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Secretary's Order No. 2009-W-0007

Re: Approval of Final Regulation Amending the Total Maximum Daily Load for Zinc in the Red Clay Creek, Delaware

Date of Issuance: February 17, 2009

Effective Date: March 11, 2009

Under the authority vested in the Secretary of the Department of Natural Resources and Environmental Control ("Department" or "DNREC") under *29 Del. C. §§8001 et seq.*, *29 Del. C. §§10111 et seq.* and *7 Del. C. §6010 (a)*, the following findings, reasons and conclusions are entered as an Order of the Secretary in the above-referenced rulemaking proceeding to amend the Department's regulation codified at 7 DE Admin. Code 7404, which established the Total Maximum Daily Load ("TMDL") for zinc in the Red Clay Creek in New Castle County.

Based on the record, including the public hearing record reviewed in the February 9, 2009, Hearing Officer's Report ("Report") attached hereto as an appendix, I find the proposed amendment to the regulation is reasonable and well supported, and is not arbitrary or capricious. The Report reviews the October 28, 2008 public hearing and the administrative record. The Report recommends approval of the proposed regulation as a final regulation without any modification. I agree with the Report and adopt it as part of this Order.

The proposed amendment of Department Regulation 7404 is based upon NVF Company's ("NVF") challenge to Secretary's Order No. 99-W-0062, which approved the final regulation that established the TMDL for zinc in the Red Clay Creek ("1999 TMDL"). NVF appealed the Order and the TMDL regulation because it owns and operates a paper manufacturing plant along the Red Clay Creek in Yorklyn, New Castle County. The Department and NVF exchanged technical information and water quality data from five sampling locations. In addition, the Department changed (unrelated to NVF) its water quality criteria for zinc, including a changing from total zinc to dissolved zinc and this change impacted the TMDL for zinc's calculation.

On February 22, 2007, the Department and NVF entered into a settlement ("Settlement") to resolve the challenge to the 1999 TMDL. The Settlement includes a term that the Department will amend the 1999 TMDL for zinc from 1.81 pounds per day to 55.93 pounds per day, but also requires NVF to implement a Pollution Control Strategy designed to significantly reduce the release of zinc from NVF's property into the Red Clay Creek. NVF challenged the 1999 TMDL because NVF discharges into the Red Clay Creek zinc from its paper manufacturing process and the Department determined that NVF's discharges are the primary source of the zinc pollution in the Red Clay Creek. NVF's appeal sought to increase the TMDL for zinc based upon the use of the more complex dynamic, lognormal modeling to determine the TMDL, as opposed to the Department's use of the steady state, low flow modeling. It is important to note that the Department and United States Environmental Protection Agency both have accepted the lognormal and steady state models for use in calculating TMDLs. The Department's decision to accept the lognormal method in this particular case does not represent the

Department's departure from the steady state model, which the Department will continue to be use as its default model. Instead, this TMDL is based upon the availability of additional data not normally available in determining a TMDL and the specific factual circumstances with NVF's source of the zinc released into the Red Clay Creek, particularly the data that showed peak zinc concentrations are not greatest at low stream flow levels. The ironic fact is that the zinc TMDL may be increased because of NVF's successful efforts to lower zinc discharges into the Red Clay Creek and the pollution control strategy changed the timing and magnitude of the zinc levels so that they do not occur at low flow conditions.

The lognormal method produces a TMDL for zinc of 55.93 pounds per day, as opposed to the 1.81 pounds per day previously determined under the challenged steady-state method's calculations. This change is significant at first blush, but the fact remains that the scientific results conclusively show that the Department's water quality criteria for zinc will be met with the TMDL derived from lognormal method.

The Department recognized the appropriateness of the amendment, but also was able to negotiate as part of the Settlement that NVF agreed to implement a pollution control strategy. The pollution control strategy will result in significant reduction to the underlying problem, namely, NVF's release of zinc into the Red Clay Creek from both direct discharge and more importantly from groundwater flows from past releases from the NVF property are effectively being controlled by the Pollution Control Strategy.

Public comments from local environmental groups both opposed and supported the proposed amendment. The support recognized the clean up in the Settlement's pollution control strategy, while the opposition was based upon the increase in the zinc

loading. I find that the scientific evidence supports the amendment as consistent under the circumstances. The Department has discretion to use different methodologies when supported by sufficient data. In this case, the water quality data and specific factual and unusual circumstances supported the use of the lognormal method. The Department's use of the lognormal method for other TMDLs will be evaluated on a case-by-case basis because the water quality data may impose an undue burden on the Department not supported by any meaningful differences in results. The TMDL will limit the release of harmful levels of zinc into the Red Clay Creek, but the Department's experts have determined that the TMDL will allow the Red Clay Creek to achieve its applicable surface water standard.

The public comment about including the pollution control strategy in the regulation is rejected only because such a change may delay the regulation. This TMDL should be implemented as soon as possible and it will allow the NPDES permit to be issued to reflect this change. I agree that the Settlement provides a sufficient tool to obtain continued compliance with the Settlement's Pollution Control Strategy.

