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PADEP - Bureau of Point and Non-point Source Management
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RE: General Comments Regarding Document Number 385-2208-001 Anti-Degradation Policy for HQ and EV Streams

To Whom It May Concern:

In reviewing this proposed policy and prior to commenting, we did review the available information for the Pine Creek Case in Berks County, Pennsylvania and we believe one critical component for this case was the judge's comment about the "absence of actual data". To be honest, we came away with the same opinion when we read the proposed guidance document.

To be clear, it is our professional opinion that a written statewide policy on how to manage and address the issue of Anti-Degradation in High Quality (HQ) and Exception Value (EV) Watersheds is needed, but the proposed approach and guidance is incorrect on many levels. It is our professional opinion this proposed guidance is a clear example of making decisions in the "absence of actual data". A statewide policy that builds on the policies and procedures that have and is being used in the various regions and takes into consideration the local conditions, historic background levels, and site-specific criteria would be a better approach than this arbitrary point system. This type of guidance should be based on hierarchical approach similar to the approach used to evaluate the need for preliminary and detailed hydrological investigations that is outlined in PA Code 25, Chapter 71, Section 71.6.

The final statewide policy should provide at least two levels of evaluation. One level for high quality waters and a more rigorous evaluation for exceptional value waters. The policy should encourage the use of individual on-lot disposal systems as a long-term wastewater management practice for rural Pennsylvania. The policy should provide an implementation approach that takes into consideration a number of factors, such as: development density, proposed wastewater flow, baseline conditions, regional groundwater recharge rate, baseflow conditions, proximity to regional discharge zone, and current ambient quality. **We find these qualities lacking in the proposed guidance document.**

The following is our professional comments relating to the development of a statewide guidance.

I. Proposed Guidance for Anti- degradation to High Quality Streams has limits for non-point source pollution that is established in current law.

Statement: If Document Number 385-2208-001 was approved, the provisions would not be consistent with existing laws as specified in Chapter 93.

Under Chapter 93.4, the anti-degradation requirements for non-point source pollution are based on the goal that the regulations will implement a process to protect existing use and level of water quality necessary to protect the existing use. No detailed alternatives analysis or socio-economic justification is required for non-point source pollution control and there is no requirement to have zero influence. Chapter 71, Section 71.6 does provide for a more rigorous evaluation for new land development that has a hierarchical structure and a function of the activity, existing conditions, or geologic issues raise a specific concern. This section primarily relates to the need for additional testing and preliminary and detailed hydrological assessments.

Section 93.4b- Standards for High Quality Streams, requires that a stream must have long-term water quality data that demonstrates the system can support propagation of fish, shellfish, along with wildlife and recreation and the quality must be better than the water quality criteria in Section 93.7, Table 3. Table 3 provides the water quality criteria based on a value and associated critical use. Nitrate is listed as Nitrate+Nitrite – Maximum 10 mg/L – with the critical use cited as PWS (Public Water Supply).

Section 93.8a – Under the exception provision, there is an exemption for items that are considered a toxic substance. Nitrate is not a toxic substance and it is not a proven carcinogen. The only use provision that could potentially regulate nitrate in a surfacewater is for a Public Water Supply (PWS) – See 93.7.

"*Potable Water Supply*—Used by the public as defined by the Federal Safe Drinking Water Act, 42 U.S.C.A. § 300F, or by other water users that require a permit from the Department under the Pennsylvania Safe Drinking Water Act (35 P. S. § § 721.1—721.18), or the act of June 24, 1939 (P. L. 842, No. 365) (32 P. S. § § 631—641), after conventional treatment, for drinking, culinary and other domestic purposes, such as inclusion into foods, either directly or indirectly."

Under 93.4 – Protection of High Quality and Exceptional Value Waters as it relates to non-point source discharges only require that cost-effective and reasonable best management practices be implemented, it does not require the non-point discharge approach to have ZERO influence.

Non-point source control for a High Quality Waters can be accomplished through the use of cost-effective and reasonable best management practices that maintain the associated existing critical use within the watershed. In rural Pennsylvania, this is often a septic system that meets current standards and is sited, designed, and permitted as per Chapter 73. There are no other special conditions or requirements and there are no requirements to have ZERO influence on an adjacent stream. The implementation of a ZERO influence approach, as proposed by this policy, results in requiring a non-point source discharge to meet a higher standard than a point source discharge or a non-degrading point source discharge.

Therefore, it does not appear reasonable or possible to apply a nitrate standard to a High Quality Water if there are no public water supplies within the watershed or when there is no specific Sourcewater Protection Plan. Therefore, this proposed guidance document should not apply to High Quality Waters that do not have an existing PWS use or for a stream segment where there is no Sourcewater Protection Plan that demonstrates nitrates as a problem. Even if these conditions would occur, it is highly unlikely that the scientific evaluation of these sources would require ZERO influence on in stream quality. Therefore, it would appear reasonable to develop clear guidance on the type of site-specific evaluation that would be needed as part of the implementation of "**cost-effective and reasonable best management practices" that are based on science and regional variation. As the laws are currently written, this type of guidance related to nitrates and on-site septic system would only apply to HQ waters with a PWS critical use provision and/or watershed segments where a Sourcewater Protection Plan requires some higher level of enhanced protection related to an existing downgradient withdrawal and the policy could be developed in a manner similar to the process cited in Chapter 71, Section 71.62 (b)(2) related to the need for preliminary hydrological studies for new land development.**

Note in Chapter 71: "The Environmental Hearing Board correctly held that the Department of Environmental Protection (DEP) did not violate its regulations by failing to require a dispersion plume for the individual property owner's subdivision, where the DEP did not interpret its regulation to require maps for every system, and it accepted dispersion plume information in narrative form for systems which generate less than 400 gpd sewage. *Oley Township v. Department of Environmental Protection*, 710 A.2d 1228 (Pa. Cmwlth. 1998)".

