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**From:** Eades, Natalie [Natalie.Eades@anadarko.com]  
**Sent:** Friday, February 12, 2010 3:16 PM  
**To:** EP, RegComments  
**Subject:** Comments on Proposed Revisions to 25 PA. Code Chapter 95  
**Attachments:** [Untitled].pdf

Attached please find the comments of Anadarko Petroleum Corporation on behalf of the corporation and its subsidiary organizations that operate in Pennsylvania.

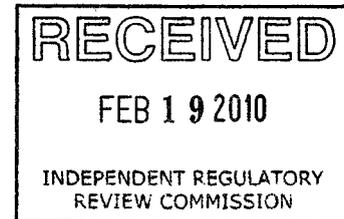
Natalie Eades  
Senior Counsel

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February 12, 2010



Environmental Quality Board  
Rachel Carson State Office Building  
16<sup>th</sup> Floor  
400 Market Street  
Harrisburg, PA 17105-2301

*via e-mail only at [RegComments@state.pa.us](mailto:RegComments@state.pa.us)*

**Re: Comments on Proposed Revisions to 25 PA. CODE CHAPTER 95  
(39 Pa.Bull. 6547, NOVEMBER 7, 2009, AS REVISED NOVEMBER 14, 2009)**

Dear Members of the Board:

Enclosed please find Anadarko Petroleum Corporation's comments on the above-referenced rulemaking.

Should you have any questions regarding these comments or wish to discuss further, please contact Pat McGrievy at (832) 636-3973.

Sincerely,

A handwritten signature in cursive script that reads "Keith Nosich".

Keith Nosich  
General Manager of Operations

Enclosure

**ANADARKO PETROLEUM CORPORATION'S  
COMMENTS ON THE  
PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION'S  
PROPOSED REVISIONS TO CHAPTER 95**

The Pennsylvania Department of Environmental Protection (the "Department") published proposed revisions to its water effluent standards for Total Dissolved Solids ("TDS"), sulfates, and chlorides in 25 PA. CODE Chapter 95 in the November 7, 2009 Pennsylvania Bulletin. 39 Pa. Bull. 6467. According to the Department, the proposed changes to Chapter 95 were initiated because of complaints of "unusually high levels" of TDS in the Monongahela River in October 2008, which continued through the end of December 2008. Over this same time period, the Monongahela River experienced a period of very low flow.

Based on this limited data, the Department is now proposing revisions that would require treatment of "new discharges" of "High-TDS wastewater" prior to release into all Pennsylvania waters - not just the Monongahela River, the only one for which the Department has any data. The Department proposes to define "High-TDS wastewater" as any discharge with a TDS concentration that exceeds 2,000 mg/L or a TDS loading that exceeds 100,000 pounds per day that did not exist prior to April 1, 2009. A "new discharge" is defined to include an additional discharge, an expanded discharge, or an increased discharge from a facility in existence prior to April 1, 2009. If these proposed revisions are adopted, new discharges of High-TDS wastewater would be required to meet new average monthly effluent limits of 500 mg/L for TDS, 250 mg/L for total chlorides and 250 mg/L for total sulfates. These effluent limits originate from Pennsylvania's secondary drinking water standards, adopted from the National Secondary Drinking Water Regulations, which are designed to protect public water supplies from color, taste, and odor concerns rather than guard against adverse human health risks.<sup>1</sup>

**A. ANADARKO PETROLEUM CORPORATIONS INTEREST**

Anadarko Petroleum Corporation is an independent oil and gas exploration company with headquarters located in The Woodlands, Texas. As one of the largest independent oil and natural gas exploration and production companies in the world, Anadarko has approximately 2.28 billion barrels of oil equivalent (BBOE) of proved reserves at year-end 2009. Anadarko and its subsidiary companies have a considerable base of leased acreage in Pennsylvania, which it intends to fully develop in the coming years. As such Anadarko's operations could potentially be negatively impacted should the rules as proposed by adopted.

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<sup>1</sup> Effluent limits guidelines are customarily based on an express "technology-based" evaluation, which the Department has not employed in this case.

