CRITICAL ANALYSIS OF PROPOSED TOTAL DISSOLVED SOLIDS AND SULFATE LIMITS IN NPDES PERMIT NO. 0IL00159*AD

AMERICAN ENERGY CORPORATION, CENTURY MINE, BENNOC REFUSE DISPOSAL AREA

I. MINING IS A HIGHLY-REGULATED INDUSTRY – BEST MANAGEMENT PRACTICES

The coal mining industry is one of the most regulated industries in the United States. Indeed, the coal industry is regulated by federal law administered by OSM, USEPA, ACOE, and USFWS, and it is heavily regulated by their state counterparts. Relative to the regulations of the coal industry in Ohio, Ohio laws include federal requirements from the various federal agencies and, in many instances, Ohio has imposed even more stringent requirements than those required by the federal agencies.

One of the primary regulatory schemes that the State has adopted is SMCRA (Surface Mining Control and Reclamation Act). These state regulations have been in place since August 3, 1977, and require the coal industry to comply with "Best Management Practices (BMPs)." Through extensive reviews and amendments over the years, by both industry and the regulatory communities, BMP practices have been enhanced and incorporated into mining permits, and implemented on the ground by the operators. However, the American Energy Corporation (AEC) and The Ohio Valley Coal Company (TOVCC) go significantly further with the implementation of additional voluntary measures to provide additional protection to the environment.

Coal mining at the TOVCC No. 6 mine, Alledonia, Ohio, has been continuous since the 1960s, while mining at AEC's Century Mine has been continuous since calendar

year 2000. During that time TOVCC and AEC have followed the regulatory requirements and BMPs. Today, over forty years later, Captina Creek is classified as a High Quality Stream. In fact, it is rated as an outstanding aquatic resource stream with rare and diverse fish, macroinvertebrates, and amphibian communities. However, these data have been disregarded by OEPA and USEPA. These regulatory agencies have ignored the fact that, through the use of BMPs, AEC and TOVCC have been able to enhance and maintain the superb health of this stream and the biological communities within it, and have demonstrated that additional requirements are not necessary in Captina Creek to further restrict sulfate or TDS.

From the initial development of a coal mine, each operator takes into consideration SMCRA and Ohio requirements for BMPs regarding water management, slope stability, pit backfilling, backfill grading to final contour, compaction of backfill, erosion control, and covering of toxic materials. These practices create comprehensive and environmentally sound mine and reclamation plans that minimize impacts to the environment. An important part of these plans is the surface drainage control plans that protect resources, control erosion and surface runoff, and minimize sediment loading and impacts on water quality in the streams into which runoff is ultimately discharged. Best management practices include both proper administration (*e.g.,* monitoring, inspection, standard operating procedures, scheduling) and engineered controls, such as ponds, sumps, diversion ditches, pumps and pipelines, rip-rapped drainage structures, and the use of synthetic geo-fabrics and geo-membrane materials.

In the mine planning phase, operators identify potential acid-forming materials that could impact surface and ground water. Drainage plans are designed so that acidic and toxic materials have minimal contact with groundwater and surface water during mining and related activities. This can sometimes be managed

through special handling of material to minimize the exposure of runoff. In other cases, mine plans try to reduce the time of contact of acid or toxic forming materials through concurrent reclamation—the covering of these materials with non-toxic material as soon as possible following mining or final grading of a site.

During mine planning, BMPs are used to minimize deleterious water being discharged from the disturbed areas. Additionally, sites may use multiple sumps or rock check dams to capture in-ditch sediment flows before reaching sediment ponds and the point of final discharge. Upstream measures, like "graded ditches," are used to convey runoff from areas that have been graded or from temporary stockpiles to control erosion and reduce rills, gullies, and other erosional features that contribute to sediment loss off of disturbed areas. Other means of erosion control include temporary seeding and mulching, rip-rapping of channels, pumping and piping runoff, recycling water, and directing runoff to pits. The overall goal is to secure the sediment on the disturbed area to minimize treatment needed at the sediment ponds before discharging through the final outfall.