II. Application to EV Streams

For EV Streams, the water quality of these streams should be maintained and protected. There are no limitations that relate to or depend on an existing use provisions. The water must meet the provisions of 93.4b (ii) (b).

Under 93.4c (b) – Protection of Exceptional Value Waters – subsection (2) – Non-point source control – The Department will assure that cost effective and reasonable best management practices for non-point source control are achieved.

Since EV waters do not have the limitation of a potential use provision, it is possible and reasonable that the use of on-lot wastewater disposal should be evaluated in a manner to ensure that the approach does maintain and protect current quality. Therefore, it would appear reasonable to develop clear guidance on what would be considered "**cost-effective and reasonable best management practices and to maintain the quality of an EV stream" for septic systems that service multiple dwelling units.**

Therefore, based on current law additional guidance is need for:

1. HQ streams that have an existing PWS use designation or where a Sourcewater Protection Plan has demonstrated the need to limit and control nitrate.
2. All EV Streams.

III. Application to On-lot Disposal and Land-Use Planning

The implementation of this type of policy must have the following hierarchical structure.

A. A policy that applies to HQ watersheds with PWS use criteria and a separate policy for EV watersheds.

B. Policy that encourages the repair of malfunctioning systems so they meet current standards. In general, it is our professional opinion that it is more important to repair malfunctioning systems than to meet an anti-degradation policy. The repair to a malfunctioning system is actually promoting anti-degradation by eliminating a problem that is likely impacting surfacewater and groundwater quality.

C. Policy should not apply to the use of spray irrigation systems. For drip irrigation systems this policy should either not apply or not be required when the drip irrigation system is designed based on a water budget and/or nutrient loading analysis.

D. Policy needs to factor existing conditions and local soil, geology, and landscape features. Therefore, it is not likely a single statewide policy can be developed, but it should be a statewide policy that is customized for each region.

E. Policy should be implemented in a manner that is based on the anticipated building density and proposed project average water usage or wastewater flow.

The spray irrigation approach is an excellent system to manage and recharge treated on – lot wastewater, but because of regional concerns at the time of setting the initial design criteria the PADEP developed an extremely conservative design approach. This over conservative design approach actually inhibits the implementation and use of individual spray irrigation systems. It was not specifically mentioned in the policy, but this policy should not be applied to individual or small flow drip irrigation systems and the PADEP should review the design criteria for an individual or small flow spray irrigation system to more widely promote the use of these systems.

It is possible that the implementation of this guidance may aid in undoing the benefits of low impact development and clustered development. A developer may find it easier to implement a development with very large lots to avoid the provisions created by this guidance. Since most of the areas with EV status are "Wild Areas", this policy may make it difficult to install on-lot disposal systems on commercial business, tourist destinations, and residential development in these areas that are necessary for the Citizens of the Commonwealth and our visitors to travel and enjoy these protected areas. **The guidance document does not address this concern or issue and no formal cost-benefit analysis was conducted. The policy just states this approach is "cost effective", but does not provide a cost analysis to support this conclusion and does not mention the cost to implement.**

IV. Level of Protection

The proposed guidance document uses an arbitrary approach that is not based on regional factors and existing conditions to demonstrate adequate protection of HQ and EV waters. In reality, the level of protection that is needed will vary regionally and based on the nature of the proposed development and EV streams should have a higher level of protection than HQ waters and **this arbitrary approach does not provide proof and is not consistent with the facts or science.**

As written, the current policy seems to suggest it should be applied in the following manner:

a. HQ and EV streams are treated the same with no regional variation and the requirement is to have ZERO influence on in-stream quality and associated habitat;

b. The policy applies to new systems where planning is required, but this does not restrict the **application of this guidance to new subdivisions that require planning**. The guidance further suggests or recommends it should be applied to repairs and replacements systems. The policy makes no specific suggestion on how to deal with all of the

preexisting lots that have been subdivided and sold as buildable lots in Pennsylvania prior to the implementation this guidance (Note- During the PADEP sponsored webinars, it was suggested that this policy would apply to pre-existing lots that do not have a current permit, but not apply to pre-existing lots with a valid permit) – Clarification in the policy is needed through a declarative statement;

c. Because the science has been removed from this guidance, the guidance applies to gullies, intermittent streams, ditches, and other small tributaries that may be adjacent to an on-lot disposal system, but these features may not be the "streams" connected to the groundwater discharge zone associated with the adjacent on-lot disposal system (s);

d. The guidance creates a very broad definition of point sources of pollution that includes a number of activities that have been classified as non-point sources of pollution as it relates to on-lot septic systems, and then discusses issues related to agricultural practices that are not regulated under the on-lot septic system program;

e. The proposed guidance appears to favor a "point" system approach with a prescriptive methodology over a fact-based approach using the scientific method and actual site conditions;

e. The guidance implements and recommends new BMPs that have never been tested in Pennsylvania or used for this purpose, but excludes the current practices that are used in PA such as an inspection repair program, replacement systems, proper siting, backup areas, and sewage management districts as a management tool;

f. The policy assumes that the mass balance approach for evaluation nitrate loading is not effective because it can not be used to determine the concentration a particular time and particular point in a stream and may not effectively target a single individual septic system; and

Note in Chapter 71: "The Environmental Hearing Board correctly held that the Department of Environmental Protection (DEP) did not violate its regulations by failing to require a dispersion plume for the individual property owner's subdivision, where the DEP did not interpret its regulation to require maps for every system, and it accepted dispersion plume information in narrative form for systems which generate less than 400 gpd sewage. *Oley Township v. Department of Environmental Protection*, 710 A.2d 1228 (Pa. Cmwlth. 1998)".

g. The proposed guidance document establishes a pollutant of concern for surfacewater as nitrate, because it is a "reasonable potential" to affect water quality and the limit should be set at $\leq$ 1 mg/L nitrate+nitrogen. The guidance document offers no proof or documentation of the statewide negative impacts of nitrate to our surfacewaters. The guidance documents suggests that future "pollutants of concern" can be identified and added if the parameter is cited in only one "peer" reviewed journal. **Therefore, all the streams with nitrate-nitrogen above 1 mg/L are degraded?**

