Original: 2243

BRINE & FRAC

HRT

WATER TREATMENT

HART RESOURCE TECHNOLOGIES

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EQB Oral Testimony
By Paul Hart, HRT
2-26-02

Proposed Rulemaking; 25 PA. Code CH. 96
Water Quality Standards Implementation – Chloride and Sulfate

Thank you for providing this opportunity for public comment. I am Paul Hart, President of Hart Resource Technologies, Inc. (HRT) providing industrial wastewater treatment and disposal services for the oil and gas industry. I am also chairman of the environmental committee for the PA Independent Oil and Gas Association. I have 16 years experience in the wastewater treatment and oil and gas industries, and a graduate of Indiana University of PA with a degree in secondary science education.

The proposed rulemaking to include sulfate and chloride to the criteria in Chap. 96.3(d) is not only prudent it is necessary. The complaints that this proposal represents backsliding are unfounded. This proposal will essentially return the criteria for discharges to the standards that existed in October of 2000. At that time osmotic pressure was used to limit discharges to protect drinking water and aquatic life. The oil and gas industry are not the villains some members of our society would portray them as. A vast majority of the industry goes to great length and expense to operate legally and ethically. As members of our community we realize we must take responsibility for our environment. We are the custodians and stewards in care of our ecosystem for our children and generations to come. All evidence we have found indicates than an osmotic pressure 50 mOsm/kg is sufficient to protect aquatic life and drinking water supplies. We have abided by this criteria for 16 years, and under this criteria we will be able to continue to provide disposal services for the industry.

If this proposal is not approved, discharges will have to meet a chlorides limit of 250 mg/l, which will have no benefit to environment. High concentrations of chlorides do have a negative impact on environmental and human health but a standard of 250 mg/l is arbitrary and set ridiculously low. There is no scientific basis to support a 250 mg/l limit to protect human health. It is primarily for cosmetic/aesthetic concern only. Discharges from water softeners cannot even meet this requirement.

The Integrated Risk Information System (IRIS, EPA risk assessment information) "provides chemical-specific risk information on the relationship between chemical exposure and estimated human health effects". A current search of the IRIS database reveals that neither chlorides or sulfates are listed as a human health hazard.

If you do not approve this proposal, the effect on the environment and industry, will be measurable, and possibly severe. The Appalachian basin must have affordable approved disposal methods available. Our business provides such treatment and disposal service with a controlled chlorides discharge that meets the osmotic limitations for discharge to a stream. If this proposal is not approved we will not be able to meet the new chloride limitations and will have to go out of business. Our facility and others in the industry are operating at capacity more than ever before. The oil and gas industry is working hard to meet the energy demands of society to produce the paper we hold the chairs we sit on, and the transportation we used to get here. New, more efficient methods of production generate more wastewater for disposal. Costs for disposal of wastewater in PA are currently 2-3 times higher than the national average due to geological differences and restrictions on disposal options. According to EPA's 2000 "Profile of the Oil and Gas Industry", they site the American Petroleum Institute statement that "over 90% of onshore produced water is disposed of through injection wells". However, in Pennsylvania less than 9% of produced water is disposed of in injection wells, and over 75% of wastewater is disposed of at facilities like ours that require NPDES permits.

If this proposal is not approved, disposal costs will be 4-8 times the national average due to transportation and new technology requirements. The oil and gas industry is trying to meet demands of our society but they cannot pass the cost on to the consumer. The producers in PA do not sell their gas retail. They usually have to sell to the closest transmission line or utility and have little or no leverage to negotiate price. Price is based on supply and demand. Producers are paid the market price and cannot increase their price when their costs increase. The reality is if they do not have affordable disposal, they will reduce production, plug wells, lay off employees, and/or dispose of water illegally to stay in business.

Please do not surrender to emotional idealogic rhetoric.
I urge you to make the responsible decision to approve the proposed regulation.

Thank you for your time and this opportunity to testify on the proposed regulation.

Paul Hart

Paul Hart

ORIGINAL: 2243

PENNSYLVANIA OIL & GAS ASSOCIATION

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March 21, 2002

Environmental Quality Board
P. O. Box 8477
Harrisburg, PA 17105-8477

Re: Proposed Rulemaking – Chapter 96, Water Quality Standards Implementation (Chloride and Sulfate)

I write on behalf of the approximately 150 companies and individual members of the Pennsylvania Oil and Gas Association to express support for the proposed rulemaking that would revise 25 *Pennsylvania Code* §96.3 (water quality protection requirements). The amendments add chloride and sulfate to the list of chemicals for which water quality criteria for the protection of potable water supplies would be established at the point of an existing or planned surface potable water supply withdrawal instead of at the point of discharge.

As discussed in the preamble to the rulemaking proposal, the amendments are meant simply to correct an inadvertent error made in the Department's water quality rulemaking that amended Chapter 93 and established Chapter 96 under the Governor's Executive Order 1996-1 and the Department's Regulatory Basics Initiative (RBI).

Restoring the regulatory treatment of chloride and sulfate that existed prior to the promulgation of the RBI amendments will have no negative impacts either on the environment, on human health, or on drinking water supplies.

The criteria for the two chemicals are the same as the secondary maximum contaminant levels of the drinking water program and are managed for aesthetic considerations only. Historically, they have not been treated as statewide parameters of concern because there are no identified toxicity-related human health impacts at or near the criteria values. In addition, the Department's current regulation of chloride through an osmotic pressure criterion to protect aquatic life from adverse effects of dissolved solids has proven to be protective of the instream use.

We also support the proposed amendment because the water quality protection requirements for chloride and sulfate made in the RBI rulemaking will have severe consequences for the management and disposal of wastewater from oil and gas exploration and production activities.

Approximately 100 million gallons of production wastewater are managed at centralized treatment facilities and discharged to surface waters under an NPDES permit. In its current form, §96.3 will require a significant reduction in the volumes of wastewater that can be handled by existing treatment facilities and force plant operators to incur substantial new capital expenses to modify their treatment processes.

Treatment plant operators anticipate that the current regulations could increase the cost of their services to independent oil and gas producers by as much as four to eight times. Such cost increases would undermine the economic viability of the only cost-effective wastewater treatment and disposal option available to oil and gas producers in Pennsylvania today.

Because there are no negative environmental or human health effects cause by the proposed amendments to §96.3, we urge the Board to promulgate the amendments as a final rulemaking as soon as practicable to avoid the unintended regulatory costs created by the inadvertent RBI revisions.

for the Pennsylvania Oil and Gas Association

Stephen W. Rhoads
President

Original: 2243

March 12, 2002

Delivered by Hand
Mr. Edward R. Brezina, Chief
Division of Water Quality Assessment and Standards
Bureau of Water Supply and Wastewater Management
Pennsylvania Department of Environmental Protection
11th Floor, Rachel Carson State Office Building
P.O. Box 8467
Harrisburg, PA 17105-8467

Re: Proposed Rulemaking
"Water Quality Standards Implementation – Chloride and Sulfate"
32 Pa. Bull. 428 (January 26, 2002)
Comments of Citizens for Pennsylvania's Future (PennFuture)

Dear Mr. Brezina:

Citizens for Pennsylvania's Future (PennFuture) appreciates the opportunity to submit these comments on the Environmental Quality Board's proposed rulemaking that would amend 25 Pa. Code § 96.3 with respect to the water quality protection requirements for chloride and sulfate. Notice of the proposed rulemaking appears at 32 Pa. Bull. 428 (January 26, 2002).

PennFuture is a statewide, nonprofit public interest organization that advocates in the area of environmental and energy law and policy in order to promote sustainable economic growth and protection of Pennsylvania's environment and natural resources. PennFuture firmly believes, as Pennsylvania's Clean Streams Law states, that "the prevention and elimination of water pollution is . . . directly related to the economic future of the Commonwealth," and that "clean, unpolluted streams are absolutely essential" for Pennsylvania to attract new business enterprises, to develop its full share of the tourist industry, and to ensure that Pennsylvanians have adequate outdoor recreational facilities." 35 P.S. § 691.4(1), (2), (4). Proper implementation of Pennsylvania's water quality standards is a critical part of realizing the Commonwealth's water quality goals.

The preamble to the proposed rule asserts that "historically, sulfate and chloride were not treated as Statewide parameters of concern." 32 Pa. Bull. 429. If so, it is surprising that any issue arose about the implementation of the water quality criteria for those parameters. The preamble does not explain how the inadvertent oversight through which chloride and sulfate were omitted from 25 Pa. Code § 96.3(d) came to DEP's attention. Such an explanation obviously would help people evaluate the purpose and effect of the proposed rule, and PennFuture requests that DEP include such an explanation in the final rulemaking or the "comment-response" document.

PennFuture shows in Section I of these comments that there is good reason for the Board to leave Section 96.3(d) unchanged, or at a minimum to evaluate additional statewide water uses before adopting the proposed amendment. Section II explains why DEP should abandon, or at least delay, the process of developing a health-based water quality criterion for sulfate.

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I. Failure to Analyze All Statewide Water Uses

The instream water quality criteria for chloride and sulfate are maximums of 250 mg/L for each contaminant. 25 Pa. Code § 93.7(a)(Table 3). As currently written, the Pennsylvania regulations make these instream criteria applicable statewide. See 25 Pa. Code § 96.3(c). The proposed rule would add chloride and sulfate to the list of pollutants in 25 Pa. Code §96.3(d) that are excepted from this general rule. For this handful of exceptions, the applicable water quality criteria need not be satisfied statewide but instead must be satisfied at each point of water withdrawal for a potable water supply. 25 Pa. Code §96.3(d).

In its analysis of "Benefits, Costs and Compliance," the preamble to the proposed rule states that "[o]verall, the citizens of this Commonwealth will benefit from the recommended change because it provides the appropriate level of protection for the uses of surface waters in this Commonwealth." 32 Pa. Bull. 430 (emphasis added). The preamble, however, does not evaluate all statewide water uses. It limits the analysis to the potable water supply and aquatic life uses. In so doing, it wholly neglects another relevant category of statewide water uses, namely the recreation uses of boating, fishing, water contact sports, and esthetics. See 25 Pa. Code 93.4(a). Before changing the point of compliance for chloride or sulfate by adding them to the list of exceptions in Section 96.3(d), the Board must determine that the changes will be consistent with achieving and maintaining these additional water uses. The "taste and odor" rationale for the existing criteria strongly suggests that the proposed changes would not be consistent with the statewide recreation water uses.

The preamble to the proposed rule explains that "[t]he criteria for both chloride and sulfate date back to 1967, at which time the Sanitary Water Board (a predecessor of the Department) included them to prevent objectionable taste and odor in the water based on recommendations in the United State Public Health Service (US PHS) Drinking Water Standards of 1962." 32 Pa. Bull. 429. This taste and odor rationale also provides the underpinnings for the Secondary Maximum Contaminant Levels (SMCLs) for chloride and sulfate under the federal Safe Drinking Water program, which likewise are 250 mg/L for each contaminant. Id. The preamble goes on state that adding these two contaminants to the list of exceptions in 25 Pa. Code § 96.3(d) "will provide the appropriate level of protection for the potable water supply use." 32 Pa. Bull. 429. It also asserts that "other surface water uses will be protected by application of other criteria listed in § 93.7." 32 Pa. Bull. 429.

The only water use other than potable water supply the preamble discusses, however, is the aquatic life use. It explains that the Commonwealth has not adopted water quality criteria for chloride or sulfate that are based on protecting the aquatic life use because it applies an osmotic pressure criterion to protect aquatic life uses against the effects of all dissolved solids. 32 Pa. Bull. 430. Nowhere, however, does the preamble address the third major category of statewide water uses: recreation. The recreation uses include water contact sports (swimming and related activities) and "esthetics," which is defined as the "[u]se of the water as an esthetic setting to recreational pursuits." 25 Pa. Code § 93.3. The proposed rulemaking not only fails to address these statewide recreation uses, its analysis suggests that they will not be protected if the point of compliance with the water quality standards is set at the first point of withdrawal for a potable water supply.

The basis for the SMCLs for chloride and sulfate is that treated tap water that contains more than 250 mg/L of chloride or sulfate has an objectionable taste or odor. If a glassful of such water is objectionable from these esthetic standpoints, it would seem to follow that a stream full of water that exceeds these same concentrations likewise would be objectionable from these same esthetic standpoints, and thus would fail to attain the "esthetics" use for the stream. The objectionable odors and tastes that interfere with drinking the water or using it for other domestic purposes also would interfere with the recreation uses of fishing, boating, and water contact sports. (With respect to objectionable tastes, swimmers, and in particular younger children, cannot avoid getting a mouthful of water on occasion.) In short, for those engaged in water-based recreation, the water's odor and taste matter. As a result, only if the taste-and-odor-based water quality criteria of 250mg/L are satisfied throughout the water body can the regulations ensure that all statewide recreation uses will be attained.