In conclusion, the following findings and conclusions are entered:

1. The Department, acting through this Order of the Secretary, adopts the proposed regulation 7404 as a final regulation, as set forth in the Appendix A to the Report;
2. The approval of the proposed regulation as a final regulation will protect and improve the water quality of Red Clay Creek in order that it may meet the Department's water quality standards;

3. The TMDL approved by this Order was developed consistent with the applicable law and regulatory standards, is adequately supported by expert technical analysis and is based upon use of an approved lognormal method to calculate the TMDL, which is appropriate under the specific circumstances presented here and consistent with changes that have occurred and the Settlement;

4. The Department provided adequate public notice of the proceeding and the public hearing in a manner required by the law and regulations, held a public hearing in a manner required by the law and regulations, and considered all timely and relevant public comments in making its determination;

5. The Department's proposed regulation, as published in the October 1, 2008, *Delaware Register of Regulations*, and set forth in Appendix A to the Report, are adequately supported, not arbitrary or capricious, are consistent with the applicable laws and regulations, and should be approved as a final regulation to go into effect ten days after its publication in the next available issue of the *Delaware Register of Regulations*; and that;

6. The Department shall provide written notice to the persons affected by the Order, as determined by those who participated in this rulemaking at either the public workshop or at the public hearing, including participation through the submission of timely and relevant written comments.

[s/David S. Small](#)
David S. Small
Acting Secretary

HEARING OFFICER'S REPORT

TO: The Honorable David S. Small
Acting Secretary, Department of Natural Resources and Environmental Control

FROM: Robert P. Haynes, Esquire
Senior Hearing Officer, Office of the Secretary
Department of Natural Resources and Environmental Control

RE: Proposed Regulation to Amend the Total Maximum Daily Load for Zinc in the Red Clay Creek

DATE: February 9, 2009

I. BACKGROUND AND PROCEDURAL HISTORY

This Report considers a proposed regulation to amend the Total Maximum Daily Load (“TMDL”) for zinc in the Red Clay Creek, located in northern New Castle County,¹ and makes recommendations to the Secretary of the Department of Natural Resources and Environmental Control (“Department”). The Department’s Division of Water Resources, Watershed Assessment Section (“WAS”) drafted the proposed regulation, which was published in the October 1, 2008 *Delaware Register of Regulations*.

The Department first established a TMDL for the Red Clay Creek in Secretary’s Order No. 99-W-0062, issued November 10, 1999 (“1999 TMDL”), which was based upon the then available water quality data, extensive scientific studies, and the use of the Department’s steady-state model. A TMDL establishes the maximum amount of a pollutant that may enter a particular body of water before its water quality will fail to meet the Department’s “*Surface Water Quality Standards*.”² The Department’s study of the Red Clay Creek indicated that too much zinc was present to sustain certain aquatic life, which required the Department to promulgate a TMDL for zinc. Consequently, after extensive water sampling and use of the

¹ The Red Clay Creek’s watershed drains 53.3 square miles in southeastern Pennsylvania and northern Delaware, with the Delaware portion representing one-third of the total area. The Red Clay Creek enters Delaware north of Yorklyn, Delaware and flows south approximately fifteen miles into its confluence with the White Clay Creek.

² The Department issues the *Surface Water Quality Standards* under the *Federal Water Pollution Control Act*, 33 U.S.C §§1251 et seq., known as the Clean Water Act (“CWA”), which requires that the Nation’s waters meet the applicable water quality standards

steady-state model, Department adopted the 1999 TMDL for zinc in order to direct its subsequent regulatory efforts, as undertaken in surface water discharge permits and pollution control strategies, to lower zinc discharges from point sources and non-point sources so that no more than 1.81 pounds of zinc per day would enter the Red Clay Creek during critical low flow conditions.

The NVF Company (“NVF”) appealed the 1999 TMDL regulation claiming that the Department’s action to regulate zinc discharges was unreasonable and would harm NVF’s paper manufacturing facility in Yorklyn, New Castle County. NVF’s facility is located on the Red Clay Creek and uses water from the Red Clay Creek in its manufacturing operations. NVF manufactures specialty paper, and the manufacturing process uses zinc chloride as a catalyst to bond or vulcanize paper and cloth rags together. The process washes the vulcanized fiber with water withdrawn from Red Clay Creek to remove excess zinc and the process water containing the zinc is recycled. A Department investigation determined that NVF was responsible for high levels of zinc in the Red Clay Creek due to a unknown leak in a NVF subsurface piping that carried the recycled water. As a result of this leak, zinc entered the groundwater and eventually was transported into the Red Clay Creek and caused the water quality to exceed the *Surface Water Quality Standards*. NVF also is authorized to discharge effluent from its manufacturing process into the Red Clay Creek pursuant to the Department’s National Pollutant Discharge Elimination System (“NPDES”) Permit No. DE 0000451.

NVF’s appeal of the 1999 TMDL was the subject of extensive settlement negotiations, which were complicated by NVF’s deteriorating financial situation that resulted in NVF filing for bankruptcy. Nevertheless, NVF agreed to implement a pollution control strategy, which included eliminating the ruptured pipe that was the source of most of the zinc contamination and installing a well to remove and treat the contaminated groundwater. These actions lowered the

groundwater source of zinc entering the Red Clay Creek from the levels used in determining the 1999 TMDL. In addition, NVF's pollution control strategy, as shown by additional water quality data, caused the zinc concentrations in the Red Clay Creek to no longer be consistent with the assumptions used in the steady-state model used to determine the 1999 TMDL. Another change since the Department established the 1999 TMDL was the Department's and EPA's modification to the TMDL's calculation of zinc levels based upon measuring the hardness of water.

