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To: Interested Parties

Re: Consolidated Response to Comments: *Recommendations of the Expert Panel to Define Removal Rates for the Elimination of Discovered Nutrient Discharges from Grey Infrastructure*

This memo responds to the comments received on the above cited expert panel report which was first released in June of 2014. As of August 12, written comments had been received from EPA Region 3 Water Protection Division, Maryland Department of Environment, West Virginia Department of Environmental Protection and the Virginia Department of Environmental Quality, as well as verbal comments received during three workgroup meetings this summer. The memo was developed to comply with new provisions of the CBP BMP review protocol (WQGIT, 2014).

The memo is organized into two parts. The first part responds to comments pertaining to legal/ regulatory policy objections to crediting discovered nutrient discharges. The second part responds to other technical comments on the expert panel report.

Part 1: Response to Legal/Regulatory Policy Comments.

Comment 1: Sanitary sewer overflows are illegal and CB TMDL provides no allocation for them, therefore no nutrient reduction credit should be granted for these discharges that should never be allowed to happen in the first place (EPA WPD, VA DEQ).

Background: The Bay TMDL Section 4.5.4 (p. 4-22). *" SSOs represent a source on nitrogen and phosphorus to the Chesapeake Bay: however, information available to characterize their contribution to the overall nitrogen and phosphorus loads delivered to the Bay is limited largely because of their illegality and infrequency, Although the Bay Watershed Model does not specifically account for SSOs, the nitrogen and phosphorus loads contributions from SSOs are part of the background contributions incorporated into the Phase 5.3 watershed model, and, therefore such loads are accounted for in the data used for the calibration of the Bay watershed model. Because SSOs are illegal, however, the Chesapeake Bay TMDL assumes full removal of SSOs and makes no allocation for them".*

Response to C1: The Panel acknowledges that there are several unique regulatory and legal issues associated with wet weather SSOs. While they are clearly illegal when they happen, the Panel concluded that they have frequently occurred in the past, continue to

occur in the present, and will continue in the future unless additional actions are taken by utilities. The key distinction that the panel emphasized is the difference between discovered and reported overflows, as described below:

> *Discovered Nutrient Discharge:* An existing nutrient discharge that is found through systematic assessment of a catchment, sewer-shed or stream corridor by the designated MS4 permit agency or local sewer utility, using the screening, tracing and analysis methods described in this report. Nutrient discharges that are discovered using these methods may be eligible for a credit if they lead to the prevention or elimination of the discharge (p.11).
>
> *Reported Nutrient Discharge:* Unexpected nutrient discharges from pipe breaks, spills, leaks and overflows that are reported to the local authority by the public or first responders and require immediate emergency repairs to stop the discharge. Most of these involve sudden pipe and/or infrastructure failure that is easily observed. Reported nutrient discharges are NOT eligible for nutrient reduction credits (p.12).

The Panel wanted to be clear that credit is only granted to communities that take a proactive and aggressive approach to discover and eliminate nutrient discharges from problem storm/sewer-sheds that go well beyond minimum compliance with existing permit conditions. The panel further contends that the elimination of these discovered nutrient discharges represents a real, and potentially large, source of nutrient reduction for the urban sector, which is needed to meet the Bay TMDL.

The Panel does concur with the comment that the wet-weather SSO credit protocol (N-9) is probably not ready to actually implement on the ground at this point in time, although it is conceptually and scientifically sound. The flow volumes, flow durations and nutrient concentrations of wet weather SSOs are notoriously hard to sample, estimate or measure, and the simplified crediting and verification protocols developed by the Panel are not very operational for either a locality or state enforcement agency.

For this reason, the Panel is willing to withdraw its recommendation to credit wet weather SSOs (N-9) in this report, and leave it to a future expert panel to determine whether or not any nutrient credit should be granted, and if so, what sewer monitoring and modeling tools are needed to compute and verify them. Given the legal and regulatory issues involved, any wet weather SSO expert panel should include legal and regulatory experts, and be timed to coincide with Phase 6 of the CBWM.