The above analysis leads to the conclusion that chloride and sulfate should not be added to the list of exceptions in Section 96.3(d). At the very least, the Board must explicitly analyze these additional designated water uses and whether the proposed changes would be consistent with them. The preamble to the proposed rule takes exactly this approach with respect to the aquatic life use, explaining that the osmotic pressure criterion adequately protects that use. In contrast, the preamble provides no basis for concluding that other, specific water quality criteria will adequately protect recreation uses from the odor and taste impacts of chloride and sulfate. Although the preamble broadly asserts that "other surface water uses will be protected by application of other criteria listed in § 93.7," 32 Pa. Bull. 429, it neither identifies the specific criteria that will protect recreation uses against the objectionable taste and odor impacts of chloride and sulfate, nor explains how those other criteria will protect against these adverse esthetic impacts.

The fact that "potable water supply" is the "critical use" upon which the current water quality criteria for chloride and sulfate are based, see 25 Pa. Code § 93.7(a)(Table 3), should not deter an evaluation of the appropriate criteria for protecting recreation uses. The Board's water quality criteria must ensure that all designated uses are achieved and maintained. The analysis presented above suggests that recreation, and more specifically water contact sports and esthetics, may truly be the critical uses for these pollutants. As stated in the preamble to the proposed rule, the current water quality criteria for chloride and sulfate date back to 1967, four years before Pennsylvanians were given the constitutional rights to "pure water" and the preservation of the "esthetic values of the environment." Pa. Const., art. I, § 27 (emphasis added). In addition, the designated use of "esthetics" was not added to Pennsylvania's water quality standards until 1979. See 8 Pa. Bull. 511, 522 (March 4, 1978)(explaining proposed change of "Natural Areas" use to "esthetics"); 9 Pa. Bull. 3051, 3053 (September 8, 1979)(final rulemaking). The fact that the water quality criteria for chloride and sulfate originally were based on protecting the potable water supply use therefore is no bar to applying them in a manner that protects other designated uses. Indeed, unless the Board is confident that any change to the existing regulations would be consistent with all of the statewide designated uses, adopting the proposed change would be unlawful.

In sum, to ensure that all statewide water uses are attained and maintained, the Board should not adopt the proposed rule, and should leave the regulation at 25 Pa. Code § 96.3(d) unchanged. At the very least, the Board should analyze whether the proposed changes would be consistent with the statewide recreation water uses before deciding to amend Section 96.3(d).

II. Development of a Health-Based Instream Criterion for Sulfate is Unjustified.

The preamble to the proposed rule states that "[t]he Department is also considering whether a health-based criterion should be developed for sulfate." 32 Pa. Bull.429. It notes that the scientific literature suggests a health-based criterion for sulfate may be between 500 and 1,000 mg/L (i.e., higher than the existing Pennsylvania water quality criterion), and solicits "information and comment on an appropriate health-based value during this rulemaking process." 32 Pa. Bull. 430.

The preamble does not explain the reason for this endeavor. The Department should justify such a use of its resources, because the existence of a more restrictive, esthetics-based criterion for 35 years, along with the possibility that the EPA soon will develop a health-based, primary MCL for sulfate, strongly suggest that DEP should drop, or at least delay, any effort to develop a health-based water quality criterion for sulfate.

The studies of the health effects of sulfate to which the preamble refers concern sulfate in drinking water. As a result, applying the reasoning of the proposed rule, the new health-based criterion would be applied at the first point of withdrawal for a public water supply. However, assuming that the health-based criterion would be higher than the existing criterion of 250 mg/L, the existing, taste-and-odor-based criterion always would control. Thus, only if DEP is contemplating a substitution of the health-based criterion for the existing, esthetics-based criterion would the new health-based number be relevant to NPDES permitting decisions. If DEP is, in fact, contemplating replacement of the existing water quality criterion for sulfate with a health-based criterion, it should say so plainly and directly.

Substituting the health-based criterion for the existing criterion would be misguided for several reasons. First, the existing criterion has been in place for 35 years. Its longevity alone entitles it to considerable deference, and it should be displaced only if there is a very good and clearly articulated reason for changing it. Second, if the health-based criterion would be applied at the point of withdrawal for public water suppliers, its effect would be to externalize the costs of pollution by shifting them from sulfate dischargers to the public, in the form of higher water rates. Assume for the sake of discussion that the health-based criterion for sulfate is 500 mg/L. If NPDES permits were modeled to meet the existing criterion of 250 mg/L at the point of withdrawal, the public water supplier would not have to perform special treatment in order to satisfy the requirement to provide drinking water that meets the SMCL of 250 mg/L. See 25 Pa. Code § 109.202(b)(1), (2). However, if NPDES permits were based on meeting the health-based criterion of 500 mg/L at the point of withdrawal, the public water supplier would have to remove 250 mg/L of sulfate in order to satisfy this same requirement of the drinking water regulations. Thus, substituting the higher, health-based criterion for the existing criterion would simply shift the location of the treatment from the point where the sulfate is discharged to the point where it is

withdrawn for drinking water use. It also would shift the costs of treatment from the discharger to the public water supplier, which would pass these costs on to its customers. In this way, the public would be forced to bear a cost created by the sulfate discharger. This sort of externalization of costs by polluters is rightly condemned by neoclassical economic theory because it produces an inefficient misallocation of resources. DEP should have nothing to do with bringing about such a result, and therefore should replace the existing water quality criterion for sulfate with a health-based criterion only in the apparently unlikely event that the health-based number is lower than the existing criterion of 250 mg/L.

If DEP is not contemplating a substitution of the new health-based criterion for the existing esthetics-based criterion, it should explain why it would devote scarce resources to an effort that seems purely academic. Two possible answers here are: 1) DEP believes that the appropriate health-based concentration might be lower than 250 mg/L (which seems unlikely given the preamble's discussion of the scientific literature); or 2) the new health-based criterion might be applied on a statewide basis rather than at the first point of public water supply withdrawal (which seems unlikely given the rationale for the health-based criterion and the proposed rule's approach to applying the existing criterion). If neither explanation holds, then it seems wasteful for DEP to develop a health-based criterion it never expects to apply (because a more restrictive criterion already exists). It seems particularly wasteful to do so in light of the fact that EPA might propose a primary MCL for sulfate in drinking water "some time in the near future." 32 Pa. Bull. 429. At the very least, DEP should wait to see whether EPA decides to develop a primary MCL for sulfate, which DEP simply could adopt as the health-based water quality criterion.

PennFuture thanks you for your consideration of these comments. Please feel free to contact me at 717-214-7925 if you have any questions about our comments or would like to discuss any of them.

Sincerely,

Kurt J. Weist
Senior Attorney

cc: Michelle M. Moses, Bureau of Regulatory Counsel

Original: 2243

Pennsylvania Coal Association
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GEORGE ELLIS
President

March 12, 2002

Environmental Quality Board
P.O. Box 8477
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Harrisburg, PA 17105-8477

Re: Notice of Proposed Rulemaking: Water Quality Standards, Sulfate and Chloride, 25 Pa. Code Chapter 96, *Pennsylvania Bulletin*, January 26, 2002

Members of the Board:

Thank you for giving the Pennsylvania Coal Association (PCA) an opportunity to submit written comments on above-referenced Notice of Proposed Rulemaking (the "Proposed Rulemaking"). PCA represents 28 coal producers, who produce more than three-fourths of the Commonwealth's annual bituminous coal production, and 80 associate member companies who work with and support the mining industry. PCA submits the following written comments in response to the above-referenced Notice of Proposed Rulemaking.

PCA supports the proposed change adding sulfate and chloride to the exceptions contained in 25 Pa. Code Section 96.3(d). Measurement of these substances at the potable water supply intake would fully protect the critical water use served by the limit (i.e. potable water supply) while reducing unnecessary regulatory burdens and eliminating the confusion created by the inadvertent change to Chapter 93. We urge your prompt approval of this corrective amendment to the regulations.

Thank you for considering these comments. We would like a copy of the final form rulemaking when it is available. Please feel free to call me if you have any questions.

Sincerely,

Michael G. Young
Director of Regulatory Affairs

Original: 2243

PENNSYLVANIA CHAMBER OF BUSINESS AND INDUSTRY
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March 12, 2002

Environmental Quality Board
Rachel Carson State Office Building
15th Floor
P.O. Box 8477
Harrisburg, PA 17105-8477

RE: Amendments to 25 PA Admin. Code §96.3

Dear Environmental Quality Board:

The Pennsylvania Chamber of Business and Industry (PCBI) is the largest, broad based business association in Pennsylvania. Our more than 9,000 members employ about 50% of Pennsylvania's private workforce or approximately 1.5 million people. 80% of our members have less than 100 employees. The Chamber is dedicated to advocating reasonable regulations that encourage economic growth while protecting the environment.

We are pleased to provide comments on the Environmental Quality Board's proposed amendments to 25 PA Admin. Code §96.3 as published in the Pennsylvania Bulletin on January 26, 2002.

Please feel free to contact Sharon Roth of the Chamber staff at 717-720-5455 should you have any questions.

Sincerely,

Fred A. Sembach

Fred A. Sembach
Vice President, Government Affairs

Attachment

Pennsylvania Chamber of Business and Industry
March 12, 2002

The Pennsylvania Chamber of Business and Industry is the largest, broad based business association in Pennsylvania. Our more than 9,000 members employ about 50% of Pennsylvania's private workforce or approximately 1.5 million people. 80% of our members have less than 100 employees. The Chamber is dedicated to advocating reasonable regulations that encourage economic growth while protecting the environment. We appreciate the opportunity to comment on the Environmental Quality Board's proposed amendments to 25 PA Admin. Code §96.3 as published in the Pennsylvania Bulletin on January 26, 2002.

The Environmental Quality Board, at their meeting of November 20, 2001, proposed to move the point of application of the potable water quality criteria for sulfate and chloride from the discharge point to the point of existing or planned surface potable water supply withdrawals. This reverses an inadvertent result of the restructuring of § 93.7 in November of 2000 (done under the Regulatory Basics Initiative) which placed the point of application of these standards at the discharge point. The EQB has also asked for comments on whether the Department of Environment Protection should consider a health-based criterion for sulfates in the 500-1,000 mg/L range.

The Chamber strongly supports the proposed change in the point of application. The purpose of the Regulatory Basics Initiative was to ensure that Pennsylvania regulations were no more stringent than federal regulations unless there was a compelling reason. The regulatory change in November of 2000, which placed the point of compliance at the discharge point, made Pennsylvania's standards significantly more stringent than federal law and the rules and regulations of other states. The proposed change is an important step in correcting the problems caused by the earlier change and is appropriate given the Department's view that these contaminants are "not a significant concern from a public health perspective." The standards for sulfates and chlorides (250mg/L) are only secondary MCLs and are regulated for aesthetic reasons, odor and taste, and not health reasons. Additionally, the Safe Drinking Water Act still exists to effectively provide for a safe supply of drinking water for Pennsylvania's residents. Failure to implement the proposed change will mean the expenditure of significant sums of money by Pennsylvania's business and industry community with no commensurate benefit in public health.

Even if the proposed change is accomplished however, Pennsylvania's regulation of sulfate and chloride will still be more stringent than is necessary under federal law and more stringent than the regulations of most other states. In fact, most states do not have any water quality criteria for sulfate or chloride and, as such, do not regulate these constituents through the NPDES permitting program at all. Other states have established standards that regulate constituents, such as sulfate and chloride, only after the water is treated by the public water supplier. Pennsylvania, however, currently regulates on a much broader basis, by making its potable water quality standards applicable to all surface waters of the Commonwealth, irrespective of whether they are, or could be, used as a potable water source. This broad applicability places Pennsylvania businesses at a distinctive competitive disadvantage relative to other states. The Commonwealth has stated their

intention of placing these conditions on more industries as their NPDES permits come up for renewal.

In that regard, the situation could be greatly improved if the Department moves forward to adopt health based criteria for sulfate as is under consideration. Establishing health based standards for sulfates, standards that are based on work conducted by the U.S. Environmental Protection Agency and the Centers for Disease Control, will protect Pennsylvania's citizens while providing a fair and appropriate standard for business to meet. These studies have shown that a sulfate standard in drinking water of between 500 and 1,000 mg/L is protective of the population. The study notes that residents in many areas of the country regularly drink water that has naturally occurring sulfate levels in that range (and sometimes higher.) Such an action would be wholly consistent with one of the basic environmental tenets of this administration, the Regulatory Basics Initiative.

The purpose of the Regulatory Basics Initiative is to demonstrate Pennsylvania's commitment to establish and maintain standards that are protective of human health and the environment but do not reduce the competitiveness of Pennsylvania businesses or discourage businesses interested in Pennsylvania from locating here. Pennsylvania can improve the Commonwealth's business while still ensuring that its citizens are provided safe drinking water by moving to establish such health based standards.