Anadarko's portfolio of assets encompasses premier positions in nearly a dozen major U.S. onshore natural gas resource plays, including the Marcellus Shale formation in Pennsylvania. Anadarko's three business segments are vertically integrated within the oil and gas industry:

- **Oil and gas exploration and production** – This segment explores for and produces natural gas, crude oil, condensate and natural gas liquids (NGLs). Anadarko's major areas of operation are located onshore in the United States, the deepwater of the Gulf of Mexico and Algeria. Anadarko also has production in China and is executing strategic exploration programs in several other countries, including Ghana and Brazil.
- **Midstream** – This segment engages in gathering, processing, treating and transporting Anadarko and third party oil and gas production. Anadarko owns and operates natural gas gathering, treating and processing systems in the United States, including in Pennsylvania.
- **Marketing** – This segment sells most of Anadarko's production, as well as commodities purchased from third parties. Anadarko actively markets natural gas, oil and NGLs in the United States, and actively markets oil from Algeria and China.

**B. LEGAL REQUIREMENTS THAT MUST BE FULFILLED BY THE DEPARTMENT PRIOR TO ADOPTION OF NEW RULES**

Section 5(a) of The Clean Streams Law (P.L. 1987, Act 394 of 1937, as amended), requires the Department to *exercise sound judgment and discretion* and consider the following factors when promulgating regulations:

- (a) Water quality management and pollution control in the watershed as a whole;
- (b) The present and possible future uses of particular waters;
- (c) The feasibility of combined or joint facilities;
- (d) The state of scientific and technological knowledge;
- (e) The immediate and long-range economic impact upon the Commonwealth and its citizens.

35 PA. STAT. ANN § 691.5(a). The Regulatory Review Act, 71 PA. STAT. ANN § 745.5, places an additional burden on the Department to consider and provide the Independent Regulatory Review Commission with a complete and in-depth regulatory analysis of the following factors, among others:

- (a)(4) Estimates of the direct and indirect costs to the Commonwealth, to its political subdivisions and to the private sector...

(a)(12) A description of any alternative regulatory provisions which have been considered and rejected and a statement that the least burdensome acceptable alternative has been selected.

71 PA. STAT. ANN § 745.5.

For the reasons discussed below, Anadarko does not believe that the Department has met these statutory requirements as detailed more fully below.

**C. THE DEPARTMENT HAS FAILED TO DEMONSTRATE WITH LEGALLY SUFFICIENT GROUNDS THAT THE PROPOSED CHAPTER 95 REVISIONS ARE REQUIRED OR NECESSARY**

***1. The Department has Provided Insufficient Data in Support of the Proposed Chapter 95 Revisions***

The Department has not presented a rational connection between its sampling data collected to date and water quality problems in Pennsylvania's surface waters that would support a need for the imposition of additional restrictions. Anadarko does not believe the Department's data establishes that there is, in fact, a TDS issue. Therefore, the proposed Chapter 95 revisions are premature and should be withdrawn and re-evaluated if or when adequate water data is collected.

The following TDS, sulfate, and chloride concentration data is the only publicly available sample data published by the Department regarding the proposed revisions to Chapter 95: (1) the Monongahela River surface water quality sampling data posted on the Department's Southwest Regional Office's ("SWRO's) website for "Community Involvement"<sup>2</sup> and (2) the River Alert Information Network ("RAIN") new water monitoring system sponsored by the Department that frequently updates the public on the water quality in the Monongahela River via the RAIN website.<sup>3</sup> The Department has not affirmatively provided the public with any additional data outside of these two data sets, and has not provided any indication that it reviewed or researched historic sampling data prior to proposing the revisions to Chapter 95. Anadarko believes that the Department's information available for public review is does not support the proposed revisions to Chapter 95. Furthermore, nearly all of the Department's data is limited to the Monongahela River, which does not support the proposed imposition of Chapter 95 across Pennsylvania as a whole.