Comments

1. It is clear the author or authors of this document do not fully understand the peer review process. Just because something was peer reviewed does not mean it is correct, accurate, or accepted as fact and it does not mean there is a consensus of scientific data that strongly suggests the hypothesis is correct. This provision and statement should be removed from this guidance document. PADEP should make decisions and policy based on proven science and facts. **If we need an example of this issue and the problems this approach would cause, I would suggest the authors read the significant number of peer reviewed studies related to natural gas development.**

2. The Department has always considered nitrate as a pollutant of concern when evaluating large volume on-lot disposal systems and groundwater. These systems are evaluated based on specific criteria related to regional background levels of nitrate, anticipated building density, and projected total volume of wastewater generated. It is our experience that the Department has used the standard of 10 mg/L at property boundaries and either no measurable or detectable change or a change of not more than 5 % in a surfacewater as a guide for evaluating influence.

The regional PADEP offices have developed unofficial policies on when to evaluate projects for potential impact. For the Northeast Region, the following appears to be the unofficial guidance:

* $\geq$ 2,500 to < 5,000 GPD flow (PADEP Reviews Background Data) – If regional background over 5 mg/L (site-specific preliminary study with data) or hazard geological condition is present;

* $\geq$ 5,000 to < 10,000 GPD flow (PADEP Reviews Background and Surrounding Land-use)- Typically a Study is Requested (site specific with data and in some cases monitoring);

* Site Specific Water Balance Models for Large Projects (> 10,000 gpd) – Preliminary and Detailed Hydrogeological Study.

These types of studies consider the proposed nature of the flow and operations of the system or facility, local geology, background water quality, and anticipate levels of nitrates in groundwater and discharge zone under normal year and drought year conditions.

3. In an attempt to justify this guidance, the document concludes that nitrate is a threat to aquatic life and recreational use, simply because of the potential for nutrient enrichment, without any justification, a discussion over the role of phosphate, or the presentation of one fact that suggests that managing nitrate would adequately control algal growth and stream productivity.

Just a few items:

From a review of EPA, **Final Report on Acute and Chronic Toxicity of Nitrate, Nitrite, Boron, Manganese, Fluoride, Chloride and Sulfate to Several Aquatic Animal Species,** 2010.

Macroinvertebrates (48-hour acute test) [LC50 = 278 mg/L]
Stoneflies (96-hour acute test)[LC50 = 456 mg/L]
Minnow (96-hour acute test)[LC50 = 415 mg/L]
Brook Trout Larvae (96-days old) were 2151.4 and 2645.3 mg/L N03-N

DRBC Website -Small Mammals - Concentrations greater than 20 mg/l may pose a health hazard to small mammals, causing a problem where the blood's hemoglobin cannot transport oxygen.

(Camargo, J.A., 2005) - A maximum level of 2 mg NO3-N/l would be appropriate for protecting the most sensitive freshwater species. (Camargo, J.A., 2005).

From a review of multiple TMDLs for PA Watersheds, these documents contain the following sentences- "Because blue-green algae can fix their own nitrogen, nitrogen reductions may not be as effective in controlling algal blooms. The reduction strategy focuses on controlling phosphorus loading from the watershed to maintain desired chlorophyll-*a* concentrations." **We can not agree more with this statement.**

There may be some basis for setting a limit of 2 mg NO3/L in a stream with sensitive species, but it is clear from the data that we do NOT want to make our streams nitrogen limiting. The better strategy would be to focus on "controlling phosphorus loading" and were necessary because of a PWS or a "sensitive species" some provision related to nitrate may be reasonable. We will grant that ammonia and nitrite is highly toxic, but the best way to manage ammonia and nitrite with on-lot disposal systems is through proper siting and repairing/replacing malfunction systems to either meet current standards or at least meet Best Technical Guidance and the guidance document is NOT regulating ammonia or nitrite.

4. The document does highlight the 10 mg/L standard and makes a declarative statement that on-lot disposal is not capable of creating this in-stream level, but then the document proceeds to suggest that a lower value should apply to HQ and EV streams. The document is suggesting that the background level for nitrate in PA streams may be 1 mg/L and is suggesting on-lot disposal systems should be sited to maintain a maximum in stream level of 1 mg/L. Therefore, the proposed guidance is saying on-lot disposal systems should have ZERO impact on HQ and EV waters. **This proposed standard for on-lot disposal is more stringent than point source discharges with socio-economic justifications and even non-degrading discharges and this goal is not technically achievable.** For example- In the case of implementing American with Disabilities Act –

"if it is **not** readily **achievable** to do, the ADA would **not require**". **How can the state of Pennsylvania establish a policy that is in fact – not readily achievable?**
Note- The document provides no scientific support for this approach and clearly states that the implementation of the guidance would require changing state laws.

As previously discussed, the guidance ignores the use provision for HQ streams and appears to suggest it is required because of a "potential concern". Because of the differences in the level of protection afforded to HQ and EV waters, EV waters should have the highest level of protection, but the HQ standard should be a function of the use criteria. **We are not lawyers, but from a review of case law and previous Environmental Hearing Board decisions and other legal proceedings, this approach proposed by the guidance is not in alignment with these legal precedents.**

5. The guidance document highlights the concern over nitrogen from septic systems and the Chesapeake Bay. The document is attempting to suggest that nitrate as nitrogen from septic systems may play a significant role in the loading of nutrients to our surfacewaters.