Additionally, DEP should pursue similar studies for chloride and make a determination as to a safe and effective health based standard for that substance as well.

The PA Chamber supports the regulatory change proposed to 25 PA Code, Chapter 96 and encourages the Department to establish an appropriate health based standard for sulfate.

Original: 2243

Marshall's wood products

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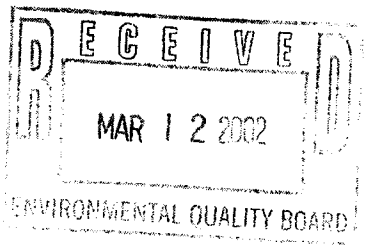
March 12, 2002



EQB PUBLIC HEARING
PROPOSED AMENDMENTS TO CHAPTER 96 WATER QUALITY
STANDARD IMPLEMENTATION (CHLORIDE AND SULFATE)

We have a family woodworking business that is located right next to east Hanover Township, Dauphin County, Wastewater Treatment Plant. In our business, we operate a sawmill and planing mill that produces hardwood flooring, mouldings, doors, etc. To market these products, we have a retail store. We also have three residents, all of which live on this property next to the Waste Water Treatment Plant. This sewer plant has been in operation for approximately two years and with the design of this type of sewer plant that we have here, it has large lagoons full of waste water that has become anaerobic, which is ideal conditions to produce suphurs such as Hydrogen Sulfate. Hydrogen Sulfate in anaerobic conditions can turn into Hydrogen Sulfide in a very short time. Hydrogen Sulfide in low levels (less than l00ppm) can cause many health difficulties. Hydrogen Sulfide in high concentrations (over l00ppm) can cause death in a matter of seconds. It also becomes odorless at that point according to "Toxicological Profile For Hydrogen Sulfide'' by U.S. Department of Health. At this sewer plant DEP has tested sulphurs at high levels in the past. Both Hydrogen Sulfate and Hydrogen Sulfide will give off odors that can be nauseating and in fact we have had many months that at least one member of our family, on a daily basis, would be vomiting. Because of these severe odors, we have not been able to work our normal hours without being ill and we have grown our business to a point where we need to hire employees. Because of these sulphurs, any employee would most certainly become ill, thereby opening us up for high liability risks. In our retail store, strong objectionable odors from the sewer plant have discouraged our patrons from being able to look at our products properly.

The following is some of our problems we have experienced:
Dave Marshall and Diana Marshall have recently been tested for heavy metals and have found enormous amounts of heavy metals in their bodies. Diana has had her gall bladder removed and Dave is experiencing gall bladder difficulties which is related to the heavy metals in his body.

After researching with a former Chemist and Chemistry Teacher, we have found that most of the heavy metals that are in Dave and Diana can link with sulphurs to form insoluble compounds that can be carried by water. Our well is located downstream of the sewer plant discharge and a couple hundred feet from the creek which the sewer plant discharges into.

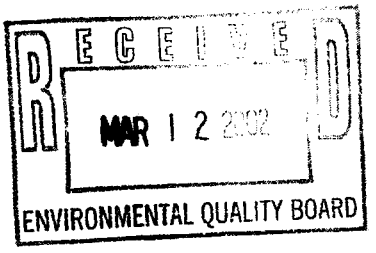
In conclusion, this is some of our concerns that because of the undesirable odors, transportation of heavy metals and the ability of Hydrogen Sulfate to turn into the deadly Hydrogen Sulfide, we sincerely hope that regulations take effect to regulate Hydrogen Sulfate so that nobody else would experience the same problems that our families have.

MARSHALL'S WOOD PRODUCTS

William and Dave Marshall, Owners

AK Steel Corporation
BUTLER OPERATIONS
P.O. BOX 832
BUTLER, PENNSYLVANIA 16003-0832
TELEPHONE 724.284.2000

Original: 2243



Via Overnight Mail

March 11, 2002

Environmental Quality Board
Rachel Carson State Office Building
15th Floor, 400 Market Street
Harrisburg, PA 17101-2301

RE: AK Steel Corporation's Comments in Support of the Pennsylvania Environmental Quality Board's Proposed Amendment to 25 Pa. Admin. Code § 96.3

Pursuant to the notice published in the Pennsylvania Bulletin at 32 Pa.B. 428, AK Steel Corporation ("AK Steel") hereby submits its comments in support of the Pennsylvania Environmental Quality Board's ("Board") proposed amendment to 25 Pa. Admin. Code § 96.3 regarding potable water supply water quality standards implementation for chloride and sulfate. Also included herein are AK Steel's comments and information in support of raising the potable water supply quality standard for sulfate from 250 to 1000 mg/liter, as well as comments and information in support of eliminating or at least raising the potable water supply quality standard for chloride. AK Steel appreciates this opportunity to offer its comments.

I. INTRODUCTION

A. AK Steel's Interest

AK Steel's Butler, Pa. Works holds an NPDES permit issued by the Pennsylvania Department of Environmental Protection ("Department"), which permit allows the Butler Works to discharge treated wastewater to the Connoquenessing Creek. The Connoquenessing Creek constitutes surface waters of the Commonwealth. The Department's potable water supply water quality standards for sulfate and chloride currently apply to the Connoquenessing Creek. AK Steel's Butler Works currently discharges sulfate and chloride to the Connoquenessing Creek. Neither the potable water supply water quality standard for sulfate or chloride, as applied to NPDES permit holders, are necessary to protect human health or aquatic life. As such, it is AK Steel's position that these standards should be rescinded. However, as the Board's current proposal is at least a small step in the right direction, AK Steel supports this proposal.

B. Background

Pennsylvania's water quality standards are set forth in Title 25 Chapter 93 of the Pennsylvania Administrative Code. The regulations establish 16 protected water uses upon which the Department develops water quality criteria. 25 Pa. Code §93.3. One such protected water use is potable water supply ("PWS"). PWS is a protected water use that applies to all surface waters of the state, even waters that are not currently used for public water supplies, unless otherwise specified in the regulations on a stream by stream or segment by segment basis. 25 Pa. Code § 93.4.

Water quality criteria are assigned to various surface waters of the Commonwealth based on the designated protected use. 25 Pa. Code § 93.7. For all those waters designated as a PWS, water quality criteria for sulfate and chloride are established limiting each to a maximum concentration of 250 mg/liter.

Chapter 96 of the administrative code implements the above water quality standards. 25 Pa. Code § 96. These rules establish the point of compliance for the water quality criteria requiring that, unless specifically exempted, the water quality criteria "shall be achieved in all surface waters." 25 Pa. Code § 96.3(c). The primary exception to this rule occurs at 25 Pa. Code § 96.3(d). There, the point of compliance for four different parameters, including total dissolved solids, fluoride, nitrite-nitrate, and phenolics, is shifted from "all surface waters" to the point of intake of a public water supply. 25 Pa. Code § 96.3(d). The basis for this exception is that the water quality limits for the excepted parameters were established solely to protect the public water supply.

The Board has found that sulfate and chloride, like the excepted parameters identified in § 96.3(d), pose no threat to human health and instead are regulated only for aesthetic reasons; namely, to protect potable water supplies from objectionable taste and odor impacts. Accordingly, the Board now seeks to amend § 96.3(d) to add sulfate and chloride to the list of excepted parameters such that the water quality criteria established for these two parameters will apply only at the point of intake of a potable water supply.

For the reasons outlined below, AK Steel supports this proposed amendment.

II. COMMENTS IN SUPPORT OF THE PROPOSED AMENDMENT

A. The Great Majority of States Have *No* Water Quality Standards for Sulfate and Chloride Based on the Water's Potential Use as a Potable Water Supply.

In the majority of states, there are no established potable water use-based water quality standards for sulfate or chloride in surface water. Specifically, only twenty-four states have potable water use-based water quality criteria for either sulfate or chloride, whereas only sixteen states have potable water use-based water quality criteria for both sulfate and chloride. *See* Appendix 1, *Summary of State Water Quality Standards.* Instead, in most states, parameters such as sulfate and chloride, which solely affect the

taste and odor of water and are not health concerns, are generally regulated, if at all, at the potable water supply distribution system *after* treatment by the public water supplier pursuant to the Safe Drinking Water Act, not by regulating the upgradient direct discharge of an industrial or other commercial activity into a river or stream pursuant to the NPDES permitting program under the Clean Water Act.

Out of the twenty-four states that do regulate either sulfate or chloride in surface waters due to the water's potential use as a source of potable water, ten of those states have some provision specific to such limits establishing the point of compliance in relation to the point of potable water supply withdrawal. In most such instances, the point of compliance is shifted to the point of potable water withdrawal, the same point of compliance that would be affected by the Board's proposed amendment. *See e.g.* 327 Ind. Admin. Code 2-1-3 (regulating chloride and sulfate at the point of water supply withdrawal); Ohio Admin. Code § 3745-1-07(A)(4)(C) (requiring compliance with sulfate and chloride water quality limits at all points within 500 yards of the point of water supply withdrawal); 401 Ky. Admin. Regs. 5:026(5) (setting point of compliance for sulfate and chloride at the point of water supply withdrawal); Mich. Admin. Code Surface Water Quality Division R. 323.1100(1) (no water quality limit for sulfate but setting water quality limit for chloride at point of water supply withdrawal); Ill. Admin. Code Title 35 § 302.301 (point of compliance for sulfate and chloride is point of water supply withdrawal); Mo. Code Regs. Title 10, § 20-7.031(4)(B)(4) (point of compliance for sulfate and chloride is point of withdrawal for drinking water based limits); W. Va. Code State R. § 46-1-7.2.a.2 (point of compliance for chloride for waters designated public water supplies apply 2,640 feet upstream of point of water supply withdrawal); *see also* Appendix 1.

Of the remaining fourteen states that regulate sulfate or chloride through an established water quality standard for potable water use, but do not specifically establish the point of compliance at the point of potable water withdrawal, nearly all limit the application of such standards by selectively designating a very limited number of surface waters as a PWS. *See e.g.* 9 Va. Code § 25-260-10(A) (all state surface waters designated for recreational and fish and wildlife use with limited number of segments further designated potable water supply); N.C. Admin. Code Title 15A r. 2B.0101(C) (all waters classified for secondary recreation unless specifically listed as potable water supply); Miss. Code Ann. Water Quality Standards § IV (all surface waters designated for fish and wildlife purposes unless specifically listed otherwise and list of exceptions rarely identifies PWS); Iowa Admin. Code r. 567-61.3(5)(e) (all surface waters classified in segments and very few classified for PWS purposes); Fla. Admin. Code Ann. r. 62-302.400(10) (all surface waters designated for recreational and wildlife use unless specifically listed otherwise elsewhere); *see also* Appendix 1. In fact, in at least one of these states, even if the surface water is designated PWS, the standard still is not applicable unless the water is actually being used for potable water withdrawal. *See* 5 Colo. Code Reg. § 1002-31.16 Table II (applying a sulfate limit if the stream is in use as a water supply).

As such, the potable water quality standards in the minority of states that have them at all are true potable water supply standards that only apply where one is likely to withdraw water for potable water purposes and do not apply state-wide, like Pennsylvania's potable water supply water quality standards.

Furthermore, there is no federal potable water quality standard for sulfate or chloride. The closest "standards" would be the secondary Maximum Contaminant Levels ("MCLs") promulgated under the federal Safe Drinking Water Act[1]. However, MCLs are not enforceable even against a public purveyor of water, and they are certainly not used by the U.S. EPA to set water quality based limits in NPDES permits for direct dischargers of treated wastewater.

Thus, because the Board's proposed amendment will continue to regulate sulfate and chloride in surface waters of the Commonwealth, Pennsylvania's regulatory structure will still remain much more conservative than the majority of the other 49 states, which do not have potable water quality standards for these substances at all. To the extent the Board feels it is necessary to continue to regulate sulfate and chloride pursuant to its NPDES permitting program, a proposition with which AK Steel strongly disagrees, moving the point of compliance to the point of water supply withdrawal will at least bring Pennsylvania's regulations closer in line with the minority of other states that have chosen to regulate these substances.

B. Regulation of Sulfate and Chloride at the Discharge Point of NPDES-Permitted Dischargers Unreasonably Burdens Those Dischargers with No Commensurate Benefit to the Health and Welfare of the Public.

As noted above, under Pennsylvania's overly stringent current regulatory structure, the potable water supply water quality standards for sulfate and chloride must be met at the discharge point of NPDES-permitted dischargers, regardless of the proximity of a potable water supply intake. Regulated entities, therefore, are charged with implementing whatever measures are necessary to meet sulfate and chloride limits at their discharge point, limits which are based solely on taste and odor concerns should the water be used for drinking water, even if there are no actual withdrawals of that water for potable use. Under the current Pennsylvania scheme, no consideration is given to reduction of the concentration due to dilution, for losses with time as the regulated parameter flows downstream from its point of discharge, or, most importantly, whether there truly are any consistent downstream points of withdrawal for potable water use.[2]

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[1] Secondary MCLs have been established under the federal Safe Drinking Water Act solely to address aesthetic (*e.g.*, odor and taste) concerns; they are not health-based standards.