Examples of voluntary BMPs include sumps to provide increased retention time to allow sediments to fall out of suspension and water curtain booms that direct the flow within a pond to maximize the designed retention time. Operators also implement chemical treatments used to precipitate metals out of solution prior to discharge, including, more recently, the use of dosing wheels to gauge the appropriate amount of chemical to be added to a specific influent flow into the pond. Flocculent and other treatment blocks are also used in ditches to facilitate the sediment drop out as soon as the water hits the ponds. The sediment ponds utilize various spillway designs targeted to discharge the best quality water possible for the specific site, while still meeting design storm event requirements. Efforts are made to control oil and grease, suspended solids, or floating debris prior to discharge. Even engineering controls such as oil absorbent booms have been

incorporated to control floating materials like foam, oil, and grease from leaving the pond. In addition, administrative controls have been implemented to include the development of a mine site water balance to determine all of the water sources and flow patterns on the mine site. Through this process, sites are better able to manage, and in some cases like TOVCC, reduce water intake from Captina Creek and minimize discharges to Captina Creek. (See attached Appendices A, *TOVCC Water Withdrawal and Discharge to Captina Creek 2006-2012.*) Overall, these required and voluntary practices enhance water quality in the receiving waters by minimizing withdrawal and discharges, improving efficiencies, and utilizing recycling where possible.

With existing BMPs, TOVCC and AEC have been able to discharge into the Captina Creek watershed for decades with no deterioration to the water quality of the stream and no proven alteration of the stream's biology. As such, additional regulatory requirements are unnecessary and unsupported.

II. OHIO EPA DATA DEMONTRATES THAT MINING DISCHARGES ARE NOT HAVING A MATERIAL ADVERSE EFFECT ON BIOLOGY IN PERENNIAL STREAMS.

Captina Creek Watershed - Overview

Captina Creek and Piney Creek, a tributary to Captina Creek, are located in one of the largest coalfields in the United States and one of the most heavily mined areas in Ohio. TOVCC and AEC have been operating coal mines within the Captina Creek watershed for approximately 25 years, and prior to TOVCC and AEC, NACCO Industries operated coal mines beginning in the 1960s. Despite both historic and active coal mining, the Captina Creek watershed possesses good to outstanding aquatic resources. Many streams within the watershed contain rare and diverse species of fish, macroinvertebrates, and amphibians, and the streams show very few signs of chemical, physical, or biological stress.

The Ohio EPA has designated the mainstem of Captina Creek an Outstanding State Water (OAC 3745-1-05). In addition, nearly the entire length of Captina Creek has been designated an exceptional warmwa[illegible] habitat. Moreover, The U.S. EPA has designated Captina Creek an Aquatic Resource of National Importance based on its biodiversity and water-quality values ([illegible]. EPA, 2010). Captina Creek's exceptional biological diversity places the creek in the top ten watersheds in Ohio (OEPA, 2010). Captina Creek and its watershed have been able to sustain its exceptional ratings despite the fact that the coal industry has operated near the watershed since the 1960s.

Sampling Data

The Ohio EPA has conducted sampling of the fish, habitat, and macroinvertebrates in the Captina Creek watershed over a 26-year period from 1983 to 2009.[1] The results of this sampling are grouped into three sections: Instream Habitat, Fisheries Community, and Benthic Macroinvertebrate Community. These data can provide a well-rounded perspective of both the physical and biological conditions of a particular reach of stream.

A. Instream Habitat

The Qualitative Habitat Evaluation Index (QHEI) represents a measure of in-stream geography and provides a semi-quantitative assessment of the physical characteristics of a sampled stream.

Captina Creek:

During 2009, the average QHEI score for the main stem of Captina Creek was 72.2 out of 100 (OEPA, 2010). This is indicative of very good overall habitat. Overall, high-quality substrates, abundant macrophytes and in-stream cover, and good channel development contribute to habitat quality that can support very good to exceptional biological communities (OEPA, 2010). There was no significant difference in QHEI among reaches upstream and downstream of TOVCC's and AEC's outfall locations. On the contrary, the near downstream stations had a mean QHEI that was somewhat greater than the upstream and far downstream reach groupings.

[1] Macroinvertebrate sampling began in 2008.

Piney Creek:

In 9, the QHEI for Piney Creek was excellent - 5 (OEPA). This is higher than the average QHEI score of 74.7 for similar-sized tributaries to Captina Creek, despite AEC having an "impact" on most of the watershed.

B. Fisheries Community

Three criteria were used by the Ohio EPA to characterize fish communities within the watershed: The Index of Biotic Integrity, the Modified Index of Well Being, and the total number of fish species. All three scores were highest in the sampling locations downstream of TOVCC's and AEC's operations.

INDEX OF BIOTIC INTEGRITY

The Index of Biotic Integrity (IBI) uses fish species to measure the aquatic vertebrate community and the surrounding conditions.