Anadarko also believes the SWRO's surface water quality sampling data for the Monongahela River is so limited that it should not be the basis for such a sweeping

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<sup>2</sup> Available at <http://files.dep.state.pa.us/RegionalResources/SWRO/SWROPortalFiles/monongahelarivertdschlorideandsulfatesamplingresults.pdf>

<sup>3</sup> Available at [www.3rain.org](http://www.3rain.org).

regulatory change.<sup>4</sup> This data spans from October 14, 2008 to December 30, 2008 and September 8, 2009 to January 5, 2010 (while omitting a nine-month period from December 31, 2008 to September 7, 2009).<sup>5</sup> In total, this is less than seven months of Monongahela River sampling data the Department reviewed and relied on to support the proposed revisions to Chapter 95. Also, this data is not supported by adequate documentation or records of sampling events, laboratory reports, or field notes. Thus, the public is unable to review the quality assurance/quality control measures that were employed to support the scientific validity of the data. For example, without knowing the weather conditions on the sampling dates, we are unable to ascertain whether the sampling may have been affected by increased runoff from rain or snowmelt.

Because the Department is relying on this data as support for the proposed revisions to Chapter 95, the public should have the ability to review records regarding the data quality. For example, there are irregularities between the Department's most recent January 14, 2010 version of the surface water quality sampling data for the Monongahela River and the previous December 7, 2009 version posted on the SWRO's website.<sup>6</sup> The Department modified 15 sample results it previously published, some dating as far back as October 22, 2008. The following table summarizes the Department's modifications:

| RMI  | SAMPLE LOCATION                                | SAMPLE ID # | DATE COLLECTED | PA DEP'S VERSION | SPECIFIC CONDUCTANCE (µs/cm) | TDS @ 105°C (mg/L) | CHLORIDE (mg/L) | SULFATE (mg/L) |
|------|--|-------------|----------------|------------------|------------------------------|--------------------|-----------------|----------------|
| 85.5 | Mon River RMI 85.5 upstream of Georgia's Creek | 0593-030    | 10/22/2008     | 1/14/10          | NA                           | 147                | 32              | 230            |
|      |  |             |                | 12/7/09          | 991                          | 194                | 11              | 77.5           |
| 84.0 | Mon River RMI 84.0 upstream of Jacob's Creek   | 0593-031    | 10/22/2008     | 1/14/10          | NA                           | 82                 | 16              | 80             |
|      |  |             |                | 12/7/09          | 991                          | 194                | 11              | 77.5           |
| 69.0 | Mon River RMI 69.0 upstream of Pumpkin Run     | 0552-873    | 10/22/2008     | 1/14/10          | NA                           | 850                | 49.9            | 428            |
|      |  |             |                | 12/7/09          | 991                          | 194                | 11              | 77.5           |
| 66.0 | Mon River RMI 66.0 upstream of Tenmile Creek   | 0552-872    | 10/22/2008     | 1/14/10          | 991                          | 756                | 37.4            | 395            |
|      |  |             |                | 12/7/09          | 991                          | 756                | 37.4            | 395            |
| 50.5 | Mon River RMI 50.5 near Newell, PA             | 1523-157    | 12/30/2008     | 1/14/10          | 115                          | 194                | 11              | 77.5           |
|      |  |             |                | 12/7/09          | 991                          | 194                | 11              | 77.5           |
| 34.2 | Mon River RMI 32.2                             | 0594-126    | 10/22/2008     | 1/14/10          | 580                          | NA                 | NA              | NA             |

<sup>4</sup> Note that this information is current as of Department's most recent January 14, 2010 revision.

<sup>5</sup> Note that the Department does not provide any public notice regarding update or revisions to the limited surface water quality sampling data for the Monongahela River posted on the "Community Involvement" section of the SWRO's website.

