

3 May 2002

Susan M. Wilson, Executive Director  
Citizens Advisory Council  
P.O. Box 8459  
Harrisburg, Pennsylvania 17105-8459

**In re: Comments on: *Study of the Effects of Longwall Mining on Streams, Wetlands, and Riparian Areas* (Earth Sciences Consultants, Inc., December 2001)**

Dear Ms. Wilson:

This letter is to provide comments on the report prepared by Earth Sciences Consultants (ESC), Inc., entitled *Study of the Effects of Longwall Mining on Streams, Wetlands, and Riparian Areas* (December 2001). These comments are provided as a public service and not on behalf of any client. They are based on my experience during more than 20 years as a private-sector environmental consultant during which time I have worked closely with Pennsylvania and federal environmental regulatory programs.

My comments relate primarily to the wetland-related aspects of this study, because wetland delineation and impact assessment have been the focus of my professional life for more than two decades. I have eagerly awaited this study since the completion in July 2000 of the Raymond Proffitt Foundation report which I co-authored entitled "Wetlands and Longwall Mining: Regulatory Failure in Southwestern Pennsylvania". My hope was that this PADEP-sponsored study would address the concerns raised in the RPF report about how wetlands have been ignored in the context of underground mine applications for many years. I'm afraid I've been disappointed.

## **Wetlands**

For an investigation as focused as this one, encompassing two, relatively short study segments (each about 2,700 feet long), it would have been much more meaningful to investigate and delineate at the outset every wetland within the immediate watershed of each study segment, instead of those found just alongside the stream segment itself. This would have yielded a valuable insight into the extent of wetland resources at risk within

the areas draining into the study stream segments being evaluated. Not only was this not done, but apparently **even the few wetlands that were found within the two narrowly-defined study segments were not fully identified or assessed.**

For a study that purports to focus on “wetlands” along with streams and riparian areas, it is interesting to note that wetlands are not discussed in Section 2.0 – Description of Study Area. Furthermore, not once is the word “wetland” even used in any of the following three parts of the ESC report: Section 4.0 – Characterization of Regional and Local Geology, Hydrogeology, and Hydrology; Section 6.0 – Evaluation of Postmining Geomorphologic and Hydrologic Characteristics; and Section 7.0 – Current and Background Surface Water Quality. Similarly absent from those parts of the report is any discussion of “springs or seeps”, which are mentioned exactly once (on Page 4-13) throughout all of those three Sections.

The initial discussion in the ESC study about the identification of wetlands comes in Section 8.5.5. The authors note that there is only limited information by way of previous studies on wetland resources for the Robinson Fork watershed, and that "*no delineation studies were performed during the premining permitting stage*". **This statement corroborates one of the principal findings of the RPF report, namely, that wetlands are not being identified in the context of underground mine applications, and as a result, impacts to them cannot be determined or evaluated by mine operators, by PADEP, or by the public.**

The ESC study notes that National Wetlands Inventory (NWI) maps were reviewed, a reasonable practice typically done in preparation for field investigation. As a number of independent studies have reported, however, NWI maps typically identify less than half of the wetlands that exist in forested Appalachia, and thus they are not a definitive source for wetland identification. Not surprisingly, the NWI map shows no wetlands within the mined study segment. It shows two wetlands in the unmined segment (one labeled PEM1A; the other PFO1/PEM1A). These two NWI-mapped wetlands are referred to [incorrectly] in the ESC study as "jurisdictional wetlands" (Page 8-17): first of all, the NWI is not a map of regulatory jurisdiction, and secondly, there is no indication that either of these wetlands was delineated using the accepted methodology for wetland delineations or that any agency with regulatory jurisdiction ever reviewed or confirmed the mapping. Referring to them as "jurisdictional wetlands" is misleading. **In fact, there is no information of any kind on the extent or**

## **characteristics of any jurisdictional wetlands in the unmined study segment.**

It appears that no attempt was made to field-delineate any wetlands within the unmined study segment. The cryptic statement that "*the NWI-identified wetlands were not specifically located*" suggests either that neither wetland was found, or that the wetlands were found but not delineated. However, at least one wetland (classified as PEM1A) apparently was found. It is briefly described as a small emergent wetland within a depression area in the floodplain, and its size was "*estimated*" to be about 0.2 acre (which would make it larger than either, or the combined total, of the two NWI-mapped wetlands). How this wetland's size was estimated, and why it was not field delineated and surveyed, are not mentioned. No specific information about the wetland's soils, vegetation, or hydrology is provided. Two "typical" photographs of depression wetlands are provided (Photos 8-1-C1 and 8-1-C2), but it is not clear whether either or both are photos of the 0.2-acre wetland area discussed. No further mention is made of the other NWI-mapped wetland (PFO1/PEM1A), or of any other wetlands in the unmined study segment.