Captina Creek:

Captina Creek had the highest IBI average of any stream in the state of Ohio (55.1 out of a possible 60 points) with a total of 56 fish species collected, many of which are pollution intolerant. In fact, the IBI scores actually *increased* downstream of TOVCC's and AEC's operations – from a 52.8 upstream to a 57 downstream of TOVCC and AEC.

Piney Creek:

The single IBI score for Piney Creek, taken in 2009 downstream of TOVCC's and AEC's operations, was 56, higher than the average IBI for the Captina Creek mainstem, despite AEC having an "impact" on most of the watershed.

MODIFIED INDEX OF WELL BEING

The Modified Index of Well Being (MIwb) evaluates a fish community's response to environmental stress. Captina Creek's average MIwb score of reflects Captina Creek's exceptional biological quality. This average score is the same as it was in 1983 (when NACCO Industries was mining in this area), five years prior to TOVCC's mining operations. Captina Creek's MIwb score indicates a fish community comparable to several of the best streams in Ohio (OEPA, 2010). As with Captina Creek's average IBI score, the average MIwb score increases slightly two miles downstream of TOVCC's and AEC's discharges—from 9.46 to 9.90.[2]

TOTAL FISH SPECIES

Certain species or quantities of fish can serve as indicators of a stream's overall health or quality.

Captina Creek:

Over the past 26 years, the average number of fish species collected at each sampling location has fluctuated between 26 and 29. This number actually increases to 30.8 downstream of TOVCC's and AEC's operations.

Piney Creek:

In 2009, 19 total fish species, including six pollution-intolerant species, were collected from Piney Creek at the sampling site downstream of TOVCC and AEC. This is greater than the average of 16 species, including 5 pollution-intolerant species collected from other similar-sized tributaries to Captina Creek. This is significant when you consider that AEC has mining operations throughout the majority of the watershed.

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[2] No MIwb data is available for Piney Creek.

C. Benthic Macroinvertebrate Community

The Invertebrate Community Index (ICI) is very similar to the IBI and measures the health of the macroinvertebrate community. Although the ICI score declined slightly below exceptional warmwater habitat status downstream of TOVCC's and AEC's outfalls during 2008 and 2009, the QHEI was also slightly lower in those areas and Captina Creek's average ICI score of 49.8 reflects exceptional biological diversity.

Conclusion

TOVCC and AEC have been operating in the Captina Creek watershed since 1988 with numerous permitted NPDES discharges, and NACCO Industries operated in the same location beginning in the 1960's and continued until 1988. Nevertheless, both Captina Creek and its tributary, Piney Creek, have remained two of the most biologically diverse streams in the state of Ohio. Further, Ohio EPA has provided no evidence to support that sulfate and TDS are having a detrimental effect on Captina Creek or Piney Creek's biota, fisheries, or habitats by evidence of Ohio EPA's data. As such, Ohio EPA has established no basis for the inclusion of additional requirements to further restrict effluent limits within the aforementioned watershed.

III. THE ASSUMPTION THAT SULFATE DISCHARGES FROM COAL IS HARMFUL IS INCORRECT.

From our review of the scientific literature, we conclude that no single sulfate concentration can yet be identified as an appropriate threshold for the protection of benthic macroinvertebrates in Ohio streams. Relatively few laboratory species have been used to develop sulfate regulatory thresholds to date, and of those that have been tested, fewer still would be considered as ecologically relevant to southeastern Ohio streams, especially the headwater streams. Therefore, insufficient toxicity data presently exist to derive a relevant and defensible aquatic life protection criterion for sulfate.

A. EPA Comments to Bennoc Discharge Estimates.

An Anti-Degradation analysis for Ponds 023 and 024 discharges to Piney Creek was resubmitted to the Ohio EPA as official comments on September 15, 2012, which can be found in the attached appendix as Appendices B (Sovereign Consulting Inc.). The Ohio EPA comments were provided in a series of emails and centered around protecting the small, unnamed tributaries the two ponds discharged to before entering Piney Creek. The Ohio EPA considered the unnamed tributaries to be headwaters and therefore discharge was limited to an end-of-pipe numeric standard for sulfate and TDS. The other comments concerned pond designs and possible dynamic modeling of discharge to Piney Creek.

The Ohio EPA also asked the USEPA to review the analysis. The USEPA comments primarily centered on the effect of sulfate and TDS discharges on Piney Creek and essentia ignored impacts to the unnamed tributaries.