<sup>6</sup> While the Department may be in possession of additional revisions, the January 14, 2010 and December 7, 2009 revisions are the last made publicly available by the Department. Please note that the Department's December 7, 2009 revision is no longer publicly available on its website.

|      |   |          |            |         |         |         |         |         |
|------|---|----------|------------|---------|---------|---------|---------|---------|
|      | upstream of Sunfish Run                       |          |            | 12/7/09 |         |         |         |         |
| 32.5 | Mon River RMI 32.5 upstream of Pigeon Creek   | 0594-127 | 10/22/2008 | 1/14/10 | 240     | NA      | NA      | NA      |
|      |   |          |            | 12/7/09 |         |         |         |         |
| 30.0 | Mon River RMI 30.0 upstream of Mingo Creek    | 0594-128 | 10/22/2008 | 1/14/10 | 195     | 142     | 9.97    | 47.8    |
|      |   |          |            | 12/7/09 |         |         |         |         |
| 26.0 | Mon River RMI 26.0 upstream of Kelly Run      | 0594-129 | 10/22/2008 | 1/14/10 | 870     | 580     | 28.4    | 282     |
|      |   |          |            | 12/7/09 |         |         |         |         |
| 24.0 | Mon River RMI 24.0 USGS Gage Sta Elizabeth    | NA       | 12/30/2008 | 1/14/10 | 241     | 546     | 37.5    | 254     |
|      |   |          |            | 12/7/09 | 241     |         |         |         |
| 24.0 | Mon River RMI 24.0 USGS Gage Sta Elizabeth    | NA       | 10/7/2009  | 1/14/10 | 826     | 576     | 36.3    | 285     |
|      |   |          |            | 12/7/09 | 826     |         |         |         |
| 24.0 | Mon River RMI 24.0 USGS Gage Sta Elizabeth    | NA       | 10/13/2009 | 1/14/10 | 901     | 568     | 44.2    | 279     |
|      |   |          |            | 12/7/09 |         |         |         |         |
| 12.0 | Mon River RMI 12.0 upstream of Turtle Creek   | 0594-135 | 10/22/2008 | 1/14/10 | 855     | 808     | 30.9    | 207     |
|      |   |          |            | 12/7/09 |         |         |         |         |
| 11.0 | Mon River RMI 11.0 downstream of Turtle Creek | 0552-868 | 10/17/2008 | 1/14/10 | 801     | 400     | 31.2    | 100     |
|      |   |          |            | 12/7/09 |         |         |         |         |
| 4.5  | Mon River RMI 4.5 near Glenwood, PA           | CMU      | 11/24/2009 | 1/14/10 | Deleted | Deleted | Deleted | Deleted |
|      |   |          |            | 12/7/09 |         |         |         |         |

The Department has not explained the changes. Due to the lack of transparency with respect to the QA/QC measures, the reliability of the data is uncertain. For example,

The RAIN data is even more minimal than the data published on the SWRO's website. On December 11, 2009, RAIN and the Department started to publish Monongahela River water data. Note that this was over a month after this proposed rulemaking was published in the Pennsylvania Bulletin on November 7, 2009. The RAIN database provides useful, up-to-date water quality data, but it does not maintain a historic table or log of the data collected.<sup>7</sup> As such, the RAIN data cannot be accessed and reviewed by the public at this time.

## 2. The Department Used an Unapproved Methodology

<sup>7</sup> The RAIN data, like the SWRO's data, does not provide any information regarding the quality assurance and quality control practices.

On the same data tables from the SWRO's website discussed above, the Department designates TDS samples as "TDS @ 105°C." We understand that the Department used USGS Method I-1749-85 for its analyses, which requires a sample to be dehydrated at a temperature of 105°C.

This analytical technique is not an EPA-approved method for determining TDS concentrations. The EPA-approved methods are Standard Method 2540 C and USGS Method I-1750-85, both of which require collected samples to be dried at 180°C before determining the TDS concentration. See 40 C.F.R. § 136.3(a), "Guidelines Establishing Test Procedures for the Analysis of Pollutants", and 40 C.F.R. § 143.4(b), "Monitoring for the National Secondary Drinking Water Regulations.