The panel proposes to keep the credit for dry weather SSOs because concentrations and flows are easier to measure due to the fact that they do not occur during a rain event. However, as mentioned in the response to comment 10, this credit will not be available until Phase 6 of the watershed model is in use.

Comment 2: A robust IDDE program is required under the MS4 program which is recognized in the report. MS4 permittees that have not properly implemented IDDE program plans are able to generate nutrient credits. Given that MS4 permittees are

required by laws and regulations to establish mechanisms to identify and eliminate illicit discharges, credit for compliance with existing terms of a permit should not be provided (VA DEQ).

Response to C2: During its deliberations, the Panel evaluated the existing MD4 IDDE permit conditions in each Bay state, and concluded that, with the exception of a handful of innovative communities, the vast majority of Bay communities were getting no measurable nutrient or sewage reduction benefit from them. Compliance with existing IDDE program permit conditions (as outlined in Table 6), is primarily a paperwork exercise. The Panel contends, however, communities that pursue an aggressive and targeted approach to discovering and eliminating nutrient discharges from grey infrastructure (that goes well beyond existing compliance) is clearly eligible for a nutrient reduction credit.

The Panel has created a new Table 6 to clearly indicate that minimum MS4 compliance with IDDE stormwater permit conditions is not eligible for nutrient credits of any kind. A conservative nutrient discharge program credit is only offered to those MS4 communities that qualify as an advanced program, by meeting the core and supplemental criteria outlined in the revised Table 7 (see Appendix A for a summary of both)

Comment 3: If credits are granted, how can we be assured that the nutrient reductions calculated are real and sustainable over time?

Response to C3: The Panel was extremely mindful that any nutrient reductions achieved by eliminating discovered nutrient discharges must be real, data-driven and verifiable. To this end, the panel developed a multi-layered approach to provide assurance that this is indeed the case:

1. Protocols require on-site sampling/measurement/estimation of nutrient concentrations, flow volumes and flow durations for each individual discharge that is eliminated. Empirical equations are then used to convert this field data into estimated nutrient reductions.

2. Field inspections are then required to verify that the discharge has been physically eliminated, followed in many instances by additional outfall screening or stream monitoring to confirm that the discharge does not re-occur and/or identify other contributing discharges to the outfall or stream corridor (see Section 5).

3. Specific MS4 data requirements are outlined to indicate what localities need to report to their state MS4 authority through existing systems (e.g., annual MS4 reports) (p. 55). The Panel also defined a 100 lb threshold to flag nutrient reduction credits for potential state review.

4. Local record-keeping requirements (p. 56) require that files be maintained on the characteristics and calculation of each individual nutrient discharge that is

credited, which are subject to audit by the state agency, under their existing MS4 authority.

5. To be consistent with recent Bay-wide verification guidance (CBP, 2014), the panel recommends a ten year lifespan for any individual nutrient reduction credit, after which the credit automatically expires. The automatic expiration reflects the fact that grey infrastructure will continue to deteriorate as time goes by, so that a reduction in one point of the system may ultimately be negated by a new discharge.

The Panel feels that the multi-layered approach toward crediting and verifying nutrient load reductions from this BMP meet, and often surpass those of any other CBP-approved urban or agricultural BMPs.

Part 2: Response to Technical Comments.

Part A: Concerns over Whether These Nutrient Discharges Are Part of the Modeling Baseline.

Comment 4: If these discharges were not part of the calibration of the Chesapeake Bay watershed model, how can their elimination be credited now?

Response to C4: During its deliberations, the Panel coordinated extensively with the CBPO Modeling team on this key modeling issue. The consensus was that both discovered and reported nutrient discharges are implicitly part of the calibration of the watershed model, even if they are not explicitly simulated by the model (p.18 of panel report, the extract from the Bay TMDL cited in comment No. 1, and second paragraph of EPA WPD comment #5).

The Panel also concurs with the three criteria that EPA has articulated for granting credits for any BMP so as not to violate the calibration of the CBWM (see last two sentences in EPA WPD comment # 5).