- The USEPA and Ohio EPA both suggested that background TDS in Piney Creek is greater than 600 mg/L and therefore is near its assimilative

capacity. However, given that sulfate and chloride rarely exceed 200 mg/L in background samples, we suggested that they had either sampled downstream of the mine discharge or made an analytical error. In fact, recent sampling (daily sampling since April 2013) of both Long Run and Piney Creek upgradient of the discharge points shows that TDS does not exceed 200 mg/L, which fits with the sum of the individual ions. In fact, the downstream receiving water for Long Run and Piney Creek also do not exceed proposed water quality standards for TDS and sulfate. Therefore, the assimilative capacity of the streams is actually quite sufficient to handle these discharges.

- The individual ponds do not have to be increased in size or re-designed to provide controlled discharges. In fact, the data demonstrate that all discharges occur when the stream discharge ratio is greater than 3, ensuring that downgradient concentrations of TDS and sulfate will not exceed the numeric water quality standards and waste load allocation estimates. As discussed numerous times, the 7Q10 is an inappropriate flow standard to use, since ponds simply do not discharge during low stream flows.

B. Sulfate toxicity depends on the relative abundance of many other ions, including hardness cations and chloride.

The toxicity of "major ions" (i.e., naturally-occurring inorganic cations and anions found in all surface waters) has been widely studied, owing to concerns over the toxicity of excess concentrations of these ions in treated effluents (Mount et al. 1997, Goodfellow et al. 2000). These studies conclude that no one mixture of major ions will exhibit the same level of toxicity, but will instead depend on the relative abundances of individual ions, including concentrations of cations related to hardness (calcium and magnesium) and chloride. Because sulfate toxicity in particular can be mitigated under conditions of elevated hardness and chloride, studies have used these relationships to propose regulatory criteria that are

numerically dependent on hardness and/or chloride (Soucek and Kennedy 2005, Soucek 2007, Elphick et al. 2010).

The Soucek studies have been used as the basis for developing hardness and chloride-dependent sulfate criteria in Illinois, Indiana, and Iowa. Ohio EPA is suggesting a tiered sulfate criteria based on chloride (in mg/L) and hardness (in mg/L as CaCO3) similar to those criteria in Illinois, Indiana, and Iowa. However, even though the use of hardness- or chloride-based criteria may be a useful general approach, it is still unknown whether the criteria employed in other states can be reliably applied to SE Ohio headwaters streams. This is because the toxicity of sulfate is also dependent on the concentrations of other major ions in addition to hardness (e.g., sodium and potassium). Therefore, it is not correct to apply these criteria until or unless it can be confirmed that the ion mixtures encountered in SE Ohio headwaters streams are similar to the ion mixtures of waters used in the laboratory tests on which they are based.

C. Few toxicity tests have been conducted using aquatic species that are ecologically relevant to Ohio headwater streams.

The accuracy and reliability of aquatic life criteria depend strongly on how well the species used in toxicity testing represent the species actually encountered in any given location. Although the species typically required for derivation of these criteria <u>should</u> represent a wide range of organisms, the fact is that the toxicity database used to derive the Illinois, Indiana, and Iowa sulfate criteria is particularly small and unrepresentative of the organisms present in Ohio headwater streams. Specifically, the existing sulfate criteria (Soucek and Kennedy 2005, Soucek 2007) are based on toxicity data for only five taxa: 1) the water flea *Ceriodaphnia dubia*, 2) *Hyalella azteca*, an amphipod, 3) an aquatic insect, *Chironomus tentans*, a midge fly, 4) *Sphaerium simile*, a fingernail clam, and 5) *Lampsilis siliquoidea*, a freshwater mussel.

Although little is yet known of the aquatic community in ephemeral or intermittent Ohio headwater streams, it is likely that only two of the five tested organisms might be expected to be found in true headwater streams – *Hyalella* and *Chironomus,* with the possible addition of *Sphaerium*. We would not expect to find *Ceriodaphnia,* which is typically found in standing waters, or *Lampsilis,* which is found in larger streams or rivers. Given that we only have sulfate toxicity data for two potentially relevant invertebrate species, there is no way to know if the sulfate criteria Ohio EPA wants to apply to mine permit discharges is necessary or appropriate for the protection of headwater streams in Ohio.

D. The potential ecological effects of mine related discharges on Ohio headwaters streams are still poorly known.

In addition to the potential for sulfate criteria from other states being irrelevant to Ohio, there are limited data on long-term adverse effects on stream biota from mine related discharges of the kinds currently found in Ohio Appalachian waters. This is because these particular headwaters streams are as yet poorly studied, and because similar studies of headwaters streams in nearby coal mining districts indicate not only a high level of variability among headwaters streams, but also the strong influence of habitat-related factors which are unrelated to toxicity from sulfate or other major ions.