Regarding the mined study segment, considerable discussion is devoted to a single wetland identified within the floodplain (the "Molinari" wetland). For some unexplained reason, that discussion is in a different part of the report (Section 8.6 - Results) than the limited discussion of wetlands in the unmined segment (Section 8.5. - Methods). The statement on Page xvii ("*...wetland areas identified on the mined reach...*") mentions "areas" (plural). Furthermore, Criterion #4 in the list of study criteria provided in Section 1.3.2. states: "The study area must support adequate wetland area(s)". The response to this is that "*jurisdictional wetland areas* [note the plural again, and the misnomer "jurisdictional"] *were identified adjacent to the study segments of Robinson Fork*". However, **it is nowhere else mentioned whether any other wetlands were identified within the mined study segment.**

Section 8.6.6 involves a lengthy discussion of the Molinari Wetland (named for the owner of the land on which it was found). The report states that this 0.73-acre wetland "*was delineated and surveyed*". However, the delineation apparently was not reviewed or confirmed as accurate by the Corps of Engineers or any other agency with regulatory jurisdiction. Furthermore, no field data sheets were included in the ESC report for this or for any other wetland, so there is no way to review the basis for the delineation. **This**

**lack of documentation of the wetland resources at risk is a typical shortcoming of longwall mine applications, one that “undermines” the whole process of evaluating the nature and extent of wetland impacts.**

In Section 8.7.5, the report authors speculate that the Molinari Wetland once was much smaller, and has expanded to its current size as a result of subsidence-related factors. They concede that there is no way to prove this conjecture because there was no premining wetland delineation. Yet even the “circumstantial evidence” put forward in the report is not very convincing. A series of aerial photographs of the area is provided, spanning premining to postmining years, but these photos are inconclusive, a fact acknowledged in the report (“... *the 1998 postmining photograph does not show a disturbance in the field, and no major signature that the wet area has expanded in size*”).

The ESC report authors suggest that the existence of a 0.73-acre wetland within an area mapped as Newark silt loam is incongruous, when in fact, it is perfectly reasonable. The soils within the floodplain adjacent to the Molinari Wetland are described (Page 8-50) as typical Newark silt loam, which is stated to be a nonhydic soil series. In fact, the Newark soil series is listed on the official list of hydric soils, but with the qualifier that *some phases* of the Newark series may not be hydric. Included with the Newark silt loam map units in Washington County are areas of Fluvaquents, which contain poorly drained components. It is neither inconsistent nor unexpected that an area of poorly-drained hydric soil would be found as an inclusion in this bottomland location within an area mapped as Newark silt loam. Furthermore, the significant difference in soil color mentioned (10YR 5/4 versus 10YR 6/1 or 5Y3/1; see Page 8-50) is unlikely to have developed during the relatively brief 5-year interval since this area was undermined. **It is equally (if not more) probable that the extent of the hydric soil (and of the wetland itself) may be as large now as it was before mining occurred.**

In the Conclusions part of the report (Section 9.0), many of the findings of the study are carefully qualified by phrases such as *“insufficient data exist to definitively conclude a relationship between [any negative effect on water resources] and longwall mining”*. However, with respect to the Molinari Wetland, no such caution is exercised in drawing conclusions. On Page 9-11, the statement is made that *“Subsidence in this area appears to have increased the size of this wetland area (enhancement).”* **Because there is no conclusive information regarding the premining size or nature of**

**this wetland, however, it is just as likely that subsidence has decreased its size or has reduced its functions.**

One of the arguments put forward in the report to suggest that this wetland has expanded as a result of subsidence is interesting in a different respect. The authors state on Page 9-11 that the “*expected settlement*” from subsidence in this area “*is about 6 feet*”. They also state that the height of the coal removed in this section of the study area was “*between 5 and 7.5 feet*” and the depth of the mining was “*530 to 545 feet*” (Page xi). Given these factors, settlement of 6 feet seems to be quite a significant drop (imagine if there was a house here!). The BMR has long accepted the mining industry’s [undocumented] contention that adverse effects on streams and other surface water features are negligible where the cover is more than 400 feet. **If surface settlement of 6 feet is to be “expected” in areas being mined more than 530 feet below ground, I suggest that there needs to be a serious reexamination of the PADEP ‘rule of thumb’ that says that surface effects are insignificant for longwall mines with 400 feet or more of cover. This consideration certainly has not been reflected in the proposed new version of the Technical Guidance Document!**