The Department and NVF formally entered into a comprehensive settlement on February 22, 2007 ("Settlement"), which the Bankruptcy Court approved. The Settlement requires the Department to seek the amendment of the 1999 TMDL and that the amendment establishes a wasteload allocation for NVF's zinc discharges of no less than 25.71 pounds of zinc per day, as measured as total zinc. In addition, the Settlement required NVF to implement a pollution control strategy that will remove the zinc from the groundwater and prevent it from entering the Red Clay Creek. The October 1, 2008 proposed regulation is the Department's compliance with the Settlement's provision that requires the Department to amend the 1999 TMDL.

The Department held a public hearing on the proposed TMDL amendment on October 28 23, 2008 at the Department's office at 391 Lukens Drive, New Castle, New Castle County in order to receive public comments. Following the end of the public comment period on November 5, 2008, I requested technical assistance from WAS in reviewing the record and WAS submitted a memorandum, which is attached hereto as an appendix A to this report.

II. SUMMARY OF THE PUBLIC HEARING RECORD

The public hearing record contains a page verbatim transcript of the public hearing, and documents, marked as Exhibits ("Ex."), which were admitted into the record as hearing exhibits.

Richard Greene, a Department Environmental Engineer with WAS, presented the Department's exhibits into the record and answered questions for almost an hour. DNREC Exhibit 1 was the proposed regulation to amend 7 *DE Admin. Code §7404*. The amendment would replace entirely the current regulation. The proposed TMDL contains five articles including the Department's TMDL components, which are the Waste Load Allocation ("WLA") for all point source discharges of zinc, the Load Allocation ("LA") for nonpoint source zinc discharges, and the Margin of Safety ("MOS") used to reflect uncertainties in the TMDL's calculations. The proposed total TMDL of total zinc load of 55.19 pounds per day is allocated as follows: 1) NVF's WLA would be 25.17 pounds per day reflecting the combined mass loading of zinc from NVF's NPDES and groundwater discharges; 2) the LA would be 25.17 pounds per day based upon the water quality upstream of the NVF facility; and 3) the MOS would be 5.59 pounds per day based upon 10% of the TMDL. DNREC Ex. 2 consists of the proof of publication of notices and DNREC Ex. 3 is the "Technical Background and Basis Document," which describes in detail how the TMDL was determined. DNREC Ex. 4 is the technical data that was used in the lognormal probability analysis.

The Red Clay Valley Association submitted public comments that supported the proposed amendment. The Delaware Natural Society also submitted comments that overall supported the proposed amendment, although the comments suggested adding an article to incorporate the pollution control strategy. The Mid-Atlantic Environmental Law Center/Widener Law School Environmental Law Clinic ("MAELC/Widener") submitted comments that opposed the change and made certain suggestions.

In response to the public comments, Mr. Greene prepared a response document memorandum in order to provide me with his technical expertise. In addition, certain documents

from the bankruptcy proceeding were included into the public hearing record and I reviewed other bankruptcy proceeding documents as part of my research.

III. DISCUSSION AND REASONS

I find that the Department's proposed regulation to amend the Red Clay Creek's TMDL for zinc will satisfy the Settlement and protect and improve the Red Clay Creek's water quality. The Settlement also allows the proposed regulation to be changed as a result of the public hearing process. Based upon my review, I find and conclude that the public hearing process and the public comments do not raise any factual or legal issue that would warrant any change to the proposed regulation. I find that the proposed regulation is well-supported by scientific studies and that the TMDL for zinc should be amended based upon the specific circumstances in which the Department received considerable additional water quality data that demonstrated the appropriateness of using the dynamic, lognormal probability analysis compared to the steady-state model that was used to determine the 1999 TMDL.

The Settlement was based upon the Department receiving additional water quality data from NVF and the application of a more complex TMDL model, as approved by the *Surface Water Standards*, than used to establish the 1999 TMDL. The most significant change from the 1999 TMDL to the proposed TMDL was the Department's decision to use the dynamic, lognormal model as opposed to the steady-state model. This decision was based upon the specific and unusual circumstances involving NVF's discharges of zinc into the Red Clay Creek and how the Red Clay Creek's water quality has responded to NVF's implementation of the pollution control strategy that has improved the water quality and changed the assumptions used in the steady-state model used to develop the 1999 TMDL.

The use of the dynamic, lognormal model to determine the TMDL is consistent with the type of modeling that the Department and EPA have recognized as appropriate for use under

certain circumstances. The use of the dynamic model allows the full range of water quality changes to be considered, including the complex interrelationships between the timing and magnitude of pollutant loading, in this case zinc in the Red Clay Creek, and the variable nature of the stream to accommodate waste loading without exceeding the stream's water quality criteria.

The public comments from MAELC/Widener were addressed in detail in the WAS response document. I adopt response document's explanations and reasons based upon the Department's technical expert knowledge of the subject matter. Consequently, I will highlight the substantive points.