Septic systems accounted for 4 % of the total nitrogen entering the Chesapeake Bay and the primary sources are agriculture, atmospheric deposition, and wastewater (point source discharges). "The majority of nitrogen and phosphorus pollution comes from sewage treatment plants, animal feed lots, and runoff from crop land, urban, and suburban areas. In addition, air pollution and industrial sources such as power plants and vehicle exhaust contribute roughly 1/3 of the nitrogen pollution and in many cases, the point source wastewater treatment plants had no limit on the amount of nitrate that could be directly discharged to a waterway. The largest source of pollution to the Bay comes from agricultural runoff, which contributes roughly 40 percent of the nitrogen and 50 percent of the phosphorus entering the Chesapeake Bay."

Source
http://www.cbf.org/how-we-save-the-bay/issues/dead-zones/nitrogen-phosphorus

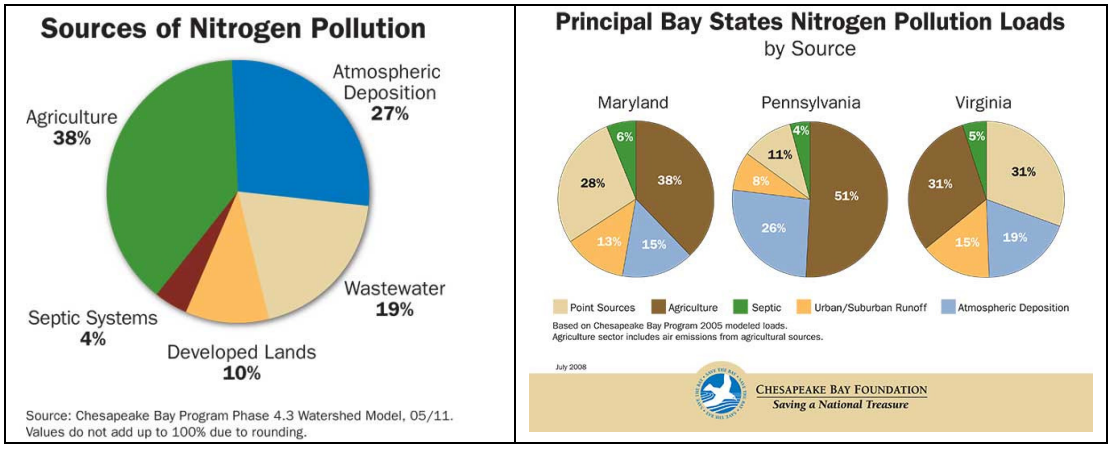

Figure 1. Breakdown of Nutrient Sources for the Chesapeake Bay Watershed.

The USGS completed a study in 2003 for Pennsylvania and the Chesapeake Bay Watershed titled "Residence Times and Nitrate Transport in Ground Water Discharging to Streams in the Chesapeake Bay Watershed (Water-Resources Investigations Report 03-4035), see Figure 2.

Figure 2. Source: Study Area from WIR 03-4035.

The following is a partial listing of the major conclusions for this study.

1." Factors affecting nitrogen transport in ground water include spatial and temporal variation in input sources, ground-water age, and aquifer processes that lead to denitrification."

2. "The level of denitrification is significant in water with residence times greater than 20 years."

3. "Denitrification in Pocomoke Creek is significant and appears to affect mostly older water discharging to streams".

4. "Other findings of this study show that nitrate in ground water discharging along preferential flow paths may not be affected by natural processes, such as denitrification or uptake by riparian vegetation".

5. Because ground-water residence times do not appear directly related to the hydrogeomorphic regions (HGMRs), the targeting of management practices will achieve the most rapid response in water quality if directed at watersheds with large agricultural sources of nitrate, areas with the shortest ground-water-flow paths, and areas not affected by significant denitrification."

6. “Of the major sources of N, …. the application of N fertilizer and animal manure are the most important sources that are related to groundwater. **Septic systems are not included in the discussion because they are considered a fairly small source of nitrogen**.”

7. “The areas of the Chesapeake Bay Watershed that have the highest loadings of nitrogen from ……. major agricultural sources”, see Figure 3.

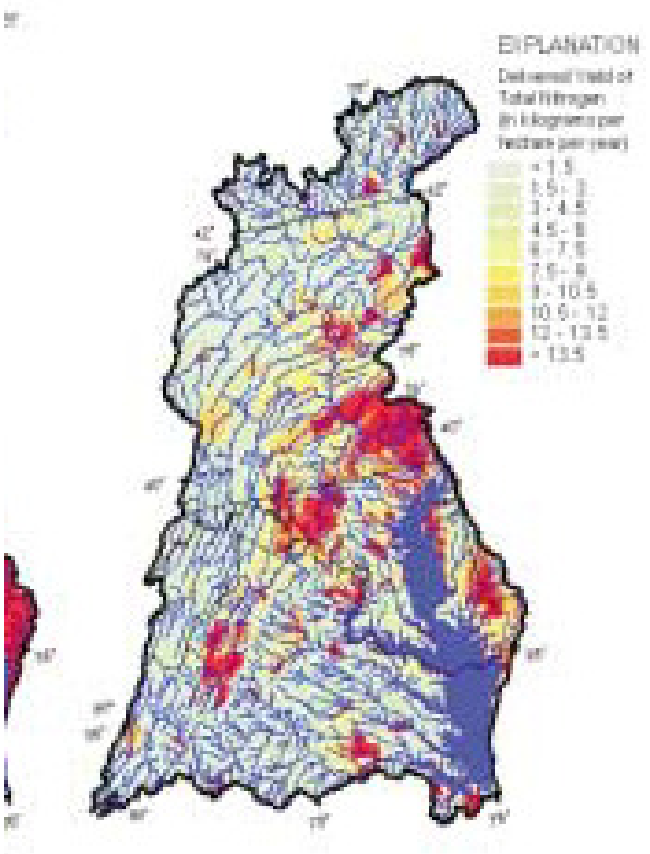

Figure 3. Distribution of Total Nitrogen Sources in kilograms per hectare per year from Figure 91 of WIR 03-4035.

From this USGS report, it is clear the primary concerns related with nitrate are associated with historic and current agricultural activity. Besides land-use, the potential for problems with nitrate are a function of the soils, geology, local hydrology, and groundwater age. The study clearly demonstrates that riparian vegetation may not significantly induce denitrification. These scientific conclusions have not been applied to the proposed guidance document.