If I assume, simply for the sake of argument, that the Molinari Wetland *did* accidentally increase in size from a small wet spot in a pasture to a diverse, 0.73-acre wetland as a result of subsidence-related settlement, I am not prepared to accept the implication that this change was an “enhancement”. As a wetland ecologist, I might be tempted to agree philosophically. But in a regulatory context, “enhancement” means something quite different. First of all, the land on which this “enhancement” occurred was not owned or controlled by the mine company. Did the landowner give permission for wetland enhancement to be done on his property? I doubt it. In fact, I can well imagine that the landowner might not have been very pleased at all.

The ESC report authors suggest that this area is “... *a field that was recently farmed (pasture) and now is reverting to oldfield habitat.*” (Page xix). If the mine subsidence indeed caused the change, and if what once had been a small wet spot in a pasture grew in size and now is wet most of the year, it should come as no surprise that the field is reverting to oldfield habitat: the landowner probably can no longer use it and had to abandon it. Does the landowner consider this an “enhancement”? I doubt it. The landowner may well have felt helpless to do anything other than abandon the pasture. However, he would have been justified in trying to drain or fill the newly-

enlarged areas of wetland (or to enlist the mine company to make such “repairs”), and such work presumably would not be regulated if it were undertaken in a timely manner.

The use of the term “enhancement” in the ESC report in reference to the Molinari Wetland, instead of the term “creation”, suggests the authors’ belief that there *was* a wetland in this field prior to mining. If the mine subsidence caused a small wetland to become significantly wetter, that in itself constitutes a Chapter 105-regulated encroachment (“... *any activity which changes, expands, or diminishes the course, current, or cross-section...*”). The creation of ponded conditions in a wetland where such conditions did not previously exist is generally viewed by PADEP as a negative impact. If a formal delineation of that wetland had been performed during the mine application phase, any changes that were caused by mining (either positive or negative) could have been documented and assessed, and the appropriate follow-up action could have been taken. **Although the ESC description of the Molinari Wetland suggests that it is diverse today, it simply is not known whether it was as diverse, or even more diverse, prior to the mining.**

A carefully crafted, yet cryptic, conclusion statement on Page 9-10 reads in full as follows: “*The wetland investigation on the floodplain in the mined reach did not indicate that any wetland areas existed that exhibited reduced wetland hydrology that would occur from a loss of the hydrologic regime that would reduce the size and functional values of the wetland.*” Come again?? As mentioned above, the ESC investigation might have provided some meaningful information if it had looked at wetlands beyond just “*the floodplain in the mined reach*”. Wetlands within the entire localized watershed of each study segment should have been investigated. However, **since no premining wetland delineations were performed, there was no baseline information against which to compare.** The lack of any premining wetland delineations/assessments ensured that no wetlands would be found to have “*reduced wetland hydrology*”, whether from mining or any other cause.

**The statement in the Executive Summary (Page xix), repeated in the Conclusions (Page 9-10), that “*there was no indication that jurisdictional wetland area was lost because of dewatering resulting from undermining*” is totally misleading.** It suggests that jurisdictional wetlands were identified in the first place (but only one wetland was claimed to have been delineated during the study, and *that* delineation was never

confirmed as accurate). It suggests that wetlands and/or their hydrology were assessed before and after undermining (but no wetlands were assessed before mining, and so no 'before-and-after' comparison was even possible, much less performed). **The only accurate statement to be made is that there was not adequate information collected in order to draw any conclusions about the effects of underground mining on wetlands, despite the documented existence of wetlands at risk there.**