[2] In the case of AK Steel's Butler Works, the nearest downstream potable water user is over 20 miles away, and that entity uses the stream into which the Butler Works discharges its treated wastewater only as a back up source of potable water during periods of drought, which sometimes do not occur for several years.

This overly stringent and unnecessary regulatory scheme is not conducive to attracting new industry to the Commonwealth or to encouraging expansion of business operations already located within the Commonwealth. In fact, considering that the majority of states have no potable water quality based restrictions on industrial or other commercial discharges of sulfate and chloride at all, companies considering expansion or relocation who discharge sulfate and chloride are encouraged to look to locations outside of the Commonwealth for a more favorable regulatory environment. The Board's proposed amendment, although remaining more restrictive than the majority of states, will at least go part of the way toward encouraging and supporting the expansion of industry and commerce within the Commonwealth, thereby positively impacting the economy without compromising either human health or the environment.

The Board's proposed amendments would also further the goals and purposes of the Regulatory Basics Initiative ("RBI"), which requires that the Commonwealth's regulations be no more stringent than standards imposed by federal law, unless there is a compelling public interest. In the instant situation, no such compelling circumstances exit, and in order to promote the RBI's goal of creating a level playing field so that the costs of doing business in Pennsylvania are competitive with other states, the Board should at a minimum adopt the proposed regulatory change.

The costs of compliance with the current regulatory scheme establishing the point of compliance for sulfate and chloride at the point of discharge is enormous. For instance, at AK Steel's Butler Works, the cost to install an on-site acid reclamation system to control sulfate and chloride would cost the Company in the range of $10 million, with additional unknown operating and maintenance costs. The cost to simply haul the wastewater off-site to a POTW or for deep-well injection would cost in the range of $5 million per year, plus approximately $3 million in capital costs. This magnitude of capital outlay cannot be justified for a receiving stream such as the Connoquenessing, which is used only occasionally as a backup water supply by a single small borough during periods of drought.

Moreover, this extremely burdensome and costly requirement cannot be logically reconciled with the fact that sulfate and chloride present no human health hazard and are not regulated for the protection of aquatic life. As noted in the preamble to the proposed rule, sulfate and chloride are regulated solely for odor and taste considerations in drinking water. As the Commonwealth's other water quality criteria applicable to drinking water (*i.e.*, total dissolved solids, nitrite-nitrate nitrogen, phenolics and fluoride) are already exempted from statewide application, common sense dictates that sulfate and chloride should also be afforded the same exemption. Any regulation of sulfate and chloride in surface waters of the Commonwealth for the purposes of protecting the taste and odor of drinking water cannot be reasonably implemented without considering the concentration of the regulated parameters at the point of water supply withdrawal. Because the proposed amendment does just that, it is at least a reasonable first step in correcting what is currently an unreasonable, overly stringent and unnecessary regulatory scheme.

C. Changing the Point of Compliance for Meeting the Potable Water Supply Water Quality Standards for Sulfate and Chloride Will Not Adversely Affect Human Health.

As noted above, Pennsylvania's potable water supply water quality standards for sulfate and chloride were established for taste and odor considerations in drinking water, not for human health reasons. As such, simply moving the point of compliance for meeting these standards cannot have any adverse impact on human health. The Board is not proposing to eliminate the potable water supply quality standards for sulfate and chloride, it is simply proposing to change where compliance with those criteria is measured.

Moreover, in addition to the protection afforded to drinking water by the Commonwealth's potable water supply water quality standards to which NPDES-permitted dischargers are subject, drinking water is also (and principally) protected by the mandates of the Commonwealth's Safe Drinking Water Act. The purpose of the Commonwealth's Safe Drinking Water Act regulations is to "protect the public health and safety by assuring that public water systems provide a safe and adequate supply of water for human consumption by establishing drinking water quality standards, permit requirements, design and construction standards, system management responsibilities and requirements for public notification." 25 Pa. Code 109.2. As such, the Commonwealth's Safe Drinking Water Act regulations effectively provide for protection of drinking water, irrespective of Pennsylvania's potable water supply water quality standards. As such, it is AK Steel's position that direct dischargers should not be subject to NPDES permit limits for substances like sulfate and chloride, which present no human health or aquatic toxicity issues. To the extent that such substances are regulated at all, the regulatory burden should fall on public drinking water suppliers, not upon industrial or commercial holders of NPDES permits. Under the Commonwealth's Safe Drinking Water Act, public purveyors of drinking water are responsible for the odor and taste of the water they supply, and that is the way it should be.

D. A Health-Based Sulfate Level of at Least 1,000 mg/liter Is Supported by the Scientific Literature.

In its proposed rulemaking, the Board stated it was considering developing a health-based criterion for sulfate higher than the Commonwealth's current potable water supply water quality criteria for sulfate of 250 mg/liter, and that recent scientific literature indicated a health-based criterion for sulfate may be between 500 and 1,000 mg/liter.[3]

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[3] AK Steel understands this to mean that the Board is considering raising its current potable water supply water quality standard for sulfate from 250 mg/l to somewhere between 500 and 1000 mg/l. In lieu of eliminating this standard entirely, which is AK Steel's position, the Company fully supports this change.

The Board requested information and comment on a new appropriate health-based criterion. The following information is provided in response to the Board's request.

AK Steel has undertaken a comprehensive literature review to determine the available scientific evidence on the health effects of sulfate exposure. Based on this literature review, a new health-based criterion for sulfate of 1000 mg/liter, to replace the Commonwealth's existing potable water supply water quality criterion for sulfate of 250 mg/liter, is appropriate and consistence with the best available science. A summary of the sulfate studies cited in the following paragraphs is found in Appendix 2.

A health-based sulfate level of 1,000 mg/liter is specifically supported by findings of the Heizer (1997), Gomez (1995), and CDC (1999) studies, and in several previous studies, where a correlation between diarrhea and higher levels of sulfate was observed only when the sulfate level exceeded 750 mg/liter.

In the Heizer (1997) study, a dose-ranging experiment was conducted to determine the effect of various drinking water sulfate concentrations on bowel function. Four healthy adults received drinking water with sulfate concentrations of 0, 400, 600, 800, 1000 and 1200 mg/liter for six consecutive two-day periods. Six adults were enrolled in a single-dose study in which the adults received drinking water with 0 and 1200 mg/liter sulfate for two consecutive six-day periods. Each participant recorded gastrointestinal symptoms and stool consistency.

In the dose-ranging portion of the Heizer study, there was no significant trend in stool mass, consistency or frequency when the sulfate content was increased from 0 to 1200 mg/liter. The only significant observed effect was a trend toward shorter mouth-to-anus appearance time. At no point in the study did the subjects report diarrhea. In the single dose study, the effects of water containing 1200 mg/liter sulfate was an increase in stool mass but no changes in frequency or consistency, and no subjects reported diarrhea. The authors concluded that most normal adults drinking large amounts of water with sulfate levels of 1200 mg/liter, would be unlikely to experience more than a mild laxative effect, and few would perceive themselves as having diarrhea.

In the CDC (1999) study, 105 adults were given bottled water containing varying levels of sulfate ranging from 0 mg/liter to 1,200 mg/liter. While there was an increase in the reported incidence of diarrhea in the most highly exposed groups (800 mg/liter and 1,200 mg/liter) compared to the control group (0 mg/liter), the difference was not statistically significant. Additionally, there was no association found between sulfate dose and the number of reports of diarrhea when different definitions of diarrhea were used.

One recent study has investigated the effect of sulfate consumption on infants. The Esteban (1997) study was a case-controlled investigation to determine whether infants were experiencing an increased incidence of diarrhea as a result of drinking water

with high sulfate concentrations. The study showed no statistically significant association between sulfate intake and diarrhea in infants and, based on a review of water used, suggested that a laxative effect of breast milk is much greater than the laxative effect of sulfate.

Several studies regarding consumption of sulfate by swine are also instructive. In the Gomez (1995) study, which was conducted in nursery pigs to examine the effect of sulfate on bowel function in human infants, it was demonstrated that sulfate levels as high as 1200 mg/liter had no effect on feces consistency (*i.e.*, no laxative effect). In addition, sulfate concentrations as high as 2200 mg/liter had no effect on pig growth. Additionally, no significant differences occurred in the body weight of piglets throughout the study period, and no effect on kidney weight was observed. Likewise, in the Veenhuizen (1992) study of swine, sulfate concentrations up to 1,800 mg/liter had no adverse outcome on pig performance as measured by weight gain and feed consumption. Finally, in Veenhuizen (1993), association between sulfate concentration and location of diarrhea regarding stage of production could not be found.

The earliest studies on the purported laxative effects of sulfate, which are cited frequently in the literature and which established the basis for future studies, were not experimental studies but rather informal surveys (Peterson, 1951 and Moore, 1952) and a case study review (Chien, 1968). These studies are outdated, and flawed in design, including a case study of only three infants in the Chien (1968) study. Nonetheless, the Peterson and Moore studies also support a health-based sulfate level of at least 1000 mg/liter. In the Peterson (1951) study, analysis of data from 248 wells showed a laxative effect only when the sulfate level exceeded 750 mg/liter. When further analyzed in the Moore (1952) study, this data revealed somewhat inconsistent results in that the majority of respondents reported a laxative effect only when sulfate levels exceeded 1000 mg/liter.

The above studies provide several conclusions. In studies where laxative effects were associated with consumption of higher levels of sulfate, there was no evidence of adverse clinical outcome such as weight loss and dehydration. And, although human studies have not measured for clinical outcome such as weight loss or dehydration, adverse clinical outcome is unlikely in these studies where only mild laxative effects were observed.

Additionally, the available data indicate that there are no chronic effects associated with exposure to high doses of sulfate, and there is no evidence that sulfate causes cancer, reproductive effects or teratological effects. In a proposed regulation setting maximum contaminant level goals under the federal Safe Drinking Water Act, U.S. EPA stated that "there is no evidence of adverse chronic health effects in animals or humans from exposure to sulfate in drinking water." 55 Fed. Reg. 30370 (July 25, 1990).

In sum, existing studies do not provide evidence of health effects other than the mild, transient gastrointestinal effects observed when high-sulfate water (generally

greater than 1000 mg/liter) was consumed. As such, the Board should either rescind the Commonwealth's existing potable water supply water quality standards for sulfate entirely or at least replace the Commonwealth's existing potable water supply water quality criterion for sulfate of 250 mg/liter with a health-based potable water supply water quality standard for sulfate of at least 1,000 mg/liter.

E. A Health-Based Potable Water Supply Water Quality Standard for Sulfate of at Least 1000 mg/liter is Not Inconsistent With the U.S. Environmental Protection Agency's Drinking Water Regulations.

In its Safe Drinking Water Act regulations, U.S. EPA has established a secondary MCL for sulfate in drinking water of 250 mg/liter. As a secondary drinking water "standard," this MCL is established based solely on aesthetic reasons, such as taste and odor of the drinking water, and is not based on human health implications. 40 C.F.R. § 143.1. Further, secondary MCLs are not federally enforceable; they are intended only as guidelines for states. *Id.*

Therefore, adoption by the Board of a human health-based potable water supply water quality standard for sulfate in excess of the secondary MCL, to which NPDES-permitted dischargers would be subject, would not be inconsistent with the U.S. EPA's Safe Drinking Water Act regulations, because the federal MCL for sulfate is not health-based but rather is based upon aesthetic concerns. Thus, the Board should implement the findings of the existing health effect studies and, at a minimum, set the Commonwealth's potable water supply water quality standard for sulfate at or above 1,000 mg/liter, or in the alternative, rescind it entirely. If individual purveyors of public water in the Commonwealth wish to address any odor or taste issues associated with sulfate, they will remain free to do so – by treating for and removing sulfate themselves.

F. The Board Should At a Minimum Propose a Regulation Increasing the Current Potable Water Supply Water Quality Standard for Chloride From 250 mg/liter to at Least 500 - 1,000 mg/liter, Or, in the Alternative, Rescind That Standard Entirely.

Chlorides are widely distributed in nature as salts of sodium (NaCl), potassium (KCl), and calcium ($CaCl_2$). Chloride exposure in humans occurs mostly from dietary sources, although the estimation of chloride intake from food is complicated by the widespread use of table salt. The overall contribution of drinking water as a source of chloride exposure is small. Compared to food intake, drinking water intake accounts for only about 0.33-1.6% of the total daily intake of chloride.[4]

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[4] *See* World Health Organization, http://www.who.int/water_sanitation_health/GDWQ/Chemicals/chloridefull.htm.