Criteria 1: Must result in additional reductions in nutrient loads compared to the 1985-2005 calibration period:

The Panel concluded that IDDE programs from the 1985-2005 era were not producing any measurable nutrient reductions (i.e., zero). Many communities, particularly Phase 2 MS4s, were not issued permits with IDDE requirements until the end of the calibration period, and largely confined themselves to checking off compliance with basic program requirements (e.g., pass an IDDE ordinance, develop a storm sewer map, educate public employees, business and the general public, etc). While some Phase 1 MS4 communities were performing limited storm drain outfall screening in the early 2000's, most of it was confined to visual indicators and outfalls that were 3 feet or greater in diameter. Indeed, the first national guidance on implementing IDDE programs (Brown et al 2004)

was not released until October, 2004, and it took several years for Bay states to explicitly reference this guidance into their MS4 permit conditions.

Criteria 2: Not be already counted by other actions or practices currently being reported in CBP progress runs.

The panel concluded the vast majority of nutrient discharges from grey infrastructure occur downstream of upland pervious or impervious areas, and are delivered to the stream corridor as groundwater inputs or dry weather flows. Dry weather nutrient discharges are also quite variable in both space and time, and are not associated with stormwater runoff processes that drive most of the nutrient loading from the urban sector (see also Comment No. 6)

For these reasons, the Panel concluded that the elimination of nutrient discharges from grey infrastructure would not cause any double-counting by other urban BMPs in a given river-basin segment.

Criteria 3: Reflects a clear change in how IDDE programs are implemented that creates real nutrient reductions achieved since 2005.

The Advanced Nutrient Discharge Program Credit, as defined in the revised Table 7 (Appendix A), reflects the new methods and technologies developed over the last decade to discover and fix nutrient discharges which represent a "clear change" from what current MS4 IDDE programs accomplished in the past. Even today, only a handful of Bay communities would qualify for the advanced nutrient reduction program credit.

Comment 5: At what year can a community become eligible for individual and programmatic credits for discovered nutrient discharges?

Response to C5: Individual nutrient reduction credits can be claimed for any year after 2005 (not the incorrect 2009 date shown on p. 5 of the report). However, it is highly unlikely that most MS4 communities will have the requisite historical data needed to compute and verify the credit over the past nine years.

The programmatic credit is available beginning in 2015 and extending through 2017. Again, very few communities in the Bay watershed will have fully met the criteria for advanced nutrient-based programs by 2015. It should also be noted that the advanced program credit is <u>not</u> cumulative year over year, (i.e., the maximum allowable reduction is capped at 1% of all qualifying pervious acres in each community).

Comment 6: How do DNDs interact with other urban BMPs--is there a chance of double counting? (EPA WPD, VA DEQ)?

Response to C6: In general, most DNDs occur downstream of upland land uses and urban BMPs, are usually delivered via groundwater or dry weather flows, and are found

within or in close proximity to the urban stream corridor. Therefore, there is a very low probability of double counting, since most upland BMPs are explicitly designed to treat or reduce stormwater runoff from small upland drainage areas. (Note: for modeling implications, see response to C10).

Part B: Concerns over the Programmatic Credit

Comment 7: Need to provide more information on the basic MS4 IDDE program requirements which are not eligible for program credit.

Response to C7: Agreed. The Panel concurs that Table 6 and the accompanying text did not clearly define the differences between a basic program (which gets no credit) and an advanced one (which does qualify for a credit). Therefore, the final report will include two tables to make this clear (Appendix A of this memo).

The Panel's reasoning for assigning no removal credit to basic programs is outlined in Response to Comment 2.

Comment 8. Need more scientific justification for the local DND programmatic credit (EPA WPD)

Response to C8: The Panel relied on best professional judgment and a very conservative approach to define the effectiveness of the advanced program credit. The first assumption is that dry weather nutrient discharges generated 20% of the nutrient load from pervious land on an annual basis. The second assumption was that nutrient discharges comprised 0% of nutrient load from impervious land, which reflects the fact that there is no groundwater or interflow associated with this land use (i.e., surface runoff only).