### Other Concerns

- ◆ In Section 1.5 - General Description of Field Program Activities - we learn that Sci-Tek personnel performed the wetland work. Unfortunately, there is no information provided anywhere in the report about the qualifications or expertise of this firm or its staff.
- ◆ The "wetland studies" for this investigation reportedly included use of "the hydrogeomorphic method" (Page 1-7), but no reference or bibliographic entry is provided, and *how* or *why* that method might have been used is not stated. The HGM (hydrogeomorphic) method is not relevant to wetland delineation; it is a wetland *assessment* technique that has become increasingly popular in recent years. The Molinari Wetland was the only wetland in this study that received *any* assessment at all, yet on Page 8-59 the authors state that the assessment of the functional values of the Molinari Wetland "...was based on professional judgment and did not use any of the assessment techniques currently in use." The reader is left to wonder in what context the hydrogeomorphic method might have been used in the wetland studies.
- ◆ Why was the evaluation of riparian vegetation limited to a corridor 10 meters (33 feet) in width along each bank? Why not 50 or 100 or 1,000 feet in width? No rationale is provided.
- ◆ In Section 5.1 (Sources of Information), eight sources are cited. Missing from the list is the Pennsylvania Fish and Boat Commission, yet this agency had performed an aquatic survey of Robinson Fork in 1975 (which is listed in the Bibliography), and likely has a considerable amount of other information on streams in the vicinity. Why was the PaFBC not contacted as a source of information?

- ♦ Table 7-1 lists historical surface water monitoring data collected several times a year at three locations along Robinson Fork between 1992 and 2000, and compares those data with data collected at four locations on 27 July 2001 for the ESC study. For the most part the same parameters were measured, although several additional parameters were measured in 2001 so as to try to attribute potential effects to agricultural operations. Notably missing from the parameters recorded for the ESC study on 27 July 2001 are data on streamflow (discharge), which was measured at every monitoring location during all of the historical monitoring. The flow rate of a stream is an important factor in and of itself, and it also is useful in providing a context for other water quality data being evaluated. It seems obvious that the flow rate would be a crucial parameter to be measured and reported, particularly when only a one-time monitoring event was performed in mid-summer, as it was for the ESC study. Why this factor was excluded is not explained in the report.
- ♦ This study (of some 350+ total pages) has been made available on CD-ROM and over the Internet, but not in paper format. Many people who might be interested in this report may not have ready access to these electronic formats. Additionally, the electronic versions make reading of the lengthy text and review of the various figures and tables more difficult than a paper format would. The previous PADEP-sponsored reports on the effects of longwall mining on forestland (March 2001) and on Interstate 70 (November 2001) were produced in paper format, and this one should have been as well.

### Overburden Depth

In general, the closer a longwall mine is to the surface, the more severe and pronounced the surface effects are expected to be. It is not unusual for longwall mines in southwestern Pennsylvania to operate in areas where cover is less than 400 feet. In its 1999 report on Act 54, the PADEP stated that its surface subsidence agents reported that ground cracks "...are more prominent in areas where mining is less than 300 feet below the surface" (Page XIII-2). In recent years, PADEP has considered it a rule of thumb that cover of 400 feet or more will adequately minimize adverse effects from longwall mines on streams and other surface water features. Its Technical Guidance Document 563-2000-655 (*Perennial Stream Protection*, 14 November 1997) states that "overall, these concerns are considered to become negligible as the cover increases beyond 400 feet".

The mined study segment on Robinson Fork reportedly overlies a part of the Enlow Fork Mine where cover is 530 to 545 feet thick (Page xi). This is at least 33% deeper than the 400 feet at which PADEP has been assuming negligible impacts to streams. **If a meaningful investigation of impacts truly was intended in this ESC study, one must question why such a large depth of cover was selected for the study site.** Furthermore, given that 6 feet of surface settlement was “expected” in the Molinari Wetland (see above), even when mining was more than 530 feet below, one would hope that one of the recommendations of this study would be to revise this ‘rule of thumb’ guidance. Unfortunately, no such change is proposed in the recently-released Draft Technical Guidance Document 563-2000-655 (*Surface Water Protection*, 6 April 2002), which claims to incorporate findings from this study. One must wonder, then, whether the “expectation” of 6 feet of settlement in the vicinity of the Molinari wetland was simply a fabrication in order to “prove” wetland enhancement.

In a similar manner, in the recent PADEP-sponsored study of forest impacts from longwall mining (D'Appolonia 2001), two of the three pairs of study areas were sited where overburden was greater than 600 feet thick (the third pair had overburden between 415 and 530 feet). **One truly has to wonder how meaningful these PADEP-sponsored studies really are. They apparently have been designed to measure impacts in situations where impacts are least likely to occur.**

#### Limited Applicability of Results

Probably the main deficiency of the ESC study is in its limited applicability to other situations. If PADEP seriously intended for this study to say something definitive about the effects of longwall mining on surface water resources, it should not have imposed so many restrictions on its scope. Surface and groundwater systems are incredibly complex, as are the consequences of creating huge holes in the ground over tens of thousands of acres. Even one small change – siting the mined study segment *upstream* from the unmined study segment – might have yielded entirely different results.