For example, GEI (2013) conducted a study of twelve streams (46 sites) in West Virginia that assessed longitudinal trends in the water quality and benthic macroinvertebrate communities in three reference streams and nine streams in areas of coal mining and associated valley fill (CM/VF) activities. This study concluded that both water quality and habitat were drivers of overall benthic invertebrate community structure; i.e., sulfate or other ions could not by themselves explain patterns observed below mines. In addition, evaluation of longitudinal

trends indicated that the furthest downstream site on streams draining mine activities were not statistically different from their counterparts on reference streams.

In a companion study, GEI also evaluated the benthic macroinvertebrate populations in a number of undisturbed headwater streams (GEI 2011). This included paired sites in the headwaters, defined as 1) the upper most portion with water, and 2) the next downstream location where a defined channel exists and wetted width was 0.3 m. This study showed that headwater stream sites had remarkably dissimilar communities, even when comparing sites on the same stream – indicating that benthic invertebrate communities in these ephemeral or intermittent portions of headwater streams are developed through opportunistic colonization. As such, they simply represent a subset of a broader regional pool of taxa and that disturbance of individual headwater streams should have little measureable effect on the larger regional benthic invertebrate populations.

E. Additional study would be required to derive defensible sulfate criteria that would apply to SE Ohio headwaters streams.

As described above, we conclude that insufficient toxicity and ecological data exist to derive appropriate regulatory criteria for sulfate that can be applied to SE Ohio headwaters streams. Until it is understood which species are most likely to be present in these waters, when they are present, and in what abundance, it will not be possible to determine what additional testing might be required to develop a database listing ecologically relevant species and their threshold to sulfate toxicity, and using waters that are chemically similar to these same waters. Therefore, we conclude it is unlawful to apply existing regulatory sulfate criteria to SE Ohio waters given the information available at this time without proving that sulfate is toxic to Ohio waters and biota.

The potential effect of coal mining discharges, if any, is temporary and localized. Coal refuse is subject to reclamation, which can reduce or eliminate the potential effects (Agourdis and Warner 2013). GEI (2013) demonstrated that there are differential responses to disturbance in streams affected by coal mining and that there is no diagnostic cause/effect response to coal mining. In addition, where effects of coal mining were sometimes evident in the reaches immediately downstream of valley fills, those effects were ameliorated within a short downstream distance (GEI 2013). This longitudinal effect has been noted by several researchers using percent mining in the watershed (which decreases with increasing distance from the disturbance), such that community-level invertebrate metrics are generally within the range of reference condition when the mining footprint is reduced to less than 3 to 25 percent of the watershed (Merriam et al. 2011, Bernhardt et al. 2012). Finally, GEI (2011) suggested that the colonization of these types of headwater streams is opportunistic and that any potential impact to one or a small number of streams, does not affect the regional biodiversity.

A search of the literature was done to determine if other States have adopted different regulations for similar types of waste water discharges and, if so, why? The Iowa Department of Natural Resources (IDNR) reached the conclusion that the toxicity associated with substances comprising a major portion of TDS is predominantly due to either chloride or sulfate. The IDNR believes that with the adoption of a sulfate standard and the existing chloride standard, the water quality standards adequately address toxicity of dissolved salts and the TDS standard is not necessary, because TDS cannot predict the threshold of adverse effects to aquatic life. Further, OEPA's own monitoring data indicated that TDS levels in the Captina Creek watershed superior to limits suggested by OSM are acceptable within the watershed.

The IDNR ambient monitoring program determined that surface water conditions in Iowa and Illinois were similar enough to apply the same approach with numerical sulfate and chloride criteria. Iowa also recognized that the sulfate standard was derived on toxicity data for targeted species sensitive to sulfate, when the fact is that sulfate is a common sal necessary for life at some concentrations. The sulfate criterion applied is a tiered approach dependent on the concentrations of both hardness and chloride. There simply is not enough data on Ohio streams to demonstrate negative impacts to Ohio's stream biota from sulfate and TDS. Clearly the State's justification to jeopardize the coal industry's existence in Ohio has not been thoroughly thought out with respect to implementation of sulfate and TDS limits.