There is no evidence of adverse health effects from chloride, and no data to suggest even an association between health effects and high chloride concentration. Therefore, the World Health Organization ("WHO") has decided not to propose any health-based guideline for chloride in drinking water.[5] According to the WHO, chloride toxicity has not been observed in humans, except for a single study suggesting the role of chloride exposure in the development of congestive heart failure.[6] However, in that study, impaired sodium chloride metabolism was a factor in the development of congestive heart failure. Furthermore, while toxicity of chloride has not been shown, excessive intake of drinking water containing sodium chloride at concentrations above 2,500 mg/liter has been reported to produce hypertension.[7] However, it is believed that the hypertension observed was the result of the sodium ion concentration, not the chloride ion concentration.

Not only is there no evidence of adverse health effects from chloride, chloride is actually necessary for the human body to function. Chloride is the main extra-cellular anion in the body. The human body relies on the chloride ion for completion of several important functions, including maintaining proper osmotic pressure, water balance and acid-base balance. In healthy individuals, chloride is almost completely absorbed from the small intestine, and approximately 92% of chloride is excreted in the urine. The high mobility of the chloride ion provides the body with the ability to maintain chloride balance. Therefore, even after intake of large quantities of chloride, chloride balance is maintained.

For aesthetic reasons, U.S. EPA has established a secondary MCL for chloride of 250 mg/liter. At levels above this amount, chloride in drinking water imparts a slightly salty taste. The Department's Safe Drinking Water Act regulations include enforcement of this secondary MCL for chloride. 25 Pa. Admin. Code § 109.202. As such, the citizens of the Commonwealth will continue to be "protected" from salty-tasting water due to the imposition of the secondary MCLs, even if the Commonwealth's existing potable water supply water quality standard for chloride is eliminated or raised. However, as there is no evidence of adverse health effects from chloride, there is no concomitant reason to impose upon NPDES-permitted dischargers an overly stringent potable water supply water quality criterion of 250 mg/liter for chloride. Any aesthetic concern regarding chloride in drinking water is adequately addressed by the Commonwealth's Safe Drinking Water Act.

In summary, no human health data are available to suggest that chloride in drinking water poses adverse health effects to humans. Because chloride is a highly mobile ion and is easily excreted from the body, chloride toxicity is highly unlikely. The

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[5] *See* World Health Organization, http://www.who.int/water_sanitation_health/GDWQ/Chemicals/chlorisum.htm.

[6] *See* World Health Organization, http://www.who.int/water_sanitation_health/GDWQ/Chemicals/chloridefull.htm.

[7] *Id.*

body's nervous and hormonal systems work to regulate chloride concentrations. For these reasons, the Department should propose a regulation increasing the Commonwealth's current potable water supply water quality standard for chloride from 250 mg/liter to at least 500 mg/liter - 1,000 mg/liter or, in AK Steel's view, eliminate that standard altogether. As with sulfate, public purveyors of drinking water will still have the option of treating the water they supply to reduce the salty taste associated with high levels of chloride, if they so chose. But, there is no good scientific reason to force NPDES-permitted dischargers to reduce their chloride discharges simply to address purely aesthetic concerns. That should be the job of the purveyors of public water under the Safe Drinking Water Act.

III. CONCLUSION

Current regulation of sulfate and chloride in surface waters of the Commonwealth represents the epitome of regulation for the sake of regulation. It is regulation with no scientific basis. Sulfate and chloride do not exhibit aquatic toxicity. Nor do they have any adverse affect on human health except at levels far higher than current regulatory limits. The Commonwealth regulates sulfate and chloride solely for aesthetic reasons (odor and taste). So, under the current regulatory scheme, the Commonwealth is willing to force industry and commerce to spend millions and millions of dollars to remove sulfate and chloride from surface waters, for reasons of odor and taste, when virtually no one uses that water as a potable water supply. That is arbitrary and capricious. Moreover, in AK Steel's view, it is very poor public policy. Therefore, the Board's proposed amendment is clearly a step in the right direction, albeit a small one.

Based on the foregoing, AK Steel respectfully requests that the Board adopt the proposed amendment to 25 Pa. Code § 96.3. AK Steel further requests that the Department immediately propose a rule raising the current potable water supply water quality standard for sulfate from 250 mg/liter to at least 1000 mg/liter, or eliminating it entirely. Further, AK Steel requests that the Department solicit comments on developing a health-based standard for chloride to increase the Commonwealth's current potable water supply water quality standard from 250 mg/liter to 500 mg/liter-1,000 mg/liter, or to eliminate it entirely.

Sincerely,

Russell J. Dudek
Environmental Affairs Manager
AK Steel Corporation - Butler Works

Appendix 1
Summary of State Water Quality Standards

SUMMARY OF STATE WATER QUALITY STANDARDS REGULATING SULFATES AND CHLORIDES

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alabama	Ala. Admin. Code R. 335.6	None	None	Yes Ala. Admin. Code R. 335-6-10-.03	* None identified
Alaska	18 Alaska Admin. Code § 70	None	None	Yes. 18 Alaska Admin. Code § 70.020(a)(1)(A)(i)	* None identified
Arizona	Ariz. Admin. Code R. 18-11-1	None	None	Yes Ariz. Admin Code R. 18-11-104(B)	* None identified
Arkansas	Ark. Water Division Reg. § 2.101	250 mg/l (All Waters Unless Covered By Stream Specific Standard) Ark. Water Division Reg. § 2.511	250 mg/l (All Waters Unless Covered By Stream Specific Standard) Ark. Water Division Reg. § 2.511	Yes Ark. Water Division Reg. § 2.302(G)	* None identified
California	Federal Program California Code Reg. Title 23, § 2235.2	None	None	None	* None identified
Colorado	5 Colo. Code Reg. § 1002-31	250 mg/l (Potable Water Supplies Actually In Use As a Water Supply) 5 Colo. Code Reg. § 1002-31.11(6); 5 Colo. Code Reg. § 1002-31.16 Table II	250 mg/l (Potable Water Supplies) 5 Colo. Code Reg. § 1002-31.11(6); 5 Colo. Code Reg. § 1002-31.16 Table II	Yes 5 Colo. Code Reg. § 1002-31.13	Total nitrates-nitrites and ammonia are regulated at the point of water supply withdrawal. 5 Colo. Code Reg. § 1002-31.16 Table II
Connecticut	Conn. Agencies Regs. § 22a-430	None	None	No	* None identified
Delaware	Del. Water Pollution Regulations § 1	None	None	No	* None identified

District of Columbia	DC Mun. Reg. Title 21 § 1100	None	None	No	* None identified
Florida	Fla. Admin. Code Ann. r. 62-301	None	250 mg/l (Freshwater Limit – Potable Water Supplies) Fla. Admin. Code Ann. r. 62-302.530	Fla. Admin. Code Ann. r. 62-302.400	* None identified
Georgia	Georgia Comp. Rules and Regs. r. 391-3-6	None	None	Yes Georgia Comp. Rules and Regs. r. 391-3-6.03	For waters designated as drinking water supplies, cannot exceed MCLs after treatment by public water treatment system. Georgia Comp. Rules and Regs. r. 391-3-6.03(b)
Hawaii	Haw. Admin. Code § 11-54	None	None	Yes Haw. Admin. Code § 11-54-03(b)(1)(B)	* None identified
Idaho	Idaho Admin. Code § 58.1.2.1	None	None	Yes Idaho Admin. Code § 58.1.2.100(3)(a)	Point of water supply withdrawal for turbidity. Idaho Admin. Code § 58.2.252(01)(b)(ii)
Illinois	Ill. Admin. Code Title 35, § 301	500 mg/l (All Waters) Ill. Admin. Code Title 35, § 302-208(g) 250 mg/l (Drinking Water Supplies) Ill. Admin. Code Title 35, § 302-304 24 mg/l (Lake Michigan – All Open Waters) Ill. Admin Code Title 35 § 302.504(c)	500 mg/l (All Waters) Ill. Admin. Code Title 35, § 302-208(g) 250 mg/l (Drinking Water Supplies) Ill. Admin. Code Title 35, § 302-304 12 mg/l (Lake Michigan – All Open Waters) Ill. Admin Code Title 35 § 302.504(c)	Yes Ill. Admin. Code Title 35, § 302.300	Point of water supply withdrawal. Ill. Admin. Code Title 35 § 302.301
Indiana	327 Ind. Admin, Code 2-1	250 mg/l (Potable Water Supplies) 327 Ind. Admin. Code 2-	250 mg/l (Potable Water Supplies) 327 Ind. Admin. Code 2-1-	Yes 327 Ind. Admin. Code 2-i	Point of water supply withdrawal. 327 Ind. Admin Code 2-1-3

		1-6(e)(3); 327 Ind. Admin. Code 2-1-5-8(f)(3) (Great Lakes) 250 mg/l (All Waters) 327 Ind. Admin. Code 2-1-6(a)(3) Table 1	6(e)(3); 327 Ind. Admin. Code 2-1-5-8(f)(3) (Great Lakes) 250-860 mg/l (All Waters); 327 Ind. Admin. Code 2-1-6(a)(3) Table 1		
Iowa	Iowa Admin. Code r. 567-61	None	250 mg/l (Potable Water Supplies) Iowa Admin. Code r. 567-61.3(3)(c)(3)	Yes Iowa Admin. Code r. 567-61.3(1)(b)(8)	Radionuclides are regulated at the point of water supply withdrawal. Iowa Admin. Code r. 567-61.3
Kansas	Kan. Admin. Regs. 28-16-28e	250 mg/l (Domestic Water Supplies) 1000 mg/l (Agricultural Use) Kan. Admin. Regs. 28-16-28e(d)	250 mg/l (Food Procurement Use) Kan. Admin. Regs. 28-16-28e(d)	Yes Kan. Admin. Regs. 28-16-28d(a)(3)	Any point of potable water supply diversion. Kan. Admin. Regs. 28-16-28e(c)(3)(a)
Kentucky	401 Ky. Admin. Regs. 5:002	250 mg/l (Domestic Water Supply) 401 Ky. Admin. Regs. 5:031(5)	250 mg/l (Domestic Water Supplies) 600/1200 mg/l (Protection of Aquatic Life) 401 Ky. Admin. Regs. 5:031(5)	Yes 401 Ky. Admin. Regs. 5:026(1)(2)(e)	Point of water supply withdrawal. 401 Ky. Admin. Regs. 5:026(5)
Louisiana	La. Admin. Code Title 33, § 1101	5-700 mg/l (All Waters) La. Admin. Code Title 33, § 1123(c)(3); La. Admin. Code Title 33, § 1113(c)(2)	20-1600 mg/l (All Waters) La. Admin. Code Title 33, §1123(c)(3); La. Admin. Code Title 33, § 1113(c)(2)	Yes La. Admin. Code Title 33, § 1109(B)(1)	Chlorides and sulfates must be met at point of discharge after complete mixing. La. Admin. Code Title 33 § 1115(c)(8)
Maine	Code Me. Rule § 06-096-530.5	None	None	No	* None identified
Maryland	Md. Regs. Code Title 26 § 8.2.1	None	None	Yes Md. Regs. Code Title 26 § 8.2.2(B)(2)	* None identified

Massachusetts	Mass. Regs. Code Title 314, § 4.01	None	None	Yes Mass. Regs. Code Title 314 § 4.05(3)(a)	* None identified
Michigan	Mich. Admin. Code Surface Water Quality Division R. 323.1041	None	50 mg/l (Great Lakes) 125 mg/l (All Other Waters Designated PWS) Mich. Admin. Code Surface Water Quality Division R. 323.1051(2)	Yes Mich. Admin. Code Surface Water Quality Division R. 323.1100(1)	Point of water supply withdrawal. Mich. Admin. Code Surface Water Quality Division R. 323.1100(1)
Minnesota	Minn. R. 7050	250 mg/l (Potable Water Supplies) Minn. R. 7050.0220(3a)	230-1720 mg/l (Applies to Nearly All Water Classifications) Minn. R. 7050.0220(3a)	Yes Minn. R. 7050.0200	For Mississippi River, point of withdrawal for water supply must meet drinking water criteria standards after treatment; no other specific standards are given. Minn. R. 7056-0040
Mississippi	Miss. Code Ann. Water Quality Standards	120-150 mg/l (Mineral Constituents Limit - Mississippi River) Miss. Code Ann. Water Quality Standards § I(7)	60-75 mg/l (Mississippi River) Miss. Code Ann. Water Quality Standards § I(7) 230 mg/l (Other Surface Waters Designated Potable Use) Miss. Code Ann. Water Quality Standards § III(1)	Yes Miss. Code Ann. Water Quality Standards 2 § VII	* None identified
Missouri	Mo. Code Regs. Ann. Title 10, § 20-7	250 mg/l (Drinking Water Supplies); Mo. Code Regs. Title 10 § 20-7.031(13) 1000 mg/l combined SO_4 and Cl (To Protect Aquatic Life); Mo. Code Regs. Ann. Title 10	250 mg/l (Drinking Water Supplies) Mo. Code Regs. Title 10 § 20-7.031(13) 1000 mg/l combined SO_4 and Cl (To Protect Aquatic Life); Mo. Code Regs. Ann. Title 10 § 20-7.031(4)(L)(1)	Yes Mo. Code Regs. Ann.Title 10, § 20-7.031(4)	Point of withdrawal for drinking water based limits. Mo. Code Regs. Title 10 § 20-7.031(4)(B)(4)