As such, there is a risk that moisture which would have evaporated at 180°C would remain if dried only to 105°C. Incomplete drying of a sample would bias the sample results toward a higher TDS concentration than is actually present, thereby possibly invalidating the TDS concentrations that the Department relies upon for the proposed revisions to Chapter 95. Note that all TDS concentrations posted on the SWRO's website are designated by a column titled "TDS @ 105°C." The Department has not publicly provided any explanation regarding why the Department chose the non-EPA-approved USGS-I-1749-85 methodology to determine TDS concentration.

### ***3. TDS, Chlorides, and Sulfates are Secondary Contaminants***

TDS, chlorides, and sulfates are secondary contaminants that "primarily affect the *aesthetic qualities* relating to the public acceptance of drinking water." 40 C.F.R. § 143.1 (as adopted by 25 PA. CODE § 109.202(b)(2))( *emphasis added*). These National Secondary Drinking Water Regulations are not federally enforceable but are intended as guidelines for the states, with the secondary maximum contaminant levels for TDS, chloride, and sulfate concentrations to "represent *reasonable goals* for drinking water quality." 40 C.F.R. § 143.3 (*emphasis added*).

The Department's water quality criteria for TDS, sulfate, and chloride protect potable water supply as the only critical use. See 25 PA. CODE § 93.7<sup>8</sup> These surface water quality criteria apply at the point of an existing or planned surface potable water supply withdrawal. The Department's sampling data discussed in Section C(1) of these comments does not indicate that the samples were properly collected at the point of an existing or planned surface potable water supply withdrawal. Therefore, it is improper to establish end-of-pipe discharge limits for constituents for which compliance is to be measured at the point of withdrawal.

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<sup>8</sup> The water quality criteria are 250 mg/L (maximum) for chloride, 250 mg/L (maximum) for sulfate, and 500 mg/L (monthly average) and 750 mg/L (maximum) for TDS.

TDS, sulfates, and chlorides affect the aesthetic qualities of drinking water; they are not classified as having a potential human health risk. The Department does not provide any information demonstrating that infrequent concentrations of TDS, sulfates or chlorides above the proposed limits present any human health risk. The Department's citation, in Section "D. Background and Purpose" of the Preamble to the proposed Chapter 95 regulations, that Disinfection By-Products ("DBPs"), such as brominated and chlorinated DBPs, have been identified as posing a health risk, is unclear and potentially misleading. DBPs originate from the disinfection of sanitary wastewater, which is unlikely to be a "High-TDS discharge" under the proposed regulations. In any event, Anadarko's operations, do not produce DBPs because it does not disinfect its effluent with chlorine or bromine.

***4. The Department's Economic Analysis is Incomplete and Inadequate to Proceed with the Rulemaking.***

Section 5(a) of The Clean Streams Law, 35 P.S. § 691.5(a), and Section (a)(12) of the Regulatory Review Act, 71 PA. STAT. ANN § 745.5, both require the Department to consider the immediate and long-range economic impact of the proposed regulation, including estimates of the direct and indirect costs, to both the Commonwealth and to the private sector. We believe the Department's economic analysis of its proposed revisions to Chapter 95 is incomplete because it does not consider all of the direct and indirect costs to the oil and gas industry. Absent a complete analysis, the Department should not finalize the proposed rule.

Section D of the Preamble to the proposed rulemaking states that "currently no treatment exists for TDS, sulfates and chlorides other than dilution...[but] dilution can no longer be considered adequate treatment for high TDS wastewaters." 39 Pa. Bull. 6467. However, the Department then states, in Section F of the same Preamble and in contrast to its previous statement, that:

New or increased discharges will be required to install advanced treatment to meet the requirements of this proposed rulemaking. It is anticipated that treatment costs could be on the order of \$0.25/gallon."

Setting aside the conflicting statement regarding the viability of treatment, the Department has not provided any details on the "advanced treatment" technology that provided the basis for its cost estimate. The Department's Regulatory Analysis #7-446, which it provided to the Independent Regulatory Review Commission, has no background or supporting information regarding of \$0.25 per gallon treatment cost. The Regulatory Analysis does not state whether this treatment cost is specific to a particular industry, watershed, or location in Pennsylvania, or whether the Department's "treatment technology" (which has yet to be identified) has any volumetric limits. Because of this lack of information, Anadarko has been unable to review the technical feasibility of any treatment options for TDS, sulfate and chloride concentrations in produced water.