The MAELC/Widener comments question whether the amendment to the 1999 TMDL is consistent with the statutory and regulatory purposes for establishing a TMDL. I find that the amended TMDL is consistent with the statutory and regulatory purposes because the amended TMDL, like the 1999 TMDL, will set a goal for reducing the loading of zinc to the maximum level necessary to attain the Standards for Red Clay Creek. The Department would violate this regulatory purpose if it imposed a too stringent level of zinc. Indeed, the changes to the Red Clay Creek support the amendment because the 1999 TMDL is now too stringent, which the Department recognized when it entered into the Settlement after reviewing the more extensive water quality data collected for the Red Clay Creek. The fact that the proposed TMDL will allow more zinc in the Red Clay Creek than the 1999 TMDL is not contrary to the TMDL's purpose, but consistent with the overall purpose of regulating to meet the *Surface Water Quality Standards*. The proposed amendment recognizes the scientific fact that the Red Clay Creek is not as impaired by zinc pollution as it was when the 1999 TMDL was developed. This change is largely due to the pollution control strategy developed in the Settlement, which has lowered the zinc levels in the Red Clay Creek. Thus, the Red Clay Creek is on its way to attaining the TMDL

and the amended TMDL recognizes this reality with a higher TMDL for zinc because the TMDL is to provide the maximum loading possible for the Red Clay Creek to support aquatic life that would be imperiled by excessive zinc levels.

MAELC/Widener also comments that proposed TMDL is not adequately conservative in protecting the Red Clay Creek from zinc pollution. The response document points out that the TMDL's purpose is not to achieve the absolute cleanest water, but determine the TMDL that will achieve the applicable water quality standard assigned to the Red Clay Creek. This legal standard includes a margin of safety that provides a degree of conservativeness to the TMDL calculation. The Department has used the 10% margin of safety and this is a well-accepted calculation to provide a conservative measure to protect the environment. MAELC/Widener's comments seek to impose a conservative approach to all the TMDL components when the margin of safety provides an accepted and adequate measure.

MAELC/Widener's comments include a suggestion and criticism that the water sampling downstream from the NVF facility should be taken closer to the NVF facility near where State Route 82 crosses the Red Clay Creek. WAS' response notes the difficulty in obtaining water sampling at MAELC/Widener's suggested location at Route 82. I agree with the response, which provides a reasonable explanation for the sampling location used at Wooddale, which is a location farther downstream from MAELC/Widener's preferred Route 82 location. First, I recommend rejecting any new sampling location as unreasonable because it would significantly delay establishing any TMDL. The sampling locations the Department uses have been selected and have been used to develop a history of water quality data. Absent some evidence of fundamental flaw in a sampling location, the Department should continue to use the same sampling locations, although new locations could be added or locations changed when warranted by other events, such as construction. Second, the response document also indicated that the

regression analysis supported that the locations the Department used were representative of the Red Clay Creek's water quality. The Department determined that the Route 82 location would require samples taken from along the stream's bank, and not from the main channel of the stream as the Department prefers. In this case, there is a considerable amount of water sampling data based upon the historic sample locations, which the comments do not show are flawed. I find that the sampling locations used are reasonably representative for use in calculating the TMDL. There is no legal requirement for selecting the best possible location even assuming the comments established (which they did not) that the Route 82 location is a superior to the Wooddale location. Moreover, the Department did receive samples from locations immediately downstream of NVF's plant as part of the pollution control strategy.

MAELC/Widener also questions the TMDL's assumption regarding the characteristics of the watershed and the fact that water releases from the Hoopes Reservoir were not reflected in the calculations. The response document points out that the watershed's characteristics do not substantially change until the Kirkwood Highway crosses it and that all upstream area is relatively similar in land use, land cover, slope and geology. This expert judgment has not been shown to be flawed by the comments, and is consistent with my own personal knowledge, albeit limited, of the watershed's characteristics. I also agree that the infrequent nature of water releases from the Hoopes Reservoir do not provide any reason to factor such releases into the TMDL's calculations.

MAELC/Widener comments on the Department's change to the hardness-dependent criteria used to calculate the zinc TMDL. As noted in the response document, the change to the hardness-dependent criteria was made for all TMDLs and not just for the Red Clay Creek's. The Department used the range of hardness observed in the Red Clay Creek. I find that use of this range is reasonable, as opposed to some undefined range advocated by the comments.

MAELC/Widener questioned whether the proposed TMDL reflected seasonal variations and critical conditions for flows, loading and water quality. The Department's reliance on extensive water quality data from various stream conditions and times, and the lognormal analysis that determined a 99.98% success in meeting the applicable water quality standard provides the assurance that the seasonal variation has been reflected in the proposed TMDL.

MAELC/Widener questions the proposed TMDL's change from dissolved zinc to total zinc, but this change was explained in WAS' response as actually making the proposed amended TMDL more stringent than necessary to meet the *Surface Water Quality Standards*. The Settlement enables the Department to impose a slightly more stringent TMDL for NVF's zinc discharges than the law may otherwise allow.

MAELC/Widener's final substantive comment questioned the Department's motives in the Settlement and the term that required the TMDL amendment. The response document sets forth the history of the pollution control strategy and how the Settlement actually provided constructive steps towards improving the water quality of the Red Clay Creek. I agree and the actual water quality results show that the zinc concentrations in the Red Clay Creek have decreased as a result of the pollution control strategy implemented by the Settlement.

In conclusion, the proposed amendment to the 1999 TMDL is consistent with the Settlement and the applicable law and regulation and I recommend its approval as a final regulation.