IV. REMOVAL OF SULFATE/TDS IS NOT TECHNICALLY FEASIBLE OR ECONOMICALLY REASONABLE.

Based on the proposed new NPDES discharge limits and proposed monitoring points for coal mining in Ohio, many discharge points will likely be out of compliance with respect to:

- Sulfate: Limits of roughly 2100 mg/L have been proposed while many mine water effluents range from 260 to about 3500 mg/L.
- TDS: Although not specifically stated yet, values ranging from [illegible] to 1500 mg/L.

The comparison of existing mine effluent discharges against the proposed discharge limitations indicates that it will not be possible to effectively and economically treat mine water discharges due to the complexity of sulfate and/or TDS removal.

The proposed Ohio EPA NPDES discharge limitations are decidedly technologically impr[illegible]cal for most waste water discharges from coal mining and other similar industries. There exists very little information on the rationale for the discharge limits proposed. From a chemical perspective, mining effluents have always been treated for pH and metals based on well accepted toxicity studies. T[illegible] and sulfate, while aesthetically problematic, have not been considered particularly dangerous or toxic, especially in the range observed for most mine effluents, and Ohio EPA has not demonstrated otherwise.

In addition, the permits should be based on the chemical make-up of the water and not general water quality parameters such as TDS. In fact, [illegible]S is not particularly useful for toxicity assessment or chemical mixing because, depending on local geology, it is composed of different ions, each with its own toxicity or non-toxicity characteristics.

The use of numeric criteria for sulfate and TDS at coal mine facilities also does not take into consideration the nature of the coal operations themselves. This consideration is necessary in order to determine the need and practicality of implementing such measures. Contrary to the assumptions inherent in the NPDES permitted levels, there are limited technologies suitable for sulfate and TDS removal. Moreover, those technologies are complex, cost prohibitive, and produce waste streams more problematic than the influent water they purport to treat. These are discussed in more detail below.

Important operational considerations that have been ignored in the new permit requirements include (1) the proposed limits are not technically achievable or economically reasonable, (2) the new proposed limits will make past capital improvements entirely obsolete, (3) the construction of larger ponds is not possible, (4) coal mine discharges, unlike other regulated industries are exclusively intermittent, and (5) the permit limits are not based on rigorous scientific review.

A. The sulfate level proposed by the permits is not technically feasible or economically reasonable.

Treatment of high sulfate/ TDS water is not simple. Although some agencies believe reverse osmosis (RO) can be easily implemented, the cost is unreasonable—approaching $200M or more over a 20 year design/operation period. To treat these waters, conventional RO has to include several upfront water treatment systems including pH adjustment, ion exchange and disinfection and prefiltration to prevent clogging. The brine from the RO reject is rarely addressed, yet this waste cannot be discharged and is virtually impossible to treat without exotic systems such as crystallization or flash evaporation. Further, Ohio EPA incorrectly assumed that, because technology exists for lowering sulfate and TDS to the new permit levels, all industries should be capable of implementing this technology. USEPA has cited information on treatment technologies provided by vendors promoting the

equipment. They have failed to properly evaluate whether these technologies will work on the water chemistry matrix in different industrial waste water streams and, most importantly, whether they can be implemented in a cost-effective manner that will not force industries out of business. CONSOL Energy, Inc. attempted to implement an RO unit to handle high chloride discharges from its various properties. The system involved the connection of the discharges through miles of pipe leading to an RO unit. Typical capital cost exceeds $200M including an expected $2-5 M year in operation and maintenance. The RO option has proven so difficult and costly to implement that the consultant (Potesta, 2008) has suggested it remains economically "non-viable."

The most important single problem with the permit requirements is that Ohio EPA/USEPA presumes that reasonable off-the-shelf technology exists for the industry to adopt. The new regulations also do not allow the industry to come into compliance over a period of time, which would allow for the development of more practical, cost effective treatment technologies. There exists no mechanism that allows credit for phased compliance through Best Available Technology (BAT) and systematic planned effluent reductions. Allowing this approach would provide a true level playing field and allow smaller and medium size companies to stay competitive.

B. The New Permit Limits Will Make Past Efforts to Develop and Implement Proven Best Management Practices Obsolete.

Most coal mine discharges originate from contact of coal refuse piles with meteoric (rain/snow) water. This water runs over and through the refuse, gradually becoming enriched in sulfate and metals, such as iron and manganese, and then is collected in ponds that provide aeration and treatment prior to discharge to local waterways. The coal industry has complied with prior permit obligations by constructing specific treatment systems that meet the limits in the permits. These capital

improvements include settling basins, aeration chambers, waste water impoundments, lime treatment plants, run-on and run-off controls and end-of-pipe sampling and analysis plans and programs. The changes required to meet the new discharge permit requirements are so radical that these past capital improvements would be rendered obsolete.