		§ 20-7.031(4)(L)(1)			
Montana	Mont. Admin. R. 17.30	None	None	Yes Mont. Admin. R. 17.30.621	* None identified
Nebraska	Neb. Admin. R. and Regs. 117-2	250 mg/l Neb. Admin. R. and Regs. 117-4-01(B)	250 mg/l Neb. Admin. R. and Regs. 117-4-01(B)	Yes Neb. Admin. R. and Regs. 117-4-001	* None identified
Nevada	Nev. Admin. Code § 445A.070	250-500 mg/l (Potable Water Supplies) Nev. Admin. Code § 445A.119	250/400 mg/l (Potable Water Supplies) 1500 mg/l (Watering of Livestock and Propagation of Wildlife) Nev. Admin. Code § 445A.119	Yes Nev. Admin. Code § 445A.119	At Control Points (Control points are designated at different areas in the stream to protect the most restrictive use of that segment of the stream); Nev. Admin. Code § 445A.145
New Hampshire	N.H. Code Admin. R. Ann. Env. WS 1701	None	230/860 mg/l (Toxic Aquatic Based Criteria) N.H. Code Admin. R. Ann. Env. WS 1703.1	Yes. N.H. Code Admin. R. Ann. Env. WS 1703.01(a)	* None identified
New Jersey	N.J. Admin. Code § 7:9B-1.1	250 mg/l (All FW2 Classified Waters) N.J. Admin. Code § 7:9B-1.14(c)	230-860 mg/l (Toxic Aquatic Based Criteria) N.J. Admin. Code § 7:9B-1.14(c)	Yes N.J. Admin. Code § 7:9B-1.12 (All Freshwaters)	* None identified
New Mexico	N.M. Admin. Code § 20.6.4.900	None	None	Yes N. M. Admin. Code § 20.6.4.900(B)	Public health based limits are considered at point of withdrawal for drinking water. N.M. Admin. Code § 20.6.2.7(x)
New York	N. Y. Comp. Codes R. and Regs. Title 6 § 2-703.5	250 mg/l (Potable Water Supplies) N. Y. Comp. Codes R. and Regs. Title 6 § 2-703.5	250 mg/l (Potable Water Supplies) N. Y. Comp. Codes R. and Regs. Title 6 § 2-703.5	Yes N.Y. Comp. Codes R. and Regs. Title 6 § 2-702.2	* None identified
North Carolina	N. C. Admin. Code Title 15A, r.	250 mg/l (Potable Water Supplies)	230 mg/l (Toxic Aquatic Based Criteria – All	Yes N. C. Admin. Code Title	* None identified

	2B	N. C. Admin. Code Title 15A, r. 2B.0212(3)(g)	Waters) N. C. Admin. Code Title 15A, r. 2B.0211(4)(e) 250 mg/l (Potable Water Supplies) N. C. Admin. Code Title 15A, r. 2B.0212(3)(g)	15A, r. 2B.0101(C)	
North Dakota	N. D. Admin. Code § 33-16-02.1	250-450 mg/l (Potable Water Supplies) 750 mg/l (All Waters) N. D. Admin. Code § 33-16-62.1-09(3), Table 1	100 –175 mg/l (Potable Water Supplies) N. D. Admin. Code § 33-16-62.1-09(3), Table 1	Yes N. D. Admin. Code § 33-16-62.1-09	* None identified
Ohio	Ohio Admin. Code § 3745.1	250 mg/l (Potable Water Supplies) Ohio Admin. Code § 3745-1-07 Table 7-9	250 mg/l (Potable Water Supplies) Ohio Admin. Code § 3745-1-07 Table 7-9	Yes Ohio Admin. Code § 3745-1-07(A)	Within 500 yards of point of water supply withdrawal. Ohio Admin. Code § 3745-1-07(A)(4)(C)
Oklahoma	Okla. Admin. Code § 785:45-5-1	250 mg/l (For Agricultural General Use) Okla. Admin. Code § 785:45-5-137; Okla. Admin. Code § 785:46-9-1	250 mg/l (For Agricultural General Use) Okla. Admin. Code § 785:45-5-137 Okla. Admin. Code § 785:46-9-1	Yes Okla. Admin. Code § 785:45-5-10	Point of water supply withdrawal for Human Health Criteria Contaminants. Okla. Admin. Code § 785:46-7-4(b)(4)
Oregon	Or. Admin. R. 340-041	None	230-860 mg/l (Protection of Aquatic Life)	Yes Or. Admin. R. 340-041	* None identified
Rhode Island	R. I. Code Water Quality Regs. R. 1	None	None	Yes R. I. Code Water Quality Regs. R. 8(B)(1)	* None identified
South Carolina	S. C. Code Ann. Regs. 61-68	None	None	Yes S. C. Code Ann. Regs. 61-68(g)(10)	* None identified

South Dakota	S. D. Reg. § 74:51	500 mg/l (ave) 875 mg/l (max) (Potable Water Supplies) S. D. Reg. § 74:51:01:44	250 mg/l (ave) 438 mg/l (max) (Potable Water Supplies) S. D. Reg. § 74:51:01:44	Yes S. D. Reg. § 74:51:01:42(1)	* None identified
Tennessee	Tenn. Comp. R. & Regs. § 1200-4-1	None	None	Yes Tenn. Comp. R. & Regs. § 1200-4-4	* None identified
Texas	30 Tex. Admin. Code § 307	50-3650 mg/l (Protection of Aquatic Life and Potable Water Supplies) 30 Tex. Admin. Code § 307.10	50-37000 mg/l (Protection of Aquatic Life and Potable Water Supplies) 30 Tex. Admin. Code § 307.10	Yes 30 Tex. Admin. Code § 307.7(b)(2)	Max average for the segment (Segments of surface waters are assigned different uses) 30 Tex. Admin. Code § 307.10(1)
Utah	Utah Admin. Code R. 317	None	None	Yes Utah Admin. Code R. 317-2-6	* None identified
Vermont	Vt. Code Water Quality Standards § 1	None	None	Yes Vt. Code Water Quality Standards § 1-03(B)(1)(d)	* None identified
Virginia	9 Va. Code Ann. § 25-260	250 mg/l (Potable Water Supplies) 9 Va. Code Ann. § 25-260-140(B)	250 mg/l (Potable Water Supplies) 230/860 mg/l (Protection of Aquatic Life – All Waters) 9 Va. Code Ann. § 25-260-140(B)	Yes 9 Va. Code § 25-260	* None identified
Washington	Wash. Admin. Code § 173-201A-010	None	860/230 mg/l (Protection of Aquatic Life) Wash. Admin. Code § 173-201(A)-040(3)	Yes Wash. Admin. Code § 173—201A-030(2)	* None identified
West Virginia	W. Va. Code State R. § 46-1	None	250 mg/l (Potable Water Supplies – Human Health) 230-860 mg/l (Protection	Yes W. Va. Code State R. § 46-1-6	Standards for waters designated Public Water Supplies apply ½ mile upstream of point of water supply withdrawal. W. Va. Code

			of Aquatic Life) W. Va. Code State R. § 46-1, App. E		State R. § 46-1-7.2.a.2
Wisconsin	Wis. Admin. Code NR § 102	None	395/757 mg/l (Toxicity Criteria) Wis. Admin. Code NR § 105.06	Yes Wis. Admin. Code NR § 102.04	* None identified (Review Separate Chloride Regs)
Wyoming	Wyoming Water Quality Standard, Rule 1	None	230/860 mg/l (Protection of Aquatic Life) Wyoming Water Quality Standard, App. B	Yes Wyoming Water Quality Standard, Rule 1-3	Human Health Based Criteria may not be exceeded within 500 yards of point of water supply withdrawal. Wyoming Water Quality Standard, Rule 1-9

Appendix 2
Summary of Sulfate Studies

1. Heizer WD, Sandler RS, Seal E Jr, Murray SC, Busby MG, Schliebe BG, and Pusek SN, *Intestinal effects of sulfate in drinking water on normal human subjects.* Digestive Diseases and Sciences, 42(5): 1055-1061 (May 1997).

Purpose

Funded by the EPA, the Heizer study was a controlled study of normal adults conducted to determine the effect of various drinking water sulfate concentrations on bowel function.

Design

Ten healthy adults were studied. Four subjects, two men and two women, participated in a dose-ranging study. Each received drinking water with sulfate concentrations of 0, 400, 600, 800, 1000 and 1200 mg/liter for six consecutive two-day periods. Six additional subjects, three men and three women, each received drinking water with sulfate concentrations of 0 and 1200 mg/liter for two consecutive six-day periods.

Colored markers were given orally to each subject to measure mouth-to-anus appearance time. In addition, stool consistency was measured using a standard rating scale and study coordinator observations, and gastrointestinal symptoms were recorded by each study participant.

Results

Dose-ranging study:

Increasing the sulfate concentration every 48 hours from 0 to 1200 mg/liter showed no significant trend in stool mass or mass/hour. There was a trend toward decreasing mouth-to-anus appearance time with increasing sulfate concentration but the trend was not significantly significant. The subjects did not report diarrhea at any point in the study.

Single-dose study:

Because rapid adaptation could have blunted an effect of high sulfate concentrations in the dose-ranging study, a single-dose study was conducted. The six subjects in this study received distilled water for six days followed by six days of water containing sulfate at 1200 mg/liter. Compared to distilled water, water with sulfate produced a statistically significant increase in stool mass. Stool frequency, stool consistency and mouth-to-anus appearance time were not statistically different with high-sulfate water. No subjects reported diarrhea.

Discussion

The laxative effect of sulfate in drinking water is influenced by the amount of water ingested daily and throughout the day. To control for this effect, intake of drinking water was evenly distributed throughout the day and daily volume remained constant each day based on each participant's weight. The authors observed no self-reports of diarrhea and no significant trend in stool mass, frequency or consistency. The only significant effect was a trend to shorter mouth-to-anus appearance time.

The authors conclude that most normal adults, drinking relatively large amounts of water containing 1200 mg/liter of sulfate, would notice a mild laxative effect manifested by slightly larger, looser stools, but few, if any, would perceive themselves as having diarrhea. The authors

recommend that larger studies be conducted to determine the cathartic effects of sulfate in drinking water.

2. Gomez GG, Sandler RS, Seal, E Jr., *High levels of inorganic sulfate cause diarrhea in neonatal piglets*. Presented at 1994 Joint Annual Meeting of American Dairy Science Association and American Society of Animal Science; published in Human and Clinical Nutrition, 1995; 125:2325-2331.

Purpose
Artificially reared neonatal pigs were used to examine the effect of sulfate on bowel function in human infants.

Design
Forty piglets were used in each of two studies. For the initial four days of the study, all piglets were fed a basal diet without sulfate and then transferred to a room containing an automatic feeding device. Piglets were fed liquid diets only and did not have access to drinking water.

In Experiment 1, piglets were fed diets containing 0, 1200, 1600 and 2000 mg. sulfate/liter divided among 16 equal portions each day. In Experiment 2, piglets were fed diets containing 0, 1800, 2000 and 2000 mg. sulfate/liter divided among 13 portions each day for the entire study period.

Diet intake, body weight and fecal consistency were measured several times daily. Urine samples were taken at the beginning and end of the study, and kidney weight was determined at the end of the study period.

Results
At the beginning of the study, approximately 80 to 100% of the piglets had solid, normal stools. Added sulfate levels greater than 1200 mg/liter increased the prevalence of diarrhea. The dose at which 50% of pigs had diarrhea seemed to be between the levels of 1600 and 1800 mg. added sulfate. No significant differences occurred in the body weight of piglets throughout the study period and no effect on kidney weight was observed.

The inorganic sulfate concentration in urine increased as the level of added sulfate in the diet was increased, reaching maximum values when pigs were fed between 1600 and 1800 mg/liter of sulfate, and declining at higher levels. These results suggest that levels of added sulfate greater than 1600 mg/liter resulted in higher excretion of sulfate in the feces, which caused the cathartic effects associated with diarrhea.