IV. RECOMMENDED FINDINGS AND CONCLUSIONS

Based on the record developed, I find and conclude that the record supports approval of the proposed regulation, as set forth in Appendix B hereto, as a final regulation. In conclusion, I recommend the Secretary adopt the following findings and conclusions:

1.) The Department has jurisdiction under its statutory authority to make a determination in this proceeding;

2.) The Department provided adequate public notice of the proceeding and the public hearing in a manner required by the law and regulations;

3.) The Department held a public hearing in a manner required by the law and regulations;

4.) The Department considered all timely and relevant public comments in making its determination;

5.) The Department's proposed regulation, as set forth in Appendix B hereto, is adequately supported, not arbitrary or capricious and are consistent with the applicable laws and regulations. Consequently, the proposed regulation in Appendix B should be approved as a final regulation as promptly as possible, and be allowed to go into effect ten days after publication in the next available issue of the *Delaware Register of Regulations* or in the later date specified in the regulations; and that

6.) The Department shall submit the proposed regulation as a final regulation to the *Delaware Register of Regulation* for publication in its next available issue, and shall mail or e-mail notice to the persons who attended the public hearing or submitted written comments.

[s/Robert P. Haynes](#)
Robert P. Haynes, Esquire
Senior Hearing Officer

Appendix A

Memorandum

To: Robert P. Haynes, Esq., Senior Hearing Officer
From: Richard Greene, Environmental Engineer, Watershed Assessment Section
RE: Technical Response from to Public Comments on Proposed Regulation to Amend Regulation 7404 TMDL for Zinc in Red Clay Creek, Delaware
Date: December 9, 2008

I. Introduction

The Delaware Department of Natural Resources and Environmental Control (DNREC) proposed to amend the Total Maximum Daily Load (TMDL) regulation for zinc in the Red Clay Creek, New Castle County, Delaware. The proposed amendment was published in the Delaware Register of Regulations on October 1, 2008. A public hearing was held on October 28, 2008 to gather public comment on the proposed amendment. The hearing record was kept open for public comment until 4:30 p.m. on November 5, 2008.

II. Commenters

The table below identifies the individuals who commented on the proposed amendment, the affiliation of each commenter, the date the comments were submitted, and whether the comments were provided orally and/or in writing. The table also lists DNREC-assigned comment numbers. Those numbers will be used in Section III of this document to organize the DNREC's responses.

Commenter	Affiliation	Date of Comment	Comment Number
James Jordon	Red Clay Valley Association ("RCVA")	October 28, 2008 (oral comments at the public hearing)	1
Brenna Goggin	Delaware Nature Society ("DNS")	October 28, 2008 (oral comments at the public hearing)	2
Brenna Goggin and Jennifer Mihills	Delaware Nature Society ("DNS")	November 5, 2008 (written comments)	2
Michael D. Fiorentino	Mid-Atlantic Environmental Law Center ("MAELC")	October 28, 2008 (oral comments at the public hearing)	3
Michael D. Fiorentino, Kenneth T. Kristl, and Robert Gordon	Mid-Atlantic Environmental Law Center ("MAELC") and the Widener School of Law's Environmental and Natural Resources Law Clinic ("Clinic")	November 5, 2008 (written comments)	4 – 15

III. Response to Comments

The comments received on the proposed amendment and the DNREC's responses follow.

1. RCVA Comment: The RCVA expressed their verbal support for the proposed amendment at the public hearing.

DNREC Response: The DNREC appreciates the support of the RCVA.

2. DNS Comment: Brenna Goggin, on behalf of the DNS, expressed her support for the proposed amendment at the public hearing and encouraged DNREC to consider adding an Article 6 to the regulation to address the Pollution Control Strategy and to establish a deadline for completion. Ms Goggin and Ms. Jennifer Mihills echoed those same comments in a letter submitted to DNREC on November 4, 2008.

DNREC Response: First, the DNREC appreciates the support expressed by the DNS at the hearing and in their written comments. On the point of adding an Article 6 to the regulation to address a pollution control strategy, we note that we normally do include such an article in proposed TMDL regulations but concluded it was not necessary in this case since the Settlement Agreement between NVF and DNREC already contains binding language concerning a pollution control strategy. We do appreciate the idea but feel it is already covered.

3. MAELC Comments/Questions: Mr. Fiorentino questioned DNREC staff for nearly an hour during the public hearing. Those questions and the DNREC's responses are included in a verbatim transcript produced by a court reporter.

4. MAELC and Clinic Comment: The statement is made that, "The purpose of establishing TMDLs is to ensure the water quality standards established for a given water body will be attained after implementation of the TMDL."

DNREC Response: We agree with this comment in general and assert that the purpose of the amended zinc TMDL for the Red Clay Creek is to ensure that the applicable zinc water quality standard established for the Red Clay Creek is met after implementation of that TMDL. We further note that the Red Clay Creek is on its way to meeting the applicable water quality standard for zinc as a result of pollution controls implemented at the NVF facility over the last decade, including pollution controls prompted during settlement negotiations between DNREC and NVF over the original 1999 TMDL.

5. MAELC and Clinic Comment: The MAELC and Clinic state that, "A conservative approach to all aspects of the TMDL must be utilized to ensure the attainment of the established water quality standards."