C. Larger Ponds.

Increased retention time resulting from larger ponds is not relevant when discussing sulfates. Sulfates are very soluble and no amount of increased retention time will assist in decreasing sulfate levels. Traditionally treatment of metals, pH, and suspended solids is not similar to that of treatment for sulfates and TDS.

Topography: The topography of the area is illustrated in the map attached as Appendices C. The AEC Bennoc facility (and other coal mines) is located generally in the southeastern part of the State in Belmont, Monroe and Jefferson Counties. Here, as illustrated in the map, the area is unglaciated with steep topography ranging in elevation from 1000 to 14[illegible]ft., the highest in Ohio. The slopes range from gently sloping to very steep or 10 degrees to over 45 degrees. As such three very significant problems may be encountered with respect to ponds emplaced in these areas:

1. Ponds and conveyance channels cut into hillsides will require the excavation of large amounts of material. With increased width, the cut becomes more extensive and the slope must be decreased to achieve stability. These conditions combine to increase excavation quantities and costs disproportionately to the capacity gained. In some cases, shallow bedrock will prevent excavation to desired depths.

2. The potential for sloughing of overburden soil or weathered rock into the pond and channels will result in decreased capacity and flow. Major sloughing

will often occur during severe storm events. Costs for removal of sediment and overburden are therefore increased. In addition, the sloughing will increase both TDS levels and stream sedimentation locally.

3. Increasing pond size at Bennoc in particular would mean excavating and cutting into the face of the coal refuse areas thus exposing fresh coal refuse to interaction with rainwater. The refuse is likely not stable enough to allow this type of expansion given the 30 to 45 degree slopes.

Facility Layout: See the attached site pl view of the Bennoc ponds. (Plan is attached as Appendices D.)

Hydrology: Coal refuse ponds are designed to capture various anticipated rainfall events to allow for sedimentation and clarification of water prior to discharge. The design also considers the mine operations. For example, if the refuse pile area expands, moves or is otherwise modified to accommodate production, then pond placement and selection impacts the cost and difficulty in providing adequate hydraulic appurtenant structures for use during the disposal period and subsequent abandonment of a coal refuse disposal facility. The design of multiple ponds to accommodate production needs results in construction estimates that must be timed with production. Presently the ponds are designed and constructed to control adverse environmental effects while balancing the hydraulic requirements within any coal refuse area sub-watershed. Increasing capacity in this topographically challenging area upsets the dynamic balance presently achieved while increasing costs unnecessarily by orders of magnitude.

D. Coal Mine Discharges Are Exclusively Intermittent Discharges.

Unlike other regulated industries, the discharges from coal mines are almost exclusively intermittent discharges. These discharges are driven by meteoric events that only occur after a particular rainfall event such as 1 inch of rain per hour. The streams they discharge to also respond to rain events such that coal mine discharges only occur during average to high stream flows. They do not occur during low flow or 7Q10 flow conditions, which is the flow condition the EPA and Ohio EPA use to determine reasonable potential (for in-stream degradation). Various calculations using real stream flows and water chemistry demonstrates that under most discharge conditions, sulfate from the coal refuse ponds has a negligible effect on stream water chemistry, and Ohio EPA has not provided sufficient evidence to demonstrate otherwise. In consideration of the technological tools available to treat sulfate and TDS, it is unclear why OEPA would suggest limits on parameters that are not economically treatable, and threatens the existence of the coal industry.

V. OTHER DISCHARGES ON CAPTINA CREEK AND ITS WATERSHED

Assuming there is a demonstrated need for Sulfate and TDS limits in the Captina and Piney Creek watersheds, then these limits should be applied to all significant dischargers, not just the coal industry. However, recently issued NPDES permits for the Barnesville Wastewater Treatment Plant (WWTP), which discharges into the headwaters of North Fork of Captina Creek, and the Bethesda's WWTP, which discharges into a significant tributary of Captina Creek (Bend Fork), do not contain numeric limits on TDS or its components.

Each of these wastewater treatment plants has the ability to discharge as much as 4,000,000 GPD, whether there are high flows or low flows in the receiving stream. The loadings of TDS from these wastewater treatment plants is significantly greater than what would be associated with the 65,000 GPD discharge from the Bennoc facility, which only occurs during wet weather, i.e. when there are greater flows in the receiving stream. Accordingly, the discharge of TDS from these WWTPs would be expected to have a far greater impact on the watershed than the relatively miniscule discharge from the Bennoc facility.