Discussion
The study demonstrated that added sulfate levels as high as 2200 mg/liter of diet did not affect growth of the piglets. Although 1200 mg/liter added sulfate had no effect on feces consistency, levels of 1800 mg. sulfate/liter resulted in diarrhea. The authors state that "the national secondary drinking water standard of 250 mg. sulfate/liter is a safe quality standard for drinking water..... and could probably be set higher."

3. Centers for Disease Control (CDC), "Health Effects from Exposure to High Levels of Sulfate in Drinking Water Study," and CDC Workshop (noticed in Federal Register, 64 Fed. Reg. 7027, (February 11, 1999)).

Purpose

The Safe Drinking Water Act, amended in 1996, provided statutory authority for the CDC and EPA to study the health effects from exposure to sulfate in drinking water. The purpose of the study was to examine the relationship between consumption of tap water with high levels of sulfate and reports of diarrhea in infants and transient populations (*i.e.* travelers).

Design

A prospective study was designed to follow 800 infants born in areas with naturally high levels of sulfate, and examine the relationship between the sulfate levels and diarrhea. Seventy-two pregnant women were approached to participate, but based on study criteria, only eight were eligible for participation. Due to recruiting problems, the study was not completed.

To examine the transient population, a study of 105 adults was conducted in which volunteers were assigned to one of five groups (0, 250, 500, 800 and 1200 mg/liter sulfate). The participants were provided with bottled water for six days. For days 1, 2 and 6, the bottled water contained no sulfate, while on days 3 through 5, sulfate was added. The number of bowel movements was recorded.

Results

There was no statistically significant difference in bowel movements among the five groups on days 3, 4, 5, or 6. There was also no statistically significant differences in bowel movements when comparing days 1 and 2 with days 3, 4 and 5 within each dose group. To examine the data for a trend toward increased frequency of reports of diarrhea with increased sulfate dose, the authors used a regression model analysis. There was no statistically significant increase in reports of diarrhea with increasing dose.

Discussion

The authors' point to the number of difficulties associated with this type of study, including the ethical issues involved with exposing infants to a substance that may cause diarrhea and possible dehydration. Given the limitations of the prospective study, a self-administered questionnaire was developed to determine how many women planned to use tap water to mix formula for their infants. The authors found that only a very small number of women who live in areas with high levels of sulfate planned to provide this water to their infants.

In the adult study, there was an increase in the number of people who reported diarrhea in the most highly exposed groups (800 mg/liter and 1200 mg/liter) compared to the controls (0 mg/liter), but the differences were not statistically significant. There was no association between sulfate dose and the number of reports of diarrhea when different definitions of diarrhea were used. The authors conclude that it is unlikely that exposure to sulfate in drinking water at concentrations below 600 mg/liter would cause diarrhea in people.

4. Chien L, Robertson H, Gerrard JW, *Infantile gastroenteritis due to water with high sulfate content.* Canadian Medical Association Journal. 1968; 99: 102-104.

Purpose
Three cases of infant diarrhea following ingestion of well water with high levels of sulfate were examined to evaluate the association between sulfate levels and diarrhea.

Design
Three case histories of infant diarrhea occurring in Canada were presented. Sulfate levels ranged from 630 mg/liter to 1150 mg/liter. All three infants were symptom-free until their families moved to locations with high sulfate levels. In all three cases, the diarrhea stopped when sulfate levels were reduced and returned when water with higher sulfate levels was consumed.

Discussion/Results
Despite the small number of infants examined, the author believes that sulfate concentration alone can explain each case, even though magnesium and sodium concentrations can contribute to laxative properties of drinking water. The authors note that when diarrhea follows a move to a new location or introduction of formula, sulfate content should be suspect as the cause of diarrhea. A recommendation is made to screen water for suitability of infant feeding.

5. Esteban, E, Rubin CH, McGeehin MA, Flanders WD, Baker MJ, and Sinks TH, Evaluation of infant diarrhea associated with elevated levels of sulfate in drinking water: a case-control investigation in South Dakota. International Journal of Occupational and Environmental Health 1997; 3(3): 171-176.

Purpose
The purpose of this case-controlled investigation was to determine whether infants in South Dakota were experiencing an increased incidence of diarrhea as a result of drinking water with high sulfate concentrations.

Design
Nineteen counties in South Dakota were identified in which at least one water system used ground water with sulfate content greater than 750 mg/liter. During the first three months of 1995, 366 live births took place in these counties. Questionnaires were administered to 266 of the households in which these births had occurred. Mothers were asked to report the number and consistencies of their infants' bowel movements and the quantity of water ingested daily. Participants provided water samples that were then evaluated for sulfate concentration. The case infants were compared to non-case infants to evaluate the association between diarrhea and exposure variables.

Results
The mean water sulfate level in the 170 water samples submitted was 360 mg/liter. Water samples from the case infants' homes had a mean sulfate level of 416 mg/liter while samples from the non-case homes had a mean level of 350 mg/liter. No significant correlation was found between the sulfate level and the incidence of diarrhea. Nineteen percent of the infants in

households with water containing greater than 500 mg/liter of sulfate had diarrhea, compared with 14% of infants living in households with lower water sulfate concentrations.

Discussion
The study showed no statistically significant association between sulfate intake and diarrhea in infants and, based on review of source of water used, suggested that a laxative effect of breast milk is much greater than the laxative effect of sulfate. On the basis of water consumption, there was a significant difference in the incidence of diarrhea between the infants who drank .07 liters of water per day or less and those who drank between .44 liters and .81 liters per day. However, only 17 case infants were reported to have consumed water. Therefore, due to small sample size, the author states that the association between high sulfate consumption and infant diarrhea could not be conclusively investigated in this study, and states that further studies are needed.

6. Veenhuizen MF, Shurson GC, Kohler EM, *Effect of concentration and source of sulfate on nursery pig performance and health.* American Veterinary Medical Association Journal, 1992;201(No. 8):1203-8.

Purpose
Four hundred and fifteen nursery pigs were evaluated over 28 days with respect to weight gain, feed and water consumption and evidence of diarrhea in order to examine the effect of sulfate concentrations on nursery pig performance and health.

Design
The pigs were assigned to 1 of 8 treatment groups. Sodium sulfate and magnesium sulfate were evaluated in combination at concentrations of 600, 1200 and 1800 mg/liter and individually at concentrations of 600 and 1800 mg/liter. Weight gain and feed consumption were determined weekly. Pigs were observed daily for evidence of diarrhea and a total diarrhea score was calculated each week. Fecal specimens were collected to evaluate presence of pathogens likely to cause diarrhea. Weight gain and feed consumption were evaluated weekly.

Results
Increased prevalence of diarrhea was noted as sulfate concentration increased. Pigs drinking 600, 1200 or 1800 mg. of sulfate/liter water had increased prevalence of diarrhea. The pigs given the highest concentration of sulfate had the greatest prevalence in diarrhea throughout the study. The diarrhea was not associated with higher levels of common pathogens indicating that the diarrhea was attributable to the sulfate concentration. However, concentrations of up to 1800 mg/liter sulfate had no adverse effect on pig performance.

Discussion
The higher prevalence of diarrhea in pigs drinking high sulfate water appeared to have no relationship to growth performance. The authors note that costly water treatment systems to improve pig performance are not justified even if sulfate concentrations approach 1800 mg/liter.

7. Veenhuizen MF, *Association between water sulfate and diarrhea in swine on Ohio farms.* American Veterinary Medical Association Journal, 1993;8:1255-60.

Purpose
Water samples from 54 Ohio swine farms were analyzed for concentrations of sulfate to examine the association between sulfate concentrations and prevalence of diarrhea in swine. The overall purpose of the study was to evaluate the effects of water quality on pig performance (*i.e.* growth).

Design
A twelve question survey was distributed to 54 swine farms in Ohio. Questions pertained to source of water; water uses; treatment processes and prevalence of diarrhea in swine. Water samples were obtained and analyzed for sulfate concentrations.

Results
Well water was the primary source of water for 85% of the respondents. Water sulfate concentrations increased with the depth of the well. The sulfate concentration ranged from 6 mg/liter to 1630 mg/liter with a mean sulfate concentration of 230 mg/liter. Of 54 respondents, 15 (28%) indicated that no diarrhea was observed during the previous two years while 17 (43%) observed diarrhea in pigs still sucking the sow and 3 (17%) reported diarrhea in the nursery. The remaining respondents observed diarrhea in more than one location. A specific pattern for the development of diarrhea could not be established.

Discussion
Survey data from the 54 farms confirmed that diarrhea is more likely in suckling or nursery pigs and often develops within 2 weeks of entry into the nursery. Associations between sulfate concentration and location of diarrhea regarding stage of production could not be found. The majority of swine producers had no confirmed diagnosis for the cause of diarrhea on their farms.

Although sulfate concentrations were lower in this study than in previously cited piglet studies, the range associated with diarrhea was the same. The author points to a previous study (Veenhuizen), which suggests that pigs acclimate to higher sulfate levels within several weeks with no apparent effect on pig performance.

8. Peterson NL, *Sulfates in drinking water.* Official Bulletin: North Dakota Water and Sewage Works Conference 1951;18(10&11): 6-11.

Purpose
The Peterson study was conducted to determine if the drinking water provided by North Dakota water supplies produced a laxative effect, especially on those individuals drinking the water for the first time. The study was also conducted to determine the mineral content of the water supply.

Design
Approximately 2500 questionnaires developed by the state health department were distributed to households throughout the state of North Dakota. Of this number, approximately 300 of the questionnaires provided useful and complete data. Households completing the questionnaires were asked to send a water sample that was later analyzed for mineral content, including sulfate

concentration. Comparisons were then drawn between the sulfate concentrations recorded and the individual responses regarding whether a laxative effect was noted.

Results

Analysis of the data revealed that water with greater than 750 mg/liter sulfate generally caused a laxative effect while water with less than 600 mg/liter sulfate caused no laxative effect. The authors point to the range of 600 to 750 mg/liter sulfate as one which "should be looked upon with suspicion" for laxative effect. Some households reported a non-laxative effect even though the water sample revealed sulfate levels above 750 mg/liter, and likewise some households reported a laxative effect when the water sample revealed sulfate concentrations below 600 mg/liter.

Discussion

The authors note that a large number of households reported no laxative effect when the water sample revealed an excess of 250 mg/liter sulfate, the U.S. Public Health Service level in effect at the time of the study. The authors propose that these users have "probably built up a high tolerance to the sulfates." Likewise, where water samples revealed lower sulfate concentrations but the household reported a laxative effect, the authors conclude that the persons may have just started using the water. The authors state that a level of 500 mg/liter sulfate could be established without a physiologic effect.

9. Moore EW, *Physiological effects of the consumption of saline drinking water.* A progress report to the 16th meeting of the Subcommittee on Sanitary Engineering and Environment. Appendix B. January 1952. Washington, DC: National Academy of Sciences. 1952.

Purpose

In an attempt to gather information about the use of saline water for drinking and answer agency questions about the appropriate amount of dissolved solids that might be permitted in drinking water, the Subcommittee on Water Supply conducted a comprehensive analysis of the *Peterson* study data.

Results and Discussion

For purposes of analysis, attention was directed to reports of laxative effect. Three groups of data were established for comparison purposes: those that definitely reported a laxative effect (the "yes" group); those that reported no laxative effect (the "no" group); and those for which the question as to laxative effect was not answered (the "no mention" group). The sulfate concentration in the yes-group showed a mean value of 1250 mg/liter, while the mean sulfate concentration in the no-group was 500 mg/liter. The mean sulfate concentration of the "no-mention" group was 1210 mg/liter.

The data was arranged to show the specific range of sulfate content at which laxative effects were reported. The majority of respondents reported a laxative effect when at sulfate concentrations at or above 1000 mg/liter. According to the author, a sulfate limit of 2000 mg/liter was almost certain to produce a discernible physiologic effect.

Original: 2243

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March 5, 2002

Environmental Quality Board
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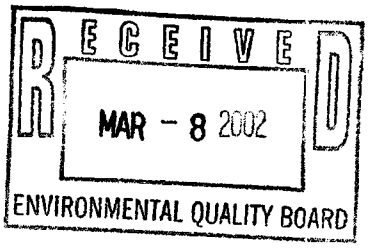

RE: Water Quality Standards Implementation - Chloride and Sulfate

Dear Members of the EQB:

Hart Resource Technologies, Inc (HRT) would like to submit the following comments on the proposal to amend Chapter 96.3 to include the chloride and sulfate parameters in the list of water quality criteria to be exempted in subsection (d). HRT agrees with the recommendation from the EQB and the Water Resources Advisory Committee that Chapter 96.3 (d) be amended to include the term "chloride and sulfate".

In analyzing the "unintended" consequence of the adoption of the new Chapter 96 regulations in November 2000, human health and aquatic life must both be considered for amending the regulations to allow chlorides and sulfates to be regulated at the point of potable water intake.