DNREC Response: We disagree with this statement. The DNREC believes that the TMDL must be established at a level necessary to attain and maintain applicable water quality standards. This can be accomplished without taking a conservative approach to "all aspects" of the TMDL. Taking a conservative approach to all aspects of a TMDL can result in a TMDL that is far more stringent than necessary to ensure compliance with

water quality standards. In the case of the amended TMDL, we accounted for the covarying nature of the factors influencing zinc concentration in the Red Clay Creek and established the TMDL at a level explicitly required by the applicable water quality criterion for zinc.

6. MAELC and Clinic Comment: The MAELC and the Clinic state that the DNREC's reliance on predicted zinc concentrations below the [NVF] Yorklyn plant is unacceptable. The MAELC and the Clinic note that Route 82 meets the Red Clay Creek at a bend in the waterway just a few hundred yards below the plant. They further note that DNREC could have directed NVF to collect data directly below the plant or that DNREC could have collected data directly below the plant.

DNREC Response: As noted in the DNREC's Technical Background and Basis Document ("TBBB", DNREC's Exhibit #3), access to the creek directly below the NVF Yorklyn plant is poor. DNREC collects samples over a wide range of conditions to more fully characterize water quality and to better understand relationships, if any, between water quality and factors influencing water quality. DNREC considers good access to be a location where a sample can be collected under nearly any condition, rain or shine, without placing sampling teams at risk of injury. Requiring an employee to climb down the banks of a creek (as would be needed at the location mentioned by the commenter) to collect a sample during storm flows or otherwise during high flow conditions would subject them to unnecessary risk. Further, the DNREC tries to avoid collecting side bank samples if at all possible because concentrations along the bank may not be representative of concentrations in the main flow of the channel. Aside from the issues of safety and representative sampling, DNREC provided its rationale for predicting zinc concentrations at Yorklyn based on measurements at Wooddale. That rationale appears in section 4.2, page 15 of the TBBB. The most compelling technical reason supporting the DNREC's approach is that zinc mass is conserved between Ashland and Wooddale. Regression between zinc load at Ashland and zinc load at Wooddale has a slope that is not statistically different than 1. This means that zinc mass loading is conserved in the system, which unambiguously validates our approach. Finally, the fact that DNREC predicted zinc concentration in the Red Clay Creek at Yorklyn for purposes of the TMDL in no way means that zinc data have not been collected at the NVF Yorklyn plant and in the creek immediately downstream of NVF. DNREC did in fact require NVF to collect data on zinc concentrations in the surface water near the plant and in the groundwater at the plant in conjunction with the pollution control strategy developed during the settlement negotiations. That data was used to design and optimize a zinc groundwater recovery system at the NVF Yorklyn facility, which is operating successfully and meeting expectations. That data, as important as it was for source characterization, was not suitable by itself for TMDL development, especially for a data intensive approach such as the lognormal probability approach. The high frequency, in-stream flow and concentration data collected at Wooddale made it possible to consider the lognormal probability approach. We point out that seldom is there a long-term dataset of such high frequency to work with for purposes of TMDL development. In summary, the DNREC's reliance on predicted zinc concentrations below the NVF Yorklyn plant for purposes of developing the amended TMDL was justified based on consideration of worker safety

and representative sampling. Further, key assumptions made in the approach were checked and justified based upon an analysis of the data (e.g., mass conservation).

7. MAELC and Clinic Comment: The MAELC and Clinic claim that the DNREC has made overbroad assumptions in step 3 of the lognormal probability analysis. In particular, the MAELC and the Clinic cite the following overbroad assumptions that they feel DNREC has made: i) that the drainage area upstream of Wooddale has the same characteristics as the drainage area upstream of Yorklyn; ii) that the land use/land cover upstream of Wooddale is similar to that upstream of Yorklyn (variation of point 1); and iii) that DNREC did not account for releases from Hoopes Reservoir.

DNREC Response: We disagree with the commenter. The DNREC believes that it has clearly justified its assumptions, particularly with regard to mass conservation between Ashland and Wooddale. If mass were not conserved between these 2 stations, then there would be reason to question step 3. Although we clearly acknowledge that we estimated concentrations at Yorklyn, those estimates were made with a high degree of confidence based upon hard data and technical analysis. With regard to watershed characteristics, land use/land cover, topographic relief, and underlying geology are all very similar upstream of Yorklyn in comparison to the area upstream of Wooddale. It is not until the Red Clay Creek crosses Kirkwood Highway south of Wooddale that the watershed changes dramatically in land use/land cover, slope, and geology. This is noted in DNREC's TBBB (Chapter 2). With regard to releases from Hoopes Reservoir, we first point out that such releases seldom occur, and when they do, they are usually of short duration. Even if there had been releases from Hoopes during the time period used for the TMDL development, their effect was not significant since the zinc mass loading at Ashland (upstream of Hoopes) was not statistically different than zinc mass loading at Wooddale (downstream of Hoopes) based on regression of paired samples. Therefore, a detailed analysis of the effect of Hoopes releases was not needed, nor justified, for the amended TMDL. In summary, DNREC believes its approach did not make overbroad assumptions in step 3.

8. MAELC and Clinic Comment: The MAELC and the Clinic contend that using hardness-dependent criteria should not be incorporated into the TMDL because it does not consider reasonable boundaries for water hardness. MAELC and the Clinic request that DNREC use a more succinct set of [hardness] data for more accurate results.