Note: In addition to the USGS Study, denitrifiation rates have been published for soils and sediments. The rate of denitrifcation is a function of the site-specific conditions and the first order rate constants range from 0.004 to 2.15 day^{-1}.

Delaware River Watershed (2007)

As part of our work, we attempted to find data for the Delaware River Basin. We did review the Sourcewater Protection Document for the Delaware River Watershed (2007) and the Delaware Bay Estuary Report (2005), the following are a few comments from these studies:

"With respect to nitrate and nitrite, these nutrients were once increasing in the Delaware River, but now the concentrations are stable and beginning to slowly decline."

"Non-point source pollution, stormwater runoff from urban and suburban areas, is a source of metals, nutrients, suspended solids, and chemicals such as pesticides, herbicides, fertilizers, gasoline, and motor oil. Stormwater is likely to increase in volume as the watershed becomes more populated and developed. The water quality threat from stormwater creates a need for low impact development, sustainable design, and stormwater best management practices."

"While conductivity, nitrate, and iron concentrations have slightly increased over the past few decades, concentrations of dissolved oxygen, ammonia, phosphorus, and fecal coliforms have significantly improved, due to reductions in **agricultural runoff** and improved wastewater treatment."

"Over the past decade, 1990-1999, levels of alkalinity, conductivity, sodium, chloride, bromide, iron, manganese, nitrate, and turbidity in the Delaware River have increased at the Baxter Intake. Increased pollution from **runoff** is the most likely source of these changes."

"Nitrate Concern – related to **land-cover changes** (page 39) and indicated that **nitrite** was a water quality parameter of concern (page 69), and for the period from 1990 to 2006 the level of nitrate has ranged from 0.52 to 2.53 mg NO3-N/L (page 72)."

This type of plan creates a framework to base decisions regarding nutrient loading issues that factor location, existing point and non-point discharges in the watershed, land-use, and proximity to the source, but these **types of plans must factor the economic impact on the upgradient communities.** It appears that land-use changes, runoff, and point source discharges are the critical factors and for the chemical factors, the bigger issue may be nitrite. **Nitrite is not a problem for properly sited and designed on-lot disposal systems in Pennsylvania.**

Delaware Bay Estuary Report (2005)

"Nitrate leaching is a major concern in humid regions (such as Delaware) where excessively well drained soils overlie shallow water tables (Sims, 1995) - page 42."

"Provided a source of nitrate exists, a more critical factor is soil type and depth to water table (Ritterand Harris, 1984; Andres, 1991; Denver 1989; Bachman, 1984). Even if nitrate sources are extensive, areas with poorly-drained soils do not tend to have high nitrate levels in ground water. Low oxygen conditions in poorly-drained soils allow for greater denitrification so that nitrogen escapes to the atmosphere rather than leaching into ground water -page 43."

Even though this report does highlight that nitrate loading can be a concern within a watershed, the report clearly shows the role of nitrates are a function of the soil, groundwater, other land-use practices**,** and other conditions **and not just a concern that should be applied to the interior watershed. This supports the site-specific approach, based on actual data, and not an arbitrary point system as proposed by this policy.**

Private Drinking Water Wells in Pennsylvania

Summary of findings from The Pennsylvania State University on nitrates in drinking water wells. Source: **"**Drinking Water Quality in Rural Pennsylvania and the Effect of Management Practices", (PSU, 2009).

" Nitrate concentrations in wells were statistically correlated with the distance to the nearest cornfield and other crop fields."

"Nitrate-nitrogen occurred above the drinking water standard of 10 mg/L in only 2 percent of the private wells."

"Mean nitrate concentrations were significantly higher in the southeast and southcentral regions compared to the other four regions."

"higher nitrate levels on carbonate and igneous bedrock are likely due to the fact that these bedrock types are predominant in the regions of the state with intensive agricultural land use rather than actual differences in the bedrock chemistry."

"A notable exception to the lack of importance of nearby land-uses was the strong correlation between the distance to nearby agricultural fields and nitrate concentrations in wells."

It is clear that the findings and data from this study were not considered when the PADEP developed the proposed anti-degradation policy for EV and HQ watersheds.

5. The link between nitrates and infantile methemoglobinemia dates back to the "Blue Baby Syndrome (Comly, 1945 and Chaplin, 1947).

In 1980s – infantile, i.e., infants under 3 months, methemoglobinemia associated with inflammatory bowel disease (including diarrhea, acidosis, infection and gastroenteritis).

1983 – 1999 – reports and studies indicated that a bacterial infection may be a causal agent and there are multiple studies that dispute this direct and sole connection that nitrate is the causal agent.

Other studies suggest dietary nitrate levels in food play a significant role.

Therefore, the causal link has been strongly questioned, but nitrate is still a regulated drinking water standard at 10 mg NO3-N/L, but a more important role may be bacterial contamination. **If PADEP wants to protect it residents, the state would do better to propagate a state-wide standard for private well construction and begin to fix the 30 to 50% of private wells that produce water that is contaminated with bacteria.**

6. The guidance ultimately develops a best management system that is based on points that require a total of 45 points or the reduction of nitrate to ensure that the maximum in stream levels are virtually zero, 0, after allowing for a background level of 1 mg/L.

This standard and approach means that non-point source pollution from on-lot septic systems would have ZERO impact on HQ and EV streams. Based on a review of NPDES discharge permits, this proposed standard for non-point sources of pollution far exceed the criteria, i.e., more conservative, than the standards for point source discharges. In fact, the proposed policy would actually require non-point source systems to meet a standard that is beyond the requirements for a non-degrading discharge approach. This approach is typically associated with a point source discharges that requires a socio-economic justification. For the point source discharge permits that were reviewed by our staff, there was only one case where the permit had a limit for nitrate and that limit was 8 mg NO3-N/L. Therefore, the proposed guidance is establishing or imposing non-degrading discharge criteria on a non-point source of pollution. **This provision and approach is not provided in current law and requires non-point source pollution systems to meet and provide to a higher burden than point sources of pollution. This is inconsistent with current law and not technically feasible.**

This guidance does not factor into the evaluation that all waste streams are not the same and some commercial and industrial waste streams have a significantly higher loading of nitrate compared to a domestic source. A waste stream may have a flow of 400 gpd, but the nitrate concentration may be two or three times the strength of domestic sewage.