The quality of the surface waters of the Commonwealth must be regulated to provide for the protection of human health, as provided in Chapter 93.4 that specifies all surface waters be protected as potable water supplies. In the case of chlorides and sulfates, the EPA established the National Secondary Drinking Water Regulations that set non-mandatory water quality standards for these substances. EPA does not enforce these secondary levels, but has established the standards only as a guideline to control the aesthetic qualities of taste and odor in public drinking water supplies. The secondary standard of 250 mg/l for chlorides and sulfates is listed in EPA's 1986 "Quality Criteria For Water", and was derived based on studies of a salty taste threshold for chlorides and a laxative effect for sulfates. None of the studies conducted found that these substances were toxic or cause irreversible damage.

As stated in the EPA's 1994 "Water Quality Standards Handbook, Second Edition", it is recommended that States use the most current risk assessment information to update human health criteria. The electronic data base that is used is the Integrated Risk Information System (IRIS) that "provides chemical-specific risk information on the relationship between chemical exposure and estimated human health effects". A current search of the IRIS database reveals that neither chlorides nor sulfates are listed as chemicals that have an effect on human health.

When deriving human health criteria, EPA uses an equation based on many factors, one being the average adult human water intake of two liters per day. This assumes that the water intake is from a public or private water source, not a stream, where the incidental ingestion of water would not result in a threat to human health. Therefore for protection of the drinking water source, the criteria for chlorides and sulfates should be applied at the point of any existing or planned potable surface water supply withdrawals, not at the point source discharge mixing zone.

The second point that must be addressed is the protection of aquatic life. Numerous studies have been done showing the effects of chloride on aquatic species. Two predominant discussions that outline the studies are EPA's 1986 "Quality Criteria For Water" and the 1988 publication of "Ambient Water Quality Criteria For Chloride".

The National Technical Advisory Committee is quoted in "Quality Criteria For Water" as recommending "maintaining osmotic pressure levels of less than that caused by a 15,000 mg/l solution of sodium chloride".
This would equate to an osmotic pressure of approximately 450 – 500 milliosmoles per kilogram. DEP currently regulates osmotic pressure at 50 milliosmoles per kilogram.

In "Ambient Water Quality Criteria For Chlorides", the criteria is based on the effects of sodium chloride on aquatic life because of the availability of data, and also because "it seems likely that most anthropogenic chloride in ambient water is associated with sodium, rather than potassium, calcium, or magnesium". From acute and chronic studies of both vertebrates and invertebrates, the national standard of Criterion Continuous Concentration (CCC) for chlorides has been set at 230 mg/l. According to EPA's 1999 "National Recommended Water Quality Criteria", the CCC is "an estimate of the highest concentration of a material in surface water to which an aquatic community can be exposed indefinitely without resulting in an unacceptable effect".

DEP is currently using an osmotic pressure criterion of 50 milliosmoles per kilogram, adopted in 1984 to protect aquatic life from the effects of chlorides. This standard is protective of aquatic life by taking into account not only of amount of chlorides present, but also the presence of other dissolved ions contained in the water such as anions of carbonates, sulfates, and nitrates and cations of sodium, potassium, calcium, and magnesium. Since this standard is not based solely on sodium chloride, but encompasses many other ions that may be in solution, this criterion protects aquatic life from a wide range of pollutional sources.

HRT processes wastewaters from the oil and gas industry. These wastewaters consist of drilling and fracturing fluids generated during the drilling of natural gas wells, and the produced fluids (brine) associated with the long

term production of natural gas wells. The produced fluids that HRT processes and discharges under the guidelines outlined in our NPDES Permit contain high levels of chlorides which are impossible to remove using conventional treatment technologies.

Typically the produced fluids generated from natural gas wells are disposed of by use of injection wells, putting the fluids back into the gas bearing formation. EPA's October 2000 "Profile of the Oil and Gas Extraction Industry" quotes the American Petroleum Institute statement that "over 90% of onshore produced water is disposed of through injection wells". However, this is not the case in Pennsylvania where the formations do not readily accept fluids. Consequently there are only 7 permitted injection wells in Pennsylvania.

The change that occurred during the revision of Chapter 93 with respect to the chloride and sulfate effluent limitations is of great concern to HRT, as well as the natural gas industry as a whole. Under the current regulations adopted in November 2000, our facility, as well as several other brine treatment facilities in Pennsylvania will be forced to severely restrict the amount of brine fluids accepted for disposal. This in turn will force the natural gas producers to find an alternative method of disposing of these waste fluids. Since injection is not widely available, fluids will have to be trucked to other states for disposal. This increased trucking and disposal cost will be viewed by many in the industry as highly prohibitive in today's economic climate. The consequence will be to curtail drilling and production of natural gas wells at a time when the Nation faces an energy crisis. The worst case scenario is that some companies fighting to stay in business, may revert to pre-1984 techniques for disposal of untreated fluids. This will result in the contamination of not only surface waters, but also groundwater, which at this time is already severely threatened due to mining activity across Pennsylvania and drought conditions which have been prevalent since 1994.

HRT realizes that economic factors should not enter into the discussion of water quality criteria, however unless the November 2000 standards for choride and sulfates are revised, Pennsylvania may see an unanticipated increase in pollution to its surface and groundwaters due strictly to economic factors.

Thank you for allowing HRT to comment on this regulatory issue. If you have any further questions, please contact our Company.

Sincerely,

Rebecca Snyder
Operations Manager

BRINE & FRAC
HRT
WATER TREATMENT

Original: 2243

HART RESOURCE TECHNOLOGIES

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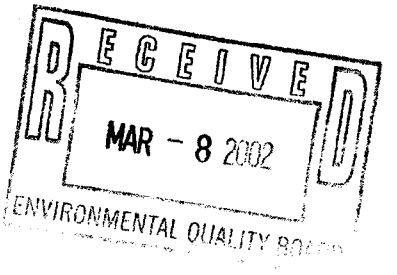
March 5, 2002



Environmental Quality Board
PO Box 8477
Harrisburg, PA 17105-8477

RE: Alternative Criterion For Sulfate

Dear Members of the EQB:

Hart Resource Technologies, Inc (HRT) would like to submit the following comments on the proposal to develop a health-based criterion for sulfate.

In reviewing the "Health Effects From Exposure to Sulfate in Drinking Water Workshop", EPA, 1999, it is evident that there is not enough scientific data to issue a regulation and that more studies need to be done to determine any health effects from sulfates in drinking water over a longer period of time. Many of the studies that were mentioned in this workshop were questionable because of small sampling size, uncontrolled variables, and subjective answers to health questionnaires. Even the results from the studies conducted by the CDC and EPA did not find a dose-response association between exposure to sulfate in drinking water and diarrhea. The American Pediatric Association also doesn't perceive a correlation between sulfate and diarrhea.

As pointed out in the Sulfate Workshop, several additional studies need to be completed:

1. Analyses from all U.S. community water supplies should be compiled and those communities with a sulfate concentration over 500 mg/l identified. The source of the sulfate concentration should also be identified (geology, brackish water supply, underground mining, etc). This definitive study, rather than EPA estimates, would identify how widespread the problem of increased sulfates is in the United States and could be used to pinpoint specific areas of the country to be used for travelers' advisories after a limit has been established for sulfates.
2. Controlled scientific studies with larger groups of individuals that also vary by age (infants, elderly) should be completed using several different levels of sulfate concentrations. This would identify if any problems exist due to age related factors when associated with specific concentrations of sulfate. If these study groups are unwilling to participate (as in the EPA study), then more animal

studies should be conducted using the same concentration criterion. If a dose-response study using animals is completed, a determination of an appropriate safety factor for extrapolation of results from animal to human must also be completed.

3. A separate study should also be done that attempts to determine if individuals can acclimate to high levels of sulfate. This would determine if community water systems need to install non-conventional treatment systems to remove sulfates.

Based on the review of available literature, until more studies are completed, HRT feels that the Department should wait until EPA proposes a primary MCL for sulfate before issuing a health-based criterion for sulfate.

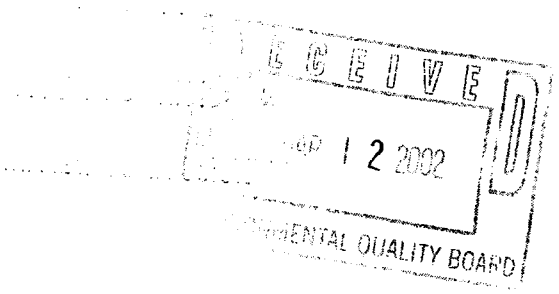
Thank you for the opportunity to comment on this subject.

Sincerely,

Rebecca Snyder
Operations Manager

Original: 2243

Pennsylvania Section
American Water Works Association
1924 N. Second St., 1st Floor
Harrisburg, PA 17102
717-230-8935



March 11, 2002

Environmental Quality Board
David E. Hess, Chairman
P.O. Box 8477
Harrisburg, PA 17105-8477
RegComments@state.pa.us

RE: [25 PA. Code CH. 96] Water Quality Standards Implementation – Chloride and Sulfate

Dear Secretary Hess:

The American Water Works Association (AWWA) consists of 2,400 members representing all classes of water utilities in Pennsylvania, including those owned by investors, authorities and municipalities. The Water Utility Council of AWWA includes representatives from the National Association of Water Companies, Pennsylvania Chapter; Pennsylvania Municipal Authorities Association; Pennsylvania Rural Water Association; and Water Works Operators' Association of Pennsylvania.

The Environmental Quality Board proposes to amend Chapter 96 (relating to water quality standards implementation). This proposed amendment to § 93.3 moves application of the specific water quality criteria for chloride and sulfate, which prevent objectionable taste and odor effects in potable water supplies, to the point of all existing or planned surface potable water supply withdrawals.

Specifically, the Board proposes to add the sulfate and chloride criteria to the exceptions in § 96.3(d). This change will provide the appropriate level of protection for the potable water supply use. The current scientific information supports this change because, as discussed in this Preamble, there are no adverse human health effects from the substances. Effluent limitations required for discharges of these substances are calculated using critical (or stringent) conditions that include a requirement that the criteria be met 99% of the time, even at the low flow condition known as Q_{7-10} (that is, the lowest 7-day consecutive flow in a 10-year period), a condition that is seldom reached, even in drought conditions. This provides an additional margin of safety built into the effluent limitations to protect the potable water supplies, prior to withdrawal. In addition, other surface water uses will be protected by application of other criteria listed in § 93.7.

The Department is also considering whether a health-based criterion should be developed for sulfate. The recent scientific literature indicates that a health-based criterion for sulfate may be between 500 and 1,000 mg/L. The Department is specifically seeking

information and comment on an appropriate health-based value during this rulemaking process.

Since sulfate and chloride would continue to be used to develop water quality-based effluent limits in situations when there is potential for a downstream potable water supply to be negatively impacted by a discharge containing these contaminants, the Council supports the adoption of the proposed rulemaking.

With regard to the appropriate health-based value, the Council would be opposed to any recommendation which would increase the 250 mg/L standard until the science definitively determines that a higher level protects all population groups, including prenatal and young children.

In response to a 1996 amendment to the Federal Safe Drinking Water Act 42 U.S.C.A. § 300g-1(b)(12)(B) (relating to national drinking water regulations), the EPA and the Centers for Disease Control conducted the study, "Health Effects from Exposure to High Levels of Sulfate in Drinking Water Study" (815-R-99-001; January 1999) and organized a workshop to review the study and the available literature. The conclusions of the experts at the workshop are included in "Health Effects from Exposure to High Levels of Sulfate in Drinking Water Workshop" (815-R-99-002; January 1999). The expert panel concluded there is not enough scientific evidence on which to base a regulation, but existing data support issuing a health advisory, especially for infants, in places where sulfate levels in drinking water exceed 500 mg/L. The EPA announced that it would decide whether it will propose a primary MCL for sulfate some time in the near future.

However, more recent CDC studies indicate that a significant gap in the data exists involving prenatal and young children. The Council believes that the department should wait until conclusive data becomes available and for the pending decision by EPA on whether to propose a primary MCL for sulfate before giving consideration to an appropriate health-based value for sulfate.

Finally, raising the number would result in bad public policy; transferring the cost unfairly from the discharger to the public water supplier.

Very truly yours,

WILLIAM T. MORRIS
Chairman

Trostle, Sharon F. - DEP

From: WTM17402@aol.com
Sent: Monday, March 11, 2002 5:39 PM
To: RegComments@state.pa.us
Cc: eross@llgm.com
Subject: WUC Comments Chloride and Sulfate


Achloride.doc

I have attached the Pa WUC comments for Water Quality Standards Implementation
Chloride and Sulfate.
A hard copy will follow in the U.S. Mail.

William T. Morris
Chairman, Pa WUC