DNREC Response: To not use the hardness-dependent criteria in the TMDL as the commenter suggests would be to ignore our own criteria in the development of the TMDL. If the commenter's reason is "because it does not consider reasonable boundaries for water hardness," it is not clear what the commenter means by "reasonable boundaries for water hardness." DNREC believes the "reasonable boundary for water hardness" is the range of hardness observed in the waterbody. Hardness values outside the range for the waterbody would be outside reasonable boundaries. Further, to use a narrow window of hardness values or just a single hardness value would be to ignore the important functional relationship between hardness and the criterion. We believe it is important to calculate the criteria based upon the hardness observed in the waterbody on the day zinc measurements are made. In so doing, zinc concentrations for the particular day can be compared to the criterion calculated for that day based upon the observed

hardness, thereby permitting an accurate determination of risk. This approach is fundamental to a dynamic modeling approach, including the lognormal probability approach. In summary, we disagree with the commenter that using “a more succinct set of hardness data yields more accurate results.” To the contrary, we believe that using a more succinct set of hardness data yields less accurate results, especially within the context of a dynamic modeling approach.

9. MAELC and Clinic Comment: The MAELC and Clinic urge DNREC to provide additional explanation of how the TMDL addresses seasonal variability. The MAELC and the Clinic contend that the DNREC’s explanation does not provide details sufficient to satisfy the seasonal variation requirements of federal TMDL regulations (40 CFR Part 130.7).

DNREC Response: As DNREC staff noted at the public hearing in response to questioning by the MAELC, DNREC believes that the conclusory statement made in section 5.5, page 28, of the TBBB is sufficient to satisfy the seasonal variation requirements of the federal TMDL regulations. The federal rules require that TMDLs consider seasonal variations and critical conditions for flow, loading, and water quality. By considering the full range of conditions, and demanding that the TMDL meet the criterion 99.908% of the time as specified by the applicable criterion, the lognormal probability approach inherently and automatically considers the co-occurring combination of critical factors for the creek, including seasonal variation. Ultimately, it will be the EPA’s decision to determine whether DNREC’s approach satisfies the seasonal variation requirements of the federal TMDL regulations.

10. MAELC and Clinic Comment: The MAELC and the Clinic note that in the 2007 Settlement Agreement, DNREC agreed to revise the TMDL to allow no less than 25.17 lbs/day combined from NVF as total zinc. MAELC and the Clinic claim that by switching to dissolved zinc in the amended TMDL that DNREC effectively handed NVF 10-20% more zinc than required under its Agreement. The commenters urge DNREC to recalculate so as to not grant an amount greater than that for which NVF bargained.

DNREC Response: The calculations used to develop the amended TMDL were based upon dissolved zinc because our water quality criteria for zinc are expressed on a dissolved basis. Equating dissolved zinc to total zinc in the actual TMDL articles as DNREC has done has the effect of making the TMDL more stringent than necessary to ensure that the dissolved criteria are met. DNREC believes this conservatism is justified because the dissolved fraction is very high near Yorklyn.

11. MAELC and Clinic Comment: The MAELC and the Clinic expressed their concern that DNREC proposed an inadequate Margin of Safety (MOS). The MAELC and Clinic cite three issues for the basis of their concern. First, they state that the MOS should be a larger number because, in their opinion, there is “more uncertainty about the numbers” because “important values are based on predictions.” Second, and alternatively, the commenters urge DNREC to return to the 1% of the TMDL that was used in the 1999 exercise. Third, the commenters state that the MOS should not be used to replace an entire TMDL standard.

DNREC Response: DNREC disagrees that there is “more uncertainty about the numbers” simply because “important values are based on predictions.” As noted previously, DNREC has a high degree of confidence in its predictions based upon mass balance principles and similarities between land use/land cover, topography, and underlying geology for the area upstream of Wooddale. We also note that the commenter’s second suggestion, to return to the 1% value of the 1999 TMDL, would in effect require the MOS in the amended TMDL to be reduced. On its face, this suggestion is at direct odds with the commenter’s first suggestion to increase the MOS. To return to the previous MOS makes little sense to us considering the environmental conditions have changed dramatically since 1999 and the technical approach (lognormal probability) is entirely different than the steady-state low flow approach used in the original TMDL. The commenter’s third point, that the MOS should not be used to replace an entire TMDL, is misleading. The DNREC did not propose to replace the 1999 TMDL with a new MOS. The MOS that we proposed as a part of the amendment was proposed on its own merits, independent of the 1999 TMDL. Our reasons for the 10% MOS for the amendment are outlined in section 5.4, page 28 of the TBBD.

12. MAELC and Clinic Comment: The MAELC and the Clinic contend that allowing one violation of the zinc water quality criterion in a three-year period as has been allowed in the amended TMDL contravenes the purpose of a TMDL.

DNREC Response: We disagree. Delaware’s Water Quality Standards (as amended July 11, 2004) allow no more than 1 exceedance of the acute and chronic aquatic life criteria for zinc in any 3 year period. That standard is approved by the EPA and is consistent with EPA’s national guidance for implementing water quality criteria for zinc.

13. MAELC and Clinic Comment: The MAELC and the Clinic indicate that they believe the new TMDL may enable anti-backsliding when NVF’s NPDES permit is up for renewal.