The selective imposition of limits on Sulfate and TDS in the AEC Bennoc NPDES permit is arbitrary and capricious and demonstrates an apparent bias against AEC and the coal industry.

VI. REQUIRING SULFATE/TDS LIMITS WILL HAVE A SIGNIFICANT ADVERSE SOCIAL AND ECONOMIC IMPACT.

The overall impact to Ohio coal mining due to the imposition of sulfate and TDS limits in NPDES permits ranges from significant to devastating. Mining facilities are made up of several components, including coal waste storage, processing facilities, stockpiles, temporary storage piles of overburden, and backfilling. Currently, SMCRA (Surface Mining Control and Reclamation Act) requires a controlled drainage plan, which captures all the drainage off a disturbed mine site and then funnels that drainage through a pond for treatment in order to meet water quality requirements. This has been the long-time standing practice in the coal mining business, and, as indicated in Captina Creek and Piney Creek, has not only prevented any adverse impact on aquatic life, but any measurable effect at all.

Presently, the existing water quality parameters and limits are expensive, yet obtainable and treatable using proven technologies as discussed in Section I. However, the recent introduction of sulfates and TDS limits is no longer a "reasonable" request by agencies. Proven and tested methods that are both reliable and economical do not exist for the treatment of sulfate and TDS. Therefore, the imposition of sulfate and TDS limits creates a crisis in maintaining a viable operation.

The closing of the TOVCC's and AEC's operations in the State of Ohio (AEC's Century Mine, TOVCC's Powhatan #6 Mine, OhioAmerican Energy, Inc. and The Ohio Valley Transloading Company) would have a detrimental impact on both the state and local economies. TOVCC and AEC take pride in their ability to provide high paying, well-benefited jobs with an average salary of $88,000. If all of TOVCC's and AEC's Ohio operations ceased due to the imposition of sulfate and TDS limits, over 1,500 individuals would lose their high paying, well-benefited jobs forever. This

impact would be significant when compared to our local demographics. The United States Census Bureau states Belmont County has an estimated population of 69,671 consisting of 28,747 households. The average income for each household is $39,712, which is well below TOVCC's and AEC's average, which only represents one member of each household. According to the U.S. Bureau of Labor Statistics, the unemployment rate in Belmont County for 2012 was 7.42%.

The loss of TOVCC's and AEC's operations in Belmont County as a result of these imposed regulations has the potential to increase the County's unemployment rate by 4.47%. In 2012, TOVCC's and AEC's Ohio operations accounted for over 1,500 well-paying jobs. Using a household multiplier from the United States Census Bureau, each household averages 2.32 members. Therefore, on average it could be said that TOVCC's and AEC's Ohio operations directly impact approximately 3500 residents in southeast Ohio. This does not include the significant number of secondary jobs that are created as a result of these mining jobs (independent studies have shown that for every mining job there are up to 11 other created), totaling 16,500 local jobs that would be impacted. The loss of these direct and indirect jobs, would have a detrimental impact to the economy and, more importantly, the families of Ohio.

If the operations of TOVCC and AEC in Ohio were to cease to exist as a result of these proposed limits, the state would suffer losses in the form of reduced revenue through taxation in excess of $285 million over the life of TOVCC's and AEC's Ohio reserves. Additionally, TOVCC's and AEC's Ohio operations and supporting facilities provide on an annual basis approximately $132 million in salaries and wages here in Ohio, not to mention the $125 million these Ohio companies invest into additional infrastructure at the operations each year. These Ohio operations also support the state and local economies through the hundreds of millions of dollars they expend each year in operation and maintenance costs. Although these numbers are significant in their impact to both state and local economies, they

reflect only the direct impact of these Ohio operations. These numbers would show more detrimental impacts when taken in the consideration of all other operations in the State of Ohio.

In conclusion, implementing sulfate and TDS limits into Ohio NPDES permits is not only inappropriate, but is not in the best interest of a state that prides itself on sustaining and creating jobs. With the potential to shut down all of Ohio's coal industry and to have detrimental impacts to both state and local economies, the proposed sulfate and TDS limits should not be implemented without considering the social and economic impacts it will have on all Ohioans.

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APPENDICES

TOVCC Water Withdrawal and Discharge to Coptina Creek 2006-2012 ..... A

American Energy Corporation, Response to Comments for NPDES 0IL00159, dated September 15, 2012 ..... B

Topographic Map of Bennoc C

Bennoc Facility Layout Map ..... D