A little aside: Point System Applied to Farm Animals:

1 single family residence – 45 points – standard can be achieved with a density of approximately 1 edu per 11 acres.

1 horse – Produces the same about of Nitrogen as 3 single family homes – Number of Points Needed per Horse (45 *3 = 135 points)
This would require a minimum of 30 acres.

1 cow – Produces the Same about of Nitrogen as 6 single family homes – Number of Points Needed per Horse (45 *3 = 270 points)
This would require a minimum of 60 acres.

Does this Make Sense??

7. The guidance document indicates that the mass balanced method is not an effective decision making tool for the PADEP. The document indicates that this is because the dispersion model approach can not be verified through water quality sample and analysis and it is not possible to track the pollutants from a single on-lot disposal system and a specific time or point. The guidance uses these criteria to justify eliminating the model approach that is based on science and site-specific conditions for an arbitrary rating. The guidance does not cite any scientific studies to suggest that the point system is a better approach and the scientific studies that are available support the mass balance approach is the favored method.

Comment- It is my professional opinion that the author or authors(s) had an interest in using a BMP point system approach using buffers over a more site-specific and scientific approach. The mass balance approach can be used to develop an understanding of the average in-stream concentration of the stream under a number of flow regimes and has been applied to extremely limiting conditions such as baseflow. In addition, the authors did not consider that the travel time for the subsurface flow system is years to decades or more and not minutes or seconds for point source discharges. As highlighted by the USGS study, it is clear that significant denitrification can occur when travel times from recharge to discharge zone are in excess of 20 years. These types of analysis can be made for a project, but they require a site-specific analysis. As previous mentioned, we suggested a multi-tiered policy that is based on a combination of existing conditions and proposed changes. This type of unofficial policy is currently being used by the regional offices for the PADEP.

8. It would be our professional opinion that the evaluation of on-lot disposal systems in HQ and EV watersheds must be evaluated when new land development is proposed and a hierarchical approach that is consistent with the current regulations should be implemented.

a. High Quality – unless there is a downstream use that is a Public Water Supply, i.e., PWS, or a Sourcewater Protection Plan that has been implemented no additional evaluation would be needed. To fall into this category, the proposed project would also need to meet the following criteria:
a. the projected peak flow is < 2,500 gpd or less than 10 % of average streamflow;
b. background groundwater levels for nitrate are $\leq$ 5 mg/L;

c. the project is using on-lot well and septic systems and the site does not have marginal conditions; and
d. the area is not located in an area with karst geology.

This proposed policy should not apply to pre-existing lots where no further subdivision is proposed or repair systems with no increase in equivalent dwelling units. This approach is consistence with regional guidance and guidelines used to evaluate water withdrawal impacts on wetland areas and surfacewaters.

b. EV – a preliminary hydrological evaluation would be conducted using a mass balance approach that would take into consideration the nature of the proposed development, property border levels of nitrate for the proposed development, average or annual wastewater volumes, and baseflow nitrate levels in the "downgradient" discharge zone.

In addition, the project would need to meet the following criteria:
a. the projected peak flow is < 2,500 gpd or less than 10 % of average streamflow;
b. background groundwater levels for nitrate are $\leq$ 3 mg/L;
c. the project is using on-lot well and septic systems and the site does not have marginal conditions; and
d. the area is not located in an area with karst geology.

This policy should not apply to pre-existing lots that require no further planning and repair systems with no increase in equivalent dwelling units. This approach is consistence with regional guidance and guidelines used to evaluate water withdrawal impacts on wetland areas and surfacewaters. The ultimate goal of the policy should be no adverse impact and not zero impact. **Zero impact is not an attainable or achievable goal.**

9. The guidance does not discuss the cost for the monitoring and tracking of the proposed BMPs. The implementation of these approaches would result in developing programs to monitor, track, and maintain these features. In most cases, these would likely be activities on an adjacent parcel and not the one owned by the homeowner, Associations, or other entity and it is possible that these features could be located in a different municipality or burden by the state and the citizens of the Commonwealth. This policy would require a registry of these natural features and a monitoring and enforcement effort. It is not reasonable to conclude that this approach is more cost-effective in the long-term without factoring in these additional costs and it is likely these will be costs that will be a direct burden on the local municipality. **The guidance basically just says the approaches are "cost-effective", but the guidance does not actually conduct the cost analysis.**

l0. Permeable barriers – **this should be simply removed** as an option for the following reasons:
a. this t**echnology and approach has not been demonstrated in Pennsylvania**;
b. this **technology and approach has not been applied to on-lot wastewater disposal**;

c. it is likely that each on-lot system and reserve disposal area would require a reactive barrier;
d. reactive barriers, if not properly sited and maintained may become artificial groundwater discharge points, **i.e., potential point sources of pollution**, therefore, the siting of these structures will require the services of a professional soil scientist, professional geologist, and/or professional engineer; and
e. improperly placed and constructed units may facilitate groundwater contamination.

Until further scientific data is available with case studies and field documentation, this approach should be eliminated from the guidance document as an option. There may be a place for this approach as a component of a pre-treatment system, but not as a downgradient disconnected best management practice.