The Panel further reasoned that an advanced local program could conservatively expect to discover and eliminate 1% of the total nutrient load generated by grey infrastructure in the targeted storm/sewer-sheds where they are applied (1% of 20% = .2%). The practitioners on the panel noted that a small fraction of the discharges are relatively easy to find and fix, whereas others are exceptionally hard to find even with a lot of detective work.

The Panel was comfortable in adopting its conservative approach, because the program credit is temporary in nature, and will be phased out with empirical computations of individual nutrient discharges by 2017.

Comment 9. The IDDE program credit should be called temporary and not interim (MDE)

Response to C9. Agreed. The term "interim credit" has a unique meaning in the context of the CBP BMP review protocol (CBP, 2014), so the most appropriate term to describe the advanced program credit is "temporary" since communities only have to the end of 2017 to qualify for it. The wording change will be reflected in the final report.

Part C: Other Technical Issues

Comment 10: When should the specific panel recommendations be phased in the CBWM (e.g., version 5.3.2 or version 6.0)?

Response to C10: The Panel has reevaluated some of the practical implications associated with implementing its recommendations, and agrees that a phased approach would help minimize the reporting burden for state and local agencies, and lead to more widespread adoption of advanced nutrient discovery programs. Consequently, the Panel suggests a two phase approach, as follows.

1. Only allow the advanced program credit in the current version of the model (V. 5.3.2) until 2017.
2. Only allow calculation of credits for individual nutrient discharges in Phase 6 of the model (i.e., after 2017).

Comment 11: Given that expert panel notes that dry weather nutrient discharges comprise a large share of urban nutrient loads, what implications does this have for other urban BMPs?

Response to C11: While this is an important question, it lies beyond the specific charge that the panel was assigned (see Section 1 of expert panel report), and is not specific to this BMP. Significant work on the loading question, however, has recently been performed as part of a STAC research workshop and follow-up CBP work group meetings (Sample et al, 2014). Based on a comprehensive review of urban stream research, Sample et al (2014) have proposed modified urban land uses for Phase 6 of the CBWM. One proposal is to create a new urban stream corridor land use, which might include loads generated by stream channel erosion, discovered nutrient discharges and other downstream load sources.

When a new land use is created, some portion of the existing urban load from pervious and impervious land must be re-allocated to the new land use, to ensure that the pollutant mass-balance is conservative and matches the total calibrated urban load. Sample et al (2014) further note:

> *Perhaps the biggest unintended consequence of any proposed load re-allocation involves the spatial change in <u>where</u> urban pollutant loads are generated. If, for example, more sediment and nutrient load where shifted from upland pervious and impervious areas to the downstream corridor, than it would have the net effect of reducing the load delivered to upland BMPs, and assuming no change in their current BMP efficiency, a net reduction in nutrient reduction for upland BMPs.*

More recommendations on addressing this issue in the Phase 6 model can be found in the STAC research report (Sample et al, 2014). It is also important to note that the ultimate decisions on Phase 6 urban land uses will be made by the CBP Modeling Work

Group. Given that grey discharges may be modeled explicitly in the Phase 6 model, and the fact that localities will only receive programmatic credit for advanced nutrient discovery programs (.2% of the pervious load), the panel does not believe that crediting the removal of dry weather nutrient reductions will impact the performance of other BMPs.

Comment 12: Can you show me an example of a community that can demonstrate water quality improvements in streams due to aggressive implementation of IDDE and SSO programs?

Response to C12: While several good examples can be drawn from the Chesapeake Bay, perhaps the leading example is Durham, North Carolina. Over the last decade, this MS4 has taken an aggressive approach to finding and fixing discovered nutrient discharges within its urban stream network, and has been able to document significant trends in dry weather water quality over time, especially for total N and bacteria. The final version of panel report will include a case study profiling the advanced nutrient discovery program utilized in Durham.

Comment 13. Why were there no sediment reduction credits developed for these discharges? (MDE).

