context of Act 54 and the effectiveness of the underground mining regulatory program as administered by PADEP to protect the resources and the people of the Commonwealth. Attention also should be focused on impacts in relation to Environmental Justice areas.
- Data from permit applications and from monitoring and enforcement files available from PADEP have been largely ignored in this Report, despite the mandate of Act 54 itself. We recommend that all impacts specifically predicted in permit applications be identified and compared with all impacts actually experienced; that the results of required monitoring be scrutinized, along with PADEP followup enforcement for violations encountered; and that all kinds of violations be tabulated meticulously by mining method in the next Act 54 report.
- As it has done for decades, the PADEP Bureau of Mining and Reclamation (BMR) evaluates underground mine permit applications primarily from a mine engineering perspective. While that may have been appropriate for room-and-pillar mines, or when the prevention of subsidence was a major consideration, it is not appropriate post-Act 54 for longwall mines where subsidence and the associated widespread environmental impacts are a certainty. We recommend that BMR interact more directly with other PADEP offices (particularly, the Water Management bureaus) to more fully evaluate water resource issues.

- There continues to be no analysis of the economic costs of underground mining impacts. We recommend, at minimum, that future Act 54 reports include a comparison by mining method of costs to prevent or minimize impacts with costs to repair, restore, or otherwise compensate for impacts.
- At present Act 54 is being administered in direct conflict with the guarantees of the Pennsylvania Constitution. Act 54 itself should be revisited by the General Assembly to reestablish protections formerly extended to the environment and residents of Pennsylvania by the BMSLCA and the Constitution. The highly destructive longwall technology henceforth should be allowed only where surface resources will be protected and impacts will be avoided and minimized.
- The arrival of a new administration in Harrisburg offers an opportunity for redirection of PADEP personnel to undertake effective implementation of existing State regulations pertaining to underground coal mining. We recommend that the environmental protections prescribed in existing regulations be fully implemented. Future regulatory improvements might be helpful, but will be meaningless unless actually applied and enforced.
- Finally, we recommend that work on the next five-year Act 54 report should begin immediately (inasmuch as we presently are more than halfway through the fourth five-year period) and should be completed as soon as possible after the close of the current assessment period.

## XVI AUTHORSHIP AND ACKNOWLEDGMENTS

This report was prepared by Stephen P. Kunz and James A. Schmid, senior ecologists with Schmid & Company, Inc. Mr. Kunz has been a consulting ecologist since receiving a degree in human ecology from Rutgers University in 1977. Dr. Schmid is a biogeographer with 40 years of experience in ecological consulting. Both Mr. Kunz and Dr. Schmid are certified as *Senior Ecologists* by the Ecological Society of America and as *Professional Wetland Scientists* by the Society of Wetland Scientists.

Mr. Kunz and Dr. Schmid offer outstanding credentials as experts in ecology, wetlands, environmental regulation, and impact assessment. They have analyzed the environmental impacts of many kinds of proposed development activities in many states, including coal mining facilities, industrial facilities, transportation facilities, commercial developments, and residential developments. They have written Environmental Impact Statements under contract to the US Environmental Protection Agency, Army Corps of Engineers, Interstate Commerce Commission, various agencies of state and local governments, and a diverse array of private sector entities. They have prepared comprehensive analyses of environmental regulations of nationwide scope.

The preparation of this report was made possible by a grant from The Heinz Endowments. This report was prepared for the Citizens Coal Council, a national