IV. Comments specific to the guidance document

The use of individual or community on-lot wastewater disposal is favored over direct discharges to our surfacewaters. This guidance document has been prepared in a manner that clearly shows that the authors did not understand the process for siting, permitting, operating, and maintaining on-lot disposal systems in Pennsylvania. As recommended, this proposed guidance would significantly limited the use of on-lot septic systems in HQ and EV watersheds, but also this guidance could be extended to include the repair of existing systems in these regions and may apply to pre-existing lots or "paper subdivisions". For the existing developments with failing on-lot septic systems in HQ and EV watersheds, the process should encourage the installation of septic systems that meets current standards, uses best-technical guidance, and encourages water conservation. We do agree that spray irrigation should not be included in this policy, but the exclusion should also include individual and small flow drip irrigation systems.

par 2 page 1 – I agree – on-lot sewage systems are non-point sources and the approach to controlling non-point source is cost-effective and reasonable best management practices, but the guidance does not provide this option. The use of on-lot wastewater disposal has been a very effective tool to manage our rural areas, the primary reason is that Pennsylvania is rather restrictive, compared to surrounding states, when it comes to siting, design, and management of on-lot disposal systems.

The BMP practices that are used in Pennsylvania include site-specific soils analysis, requiring primary and reserve disposal areas, implementing inspection / repair programs, developing sewage management districts, requiring bonding and maintenance agreements, i.e., current sewage planning is a best management practice, and the proper siting, design, and pretreatment of the applied wastewater.

The use of vegetative buffers and riparian buffers are not part of the standard of practice to ensure the proper operation of an on-lot disposal system in Pennsylvania. This method has significant limitations because the owner of the septic system may not

control or own the needed buffer or riparian zones, groundwater influenced by the septic system may not actually flow through these local buffers. The actual localized discharge zone may be a significant distance downgradient from the site and not the nearest ditch, intermittent stream, or even first order stream. This approach has been used in stormwater and agricultural applications when the movement of the contaminants is very shallow. **This is not the situation with most on-lot disposal systems.**

The use of these practices may be advisable for some of the alternative on-lot disposal systems that are approved for the areas with a limiting zone of only 10 inches to a seasonal high perched water table, but the primary reason would to prevent modification in the downgradient area that could cause a surface malfunction and not as a buffer.

par 4 page 1. This policy should not be applied to the replacement of residential or community systems. Many of these systems are substandard and do not meet current regulations. This standard should not be applied to existing approved lots or approved subdivisions using individual or community on-lot disposal.

page 3
Definition – The definition of point source could include many sources or components of septic systems or stormwater management systems that would normally be classified as non-point source. In addition, it may be possible to classify a point source as an individual well and fissure or crack in bedrock. The reference to agricultural, landfills, and boats should be removed. Remove this definition and use the following:

Point source discharge—A pollutant source regulated under the NPDES permit system as defined in § 92.1 (relating to definitions).

Nonpoint source—A pollutant source which is not a point source discharge.

Remove the definition of riparian buffer and riparian forest buffer. These buffers are more applicable to stormwater management where we may use overland flow to enhance removal. These are not appropriate for the use of on-lot disposal systems. For on-lot disposal, we do not want the wastewater to flow via overland flow or just below the surface in the root zone.

Page 4
The definition of GUDI is wrong and applies to drinking water regulations.

III. Regulatory Requirements
Par 3
The current regulations have a provision that HQ streams are protected related to existing critical use. Nitrate is only used as an indicator with the existing use criteria is PWS. There is no regulatory requirement to protect beyond the use provision for HQ streams.

Par 4
Last sentence - There is no regulatory requirement to protect beyond the use provision for HQ streams under the antidegradtion provisions for nonpoint source control. The only way this could be done would be to suggest that nitrates directly and adversely influence the oxygen or temperature of the water. The document has not made that case and the scientific evidence and the nutrient management approach strategy focuses on controlling phosphorus and not nitrogen loading from the watershed to maintain desired chlorophyll-*a* concentrations. Controlling phosphate has been the preferred approach to managing in-stream quality, because nitrate limiting streams would promote the growth of nitrogen fixers that include blue-green algae.

Page 5
Soil absorption field – switch to soil absorption area

Page 6
First sentence - the impacts of nitrates to surfacewater are minimal. Ammonia and phosphates are more significant items of concern. In fact, surfacewater systems and wetlands will actually fix nitrogen from the atmosphere if additional nitrogen is needed. **Note: The nitrogen concentration in the atmosphere is approximately 75 % by weight dry air.**

Reasonable Potential – "Just because it could be a problem – **does not mean it is**" DEP "pollutants to be of concern" -the proposed standard of a minimum of 1 peer reviewed study is inadequate and this provision could open the door to potential future guidance related to endocrine disrupters, chloride, etc. This should not be how PADEP sets policy.

Page 7
Par 2
When nitrate has been shown to be a threat to aquatic life at a level of 1 mg/L? It is not toxic and not listed as a limiting factor in any other specific criteria other than PWS. It is one nutrient associated with excess plant growth, but the nutrient of primary concern is not nitrate, but phosphate. It is not advisable to make surfacewater nitrate limiting. If this approach is used, it will encourage the growth and development of nitrogen fixers, such as blue green algae.

PWS limitation is 10 mg/L, but for this proposed guidance, a more stricter standard applies- Why? Where is the data? Where is the study? Where are the facts?

A more restrictive standard could be applied based on regulations for EV streams, but the current regulations do not permit a more restrictive standard beyond the use criteria for HQ streams. It is clear the authors of the guidance document are aware of this fact, because the documents make statements related to changing state laws once implemented. This is not how we change a law in Pennsylvania!