Response to C13: The Panel considered developing protocols to estimate sediment reduction credits early in its deliberations, but concluded the juice was not worth the squeeze for two primary reasons. First, very little TSS concentration data was available to characterize the eight dry weather discharge types. The few data that were available showed generally low concentrations (usually less than 10 mg/l). Second, the Panel noted that much of the dry weather sampling of TSS in urban streams also had low TSS concentrations, which indicate that discharges from grey infrastructure are probably not a significant term in the overall sediment budget in most urban watersheds.

Part D: Concerns over Reporting Tracking and Verification

Comment 14. The reporting requirements for computing reductions associated with individual discovered nutrient discharges are too onerous for most Bay communities (EPA).

Response to C14: The Panel agrees that the proposed reporting requirements for this new BMP will initially require more documentation by local MS4s and their state counterparts than is currently done (which is minimal or nothing at all). The proposed phasing approach suggested by Panel (see Response to C10) would give localities and state agencies several years to develop the specific reporting templates for individual nutrient discharges. The reporting and record-keeping requirements recommended by the Panel are consistent with those required for other CBP-approved urban BMPs (e.g., stream restoration, retrofits, and UNM).

Comment 15: The Panel should create an Excel spreadsheet so states and localities can compute removal credits for individual nutrient discharges (MDE)

Response to C15: Each Bay state reserves the exclusive authority to decide what locals will report, and the procedures for doing so (usually through their annual MS4 reporting system). As part of its panel support role, CSN has developed spreadsheets which may be a suitable template with some adaptation. Given the proposed phasing approach, there is now a 2 to 3 year lead time to develop the supporting tools and reporting systems to track the credits.

Comment 16: The credit for eliminating any individual nutrient discharge needs to have an expiration date.

Response to C16: Agreed. To be consistent with recent Bay-wide verification guidance (CBP, 2014), the Panel will revise the report to include a ten year lifespan for any individual nutrient reduction credit, after which the credit automatically expires. The automatic expiration reflects the fact that grey infrastructure will continue to deteriorate as time goes by, so that a reduction achieved in one point of the network may ultimately be off-set by a new source elsewhere in the network.

As indicated in the new Table 7, the duration of the advanced nutrient discharge program credit will extend no more than five years after it is first earned, and cannot be renewed.

Comment 17: Verification requirements for individual discharges are vague and not consistent with other CBP-approved panel reports (MDE and EPA WPD).

Response to C-17: The Panel is comfortable with the verification requirements for the dry weather discharges (N-1 and N-8), and concedes that the requirements for wet weather SSO's (N-9) are not operationally ready (see Response to Comment 1).

Part of the confusion about verifying this unique class of BMPs stems from the inherent difference between a structural BMP that provides treatment versus a one-time change in plumbing to prevent or eliminate an existing discharge. For structural BMPs, it is important to ensure that they still exist and are performing their treatment function over the decades.

For the plumbing changes used to eliminate nutrient discharges, however, the reduction is immediate and is verified by a one-time confirmation inspection that the plumbing has been done right (N-1 to N-5). Follow-up outfall screening and/or monitoring is generally not needed for these five discharges types, but may be useful to detect other similar nutrient discharges within the same storm sewer or sanitary sewer network (as discharges of the same type are often clustered together). Therefore, the Panel concluded that while it was good practice to perform follow-up screening and/or monitoring to detect additional discharges, it would not be a required verification element for these five discharge types.

Part E: General Editorial and Technical Comments on the Report

Comment 18: Numerous editorial, wording and technical comments were provided by Andy Dinsmore (Region 3), WVDEP, MDE and others.

Response to C-18. These suggestions certainly improve the quality, consistency and readability of the panel report, and will be fully incorporated into the Final Report.

References Cited:

Brown, E., D. Caraco and R. Pitt. 2004. Illicit Discharge Detection and Elimination: a guidance manual for program development and technical Assessment. U.S. EPA Cooperative Agreement X-82907801-0. Center for Watershed Protection and University of Alabama

Chesapeake Bay Program (CBP) 2014. Strengthening Verification of Best Management Practices Implemented in the Chesapeake Bay Watershed: A Basin wide Framework. Report