DNREC Response: Anti-backsliding refers to the Clean Water Act provision that prohibits the renewal, reissuance, or modification of an existing NPDES permit that contains effluent limits, permit conditions, or standards that are less stringent than those in the previous permit. There are, however, exceptions to the general prohibition. Any exceptions sought by NVF in response to the amended TMDL will be reviewed in accordance with the requirements of applicable law and regulation. It is premature to speculate about whether an exception will be sought and what the outcome might be.

14. MAELC and Clinic Comment: The MAELC and Clinic contend that DNREC’s proposal was motivated by issues not properly in consideration. The MAELC and the Clinic state that, “The exceptional lengths to which DNREC has gone to accommodate the needs of [NVF] are inconsistent with the purpose of the TMDL program.” The commenters go on to say that, “It is clear that DNREC’s priority is not the health of the stream but restoring NVF to operations.” Finally, the commenters ask, “...why was it necessary to sacrifice the water quality of the Red Clay Creek?”

DNREC Response: The first two statements are pure rhetoric which reflects the commenter’s general lack of appreciation, experience and understanding of the technical and programmatic nuance associated with this specific situation. It has been stated before

that it is infinitely easier to criticize a TMDL than it is to develop and implement one. This is a fine example of that. Although a different regulatory approach certainly may have been taken, it was not and we cannot turn that clock back. DNREC will take credit for discovering the precise source of the zinc; developing a state-of-the-science TMDL designed to ensure compliance with the applicable zinc water quality criterion 99.908% of the time; and leveraging a meaningful and aggressive pollution control strategy to abate the ongoing release of zinc from the site. This last feat, which is ultimately the most important, is especially impressive when you consider it was done while the company was in the heat of bankruptcy proceedings. Ultimately, DNREC found a way to ensure attainment of the applicable water quality criterion while getting a company going through bankruptcy to pay for the source cleanup. The key measure of success is the irrefutable reduction in the concentrations of zinc in the Red Clay and the associated reduction of criteria exceedances downstream of the NVF Yorklyn facility. We believe the TMDL process has worked exactly the way it is supposed to.

15. MAELC and Clinic Comment: The MAELC and the Clinic conclude their comments by urging DNREC to withdrawal its proposed amendment and reconsider its analysis for the establishment of any revised TMDL for the Red Clay Creek. The MAELC and the Clinic further conclude that no revision should be made until such time as actual zinc concentration data can be collected directly downstream of the [NVF] facility.

DNREC Response: We respectfully disagree with the position of the MAELC and the Clinic. It is not our intention to withdrawal our proposed amendment and reconsider our analysis. Thank you for your comments.

Appendix B

Amended Total Maximum Daily Load (TMDL) for Zinc in the Red Clay Creek, Delaware

A. INTRODUCTION and BACKGROUND

A TMDL specifies the maximum allowable mass loading of a pollutant (e.g., pounds per day) that can be delivered to a waterbody while still assuring that applicable water quality standards are met. A TMDL is composed of three components, including a Waste Load Allocation (WLA) for point source discharges, a Load Allocation (LA) for nonpoint sources, and a Margin of Safety (MOS) to account for uncertainties regarding the relationship between mass loading and resulting water quality. In simple terms, a TMDL attempts to match the strength, location, and timing of pollution sources within a watershed with the inherent ability of the receiving water to assimilate the pollutant without adverse impact.

On December 1, 1999, a Final TMDL Regulation for zinc in the Red Clay Creek was published in the Delaware Register of Regulations (3 **DE Reg.** 806 (12/1/99)). That TMDL Regulation was appealed by the National Vulcanized Fiber (NVF) Company to the State Environmental Appeals Board and the State Superior Court. The NVF Company owns and operates a manufacturing facility in Yorklyn, DE along the banks of the Red Clay Creek. The Department entered into a Settlement Agreement with the NVF Company in February of 2007, thereby resolving the appeal subject to the conditions of the Agreement. One condition of the Settlement Agreement was for the Department to propose an amended TMDL based upon a lognormal probability modeling approach. Such an approach provides an improved match between the strength, location, and timing of zinc mass loading to the Red Clay Creek with the inherent ability of the Red Clay Creek to assimilate the zinc loading without adverse impact. The lognormal probability modeling has been completed and the Department is now proposing to adopt an amended TMDL based upon the approach.

B. Amended Total Maximum Daily Load (TMDL) Regulation for Zinc in the Red Clay Creek, Delaware

Article 1. The TMDL for zinc in the Red Clay Creek shall be 55.93 pounds per day, measured as total zinc.

Article 2. The combined mass loading of zinc to the Red Clay Creek from NVF Yorklyn's permitted discharge 002 (i.e., WLA₀₀₂), plus the mass loading of zinc to the Red Clay Creek from contaminated groundwater beneath the NVF Yorklyn property (i.e., LA_{g.w.}) shall not exceed 25.17 pounds of zinc per day, measured as total zinc.

Article 3. The load allocation of zinc originating from upstream of Yorklyn (i.e., LA_{up}) shall not exceed 25.17 pounds of zinc per day, measured as total zinc.

Article 4. The margin of safety (MOS) for the TMDL listed in Article 1 has been set at 5.59 pounds of zinc per day, measured as total zinc. This MOS represents 10% of the TMDL and accounts for uncertainties in the overall TMDL analysis.

Article 5. DNREC has determined with a reasonable degree of certainty that water quality standards for zinc will be met in the Red Clay Creek once the mass loading requirements of Articles 1 through 3 are met.