The authors readily admit the limited applicability of the results of this study, as stated on Page 9-11: “*It would not be prudent to assume that all streams [and wetlands] and their riparian areas in Southwestern Pennsylvania*

*respond to subsidence in exactly the same manner as that observed in Robinson Fork”.*

As one reads through the summaries in Section 9.0 (Conclusions) of each impact parameter assessed in the study, one is struck by the number of times the following phrases are used:

*“... there is no premining data...”*

*“Insufficient data exists to definitively ascertain ...”*

*“Data obtained from this study, however, are not sufficient to definitively conclude a relationship ...”*

*“...the direct effect of subsidence cannot be separated from [many] other [possible] factors...”*

The authors sound sheepishly apologetic when pointing out the limitations that were imposed on this study by the PADEP. The study's potential to provide any meaningful contribution to the understanding of the effects of longwall mining on surface water resources was doomed from the start by the tight budgetary, time, and other constraints that were imposed on the scope of work. The authors' own sentiments about the limitations associated with this study, as expressed in the Summary on Pages 9-13 to 9-14, are most informative and worth repeating here:

- *“numerous variables and combinations of these variables govern subsidence mechanics and stream characteristics”*
- *“the limited scope of this study precludes its use as a comparative standard”*
- *“the period of time for conducting this study was too short to allow observation and evaluation of seasonal characteristics and long-term effects”*
- *“the limited length of channel studied provided statistically restricted data for only a small percentage of the mined and unmined portions of the Robinson Fork Watershed” [let alone any other watershed]*

- “premining data and crucial ‘before and after’ comparisons were limited for Robinson Fork and for most of the other candidate streams” [indeed, such data are lacking for all mined areas to date]
- “investigative activities necessary for a comprehensive understanding of the relationship between longwall mining and potential stream impacts” [could not be done due to the limitations imposed on the scope of this study].

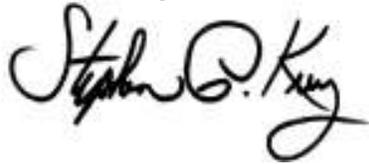
The observation is made in Section 8.2 that “*The effects of longwall mining on water resources are not well documented or understood.*” This truly is an understatement! Unfortunately, this situation has not improved as a result of the ESC study. **Indeed, one of the only “benefits” of this study (that the detailed premining database it supposedly provides for the unmined study segment) is not applicable to wetlands. Because no wetlands in the unmined segment were field-delineated (and *at least one wetland was acknowledged to exist there*), there can be no meaningful “before and after” evaluation of effects on wetlands should longwall mining ever expand into this area.**

The acknowledged ignorance regarding the effects of longwall mining on water resources is the direct result of BMR’s long-standing unwillingness to require mine applicants to provide adequate information about the water resources at risk from longwall mines. Each and every mine application presents the opportunity (not to mention the obligation) to inventory and assess all wetlands and other water resources within the permit area. Then, as mining proceeds, required monitoring and reporting on the changes recorded would establish a valuable database of information against which to evaluate future mine projects. *Hoping* that no impacts will occur and ignoring them when they do is not the way the citizens of this Commonwealth expect environmental protection programs to be administered.

In concluding my comments on the previous PADEP-sponsored study, on the effects of longwall mining on forests (D'Appolonia 2001), I remarked: *One can only hope that the next study -- on the effects of subsidence on streams, wetlands, and riparian areas -- will be more informative and credible. The citizens of this Commonwealth deserve much better than this.* Unfortunately, my fellow citizens and I have been disappointed yet again.

Thank you for the opportunity to provide these comments. I encourage the CAC to do whatever it can to promote stronger legislative and regulatory protections of wetlands and other water resources in the context of underground coal mining.

Yours truly,

A handwritten signature in black ink, appearing to read "Stephen P. Kunz". The signature is fluid and cursive, with the first name "Stephen" being the most prominent.

Stephen P. Kunz  
Certified *Senior Ecologist* (Ecological Society of America)  
*Professional Wetland Scientist* (Soc. of Wetland Scientists)

cc: David E. Hess, Secretary, DEP  
Mary Jo White, Chair, Senate Committee on Environmental Resources  
and Energy  
Arthur Hershey, Chair, House Committee on Environmental Resources  
and Energy  
Scott Hutchinson, Chair, Joint Conservation Committee