Anadarko has not yet undertaken an analysis of treatment technologies or cost that might be employed to meet the proposed standards. However, it appears the preliminary estimates of produced water generated from Marcellus shale gas development in Pennsylvania, which the Department considered when developing the proposed rulemaking overestimate the amount of water generated. In fact, recent data shows that produced water generated from Marcellus shale gas development in Pennsylvania is only 20% to 25% of the preliminary estimates considered by the Department prior proposing these Chapter 95 revisions.

Setting aside the amount of water, the real issue is whether economically viable treatment technologies exist to treat to the proposed standards. Therefore, we believe the Department should instead of implementing the proposed limits provide oil and gas operators with the opportunity to optimize the reuse and recycling of produced water where possible. Anadarko fully supports this option and maximizes its reuse and recycling to the extent possible. The Department could aid in this effort by promoting the reuse and recycling of produced water. To accomplish this, the Department should amend Pennsylvania's current residual waste regulations, which would support and encourage the reuse and recycling of produced water, rather than impose the strict effluent limits in the proposed revisions to Chapter 95.

A more viable option to manage produced water from the oil and gas industry would be to have produced water treated in Department-approved centralized wastewater treatment plants and/or publicly owned treatment works or disposed of in Class II D injection wells operated and permitted pursuant to the U.S. EPA Underground Injection Control Program. Anadarko understands, based on information gathered by the MSC, that there are about a dozen approved Marcellus shale treatment facilities for produced water, with plans for future additional capacity and treatment technologies.

#### ***5. Economic and Environmental Impacts not Considered by the Department***

The Department has not adequately considered the many additional costs and potential environmental impacts of the proposed rulemaking. For example:

- The costs associated with the energy needed to treat extremely large volumes of wastewater could be substantial, and the impact of this energy use on the environment, have not been addressed by the Department.
- The residual waste that will be generated in either solid or slurry form (depending on the treatment technology) from the wastewater treatment could be extremely large and require either landfill disposal or additional treatment prior to disposal. Significant additional landfill space and accompanying leachate control systems would then be

required for the highly soluble residual waste that would result from this treatment, assuming landfills will even agree to accept the waste.

- Additional infrastructure will be required to transport the residual waste brine from mine sites to disposal facilities.

#### ***6. The Timeframe set by the Department for Compliance is Unworkable***

The compliance date for the proposed rule is January 1, 2011. This means that in less than 11 months, Anadarko would have to comply with the proposed effluent limits for TDS, sulfates, and chlorides for any new or expanded discharges of High-TDS wastewater. This in spite of the fact that the Department itself has stated that no treatment exists. At a minimum, should the Department finalize the proposed rules, it should consider delayed implementation to provide sufficient time for those regulated to evaluate treatment options, should any exist.

#### **D. CONCLUSION**

Anadarko believes the Department has not provided the public with properly collected<sup>9</sup> or documented samples demonstrating an exceedance of current TDS limits using an EPA-approved analytical methodology. The Department has not provided the public with the scientific support required for the implementation of the proposed Chapter 95 revisions. The Department rushed the proposed rulemaking, and in the process did not prepare a complete economic analysis. In addition, the Department has not provided the public with any examples of available treatment technology, let alone cost-effective treatment technology. As such, Anadarko respectfully requests the Department to withdraw the proposed Chapter 95 revisions and allow the oil and gas industry to continue to develop methods to reuse and recycle its produced water.

Anadarko is committed to maintaining a balance between protecting the environment, public health and the communities in which we operate, while producing the energy needed to fuel American's economic growth. We look forward to working with the Department to achieve these goals and urge the Department to consider promotion of reuse and recycling as a viable alternative to the proposed effluent limits.

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<sup>9</sup> A sample collected at the point of an existing or planned surface potable water supply withdrawal.