Page 8
par 1
Why does the document discuss nitrate concentrations in the 48 states – this is Pennsylvania. Background levels vary from region to region in Pennsylvania and range from < 0.5 mg/L to over 10 mg/L. This is why a regional or site-specific approach is needed.

par 2
See above

Page 9
par 1
The guidance document suggest that streams may have some natural assimilative capacity and recognizes that other practices may play a more important role when it is applied to nitrate, see Chesapeake Bay data listed above and fertilization. This is not factored into the policy.

par2 and par3
Remove these paragraphs or rewrite- they are confusing, poorly written, and overstate facts.

page 10
par 1
The proposed guidance misses the importance of time in this process. In most cases, steady-state conditions between a septic system and stream, i.e., recharge zone to discharge zone, may take decades to hundreds of years to get from the point of recharge to discharge. This should be part of the analysis. This understanding is lacking in the proposed guidance document.

par 2
The relationship between the recharge and discharge zone is another reason for the hydrological mass balance approach over a riparian buffer approach.

par 3
Paragraph is confusing.

par 4
Denitrification can occur year-round at micro-zones within the groundwater flow system and in certain landscape features, namely – wetlands, stream sediments, lake sediments, hydric soils, seasonal perched water tables, and other anoxic zones if adequate carbon is available. A well-aerated forest or riparian buffer does not facilitate denitrification, but a poorly drained soil can facilitate denitrification. The fact that wetlands can and do facilitate denitrification is a management tool that can be used in this process and should

be used when evaluating a mass balance approach. Currently, the mass balance approach assumes no denitrification and an evaluation can be done based on normal, baseflow, or a variety of flow conditions.

Point- There are field methods and observations that can be used to determine if a hydric soils or a wetland area is providing for denitrification. If necessary, this type of assessment can be included in a preliminary or detailed hydrological evaluation.

page 11
par 2
The sentences starting "Previous" creates a benchmark that is unrealistic and beyond what is needed. If an evaluation can show that the combined influence of dilution, dispersion, mixing, and denitrification in the areas of hydric soil and wetlands will result in an in-stream level of nitrate that is not measureable or has no measurable change that all that is needed or an analysis that indicates that the system will not be degraded.

par 4 (page 11) and par 1 (page 12)
This document gets confusing. At one point, we talk about this applying to each individual system and even repairs and then the document talks about a watershed approach to this evaluation that includes upstream land-uses and activities that may be and most likely not in the direct control of the individual landowner or local agency. A watershed approach may be appropriate for point source pollution control, but this approach is not appropriate for individual on-lot septic systems. This is another reason the document should be reorganized, but a watershed approach could be conducted as part of the implementation of Source Water Protection Plans for PWS. **These plans must be prepared working with the other local and rural agencies in the headwaters of the watershed.**

par 2
Setting a goal limit of 1 mg/L is the equivalent of requiring on-lot septic systems to have ZERO influence on in-stream quality and assumes the stream is influenced based solely on the proximity to an on-lot disposal system and not based on the actual flow of the groundwater.

par 3
The point system should be eliminated and a guidance document should be developed that is based on scientific facts and regional conditions.

For Example
HQ watersheds – if there is a PWS uses in the critical area, background groundwater levels over 5 mg/L, or a Sourcewater Protection Plan – the nitrate loading analysis should be done.

For Example
EV Watershed – if background groundwater levels are less than 3 mg/L and the building density is less 1 edu per 10 acres no evaluation is needed. EV Watershed – if the building density is greater than 1 edu per 10 acres or the background groundwater nitrate level is at or above 3 mg/L-then a preliminary hydrological study should be conducted. The analysis should demonstrate that during average streamflow there is no measurable change in the in-stream water quality or any change will not degrade the habitat or stream quality.

page 13
Remove set-back distances – this is factored into a mass balance analysis and a function of the site specific conditions.

page 14
Remove riparian buffers – this could be factored into the mass balance analysis as nutrient uptake or denitrification if this area is shown to be written the dispersion and downgradient mixing zone and discharge area for a plume.

page 15
Remove

Page 16
Remove- again included in a mass balance analysis is appropriate.

page 17
Permeable barriers – Remove – Not proven and potentially has a significant amount of liability. Upon review of a study completed in 2000, the totals of 4 barriers were tested and the removal capacity was measured at "0.7 to 32 mg L/d".
http://www.ees.rochester.edu/ees217/Readings/CherryGW1.pdf

The vertical barrier application was tested where the plume of water was at a depth of 3 feet. This is not the typically depth for the seasonal low water table in Pennsylvania, but this may be an application that may be advisable for systems in lake communities. The primary concern would be that these areas are also groundwater discharge zones and the system may facilitate or permit groundwater to come to the surface. **This would defeat the purpose of the on-site septic system, since we would now be creating a potential point source.**

This technology has not been proven and as proposed in the Pennsylvania guidance manual, the available data indicates that it is not reliable and may remove as little as < 0.1 % of the nitrate loading. Further testing is needed to determine how best to implement this technology. It appears that this technology works best if "**100% wood chip mulch"** is used. In addition, this application was tested where the plume of water was at a depth of 3 feet.

Page 17
Denitrification – good BMP, but this is factored into a nitrate dispersion analysis, but this will require operation and maintenance plans.

page 19
Planning
The proposed changes would require significant changes to local ordinances and other planning related documents.

The policy has no formal cost analysis that includes the cost of changing and implementing regulatory changes on the local level, establishing a program to monitor buffers and new system components, and other costs related to confirming that the selected buffers actually intercept the downgradient dispersion plume.

Normally, I would ask specific questions about a guidance document, but in this particular case, I have only one question.

"When is this guidance document going to be withdrawn, so a guidance could be developed that is based site-specific conditions and actual data and can be defend in court?"

It appears clear that the PA Proposed Policy is basically an adoption of a DRAFT Management Approach that was proposed by the EPA in November 2012 Chesapeake Bay Watershed. Pennsylvania should not be implementing statewide policy based on draft management approaches that have not been thoroughly evaluated. http://executiveorder.chesapeakebay.net/121113_Ches%20Bay%20Onsite%20Model%20Program.pdf

I look forward to working with the PADEP to develop policy that is based on science that will effectively protect our surfacewater and groundwater resources, health and safety of the community, while allowing for economic development in our state, and being defendable in our courts.

If you have any questions, please contact Mr. Brian Oram at bfenviro@ptd.net or 570-335-1947

Respectfully submitted,

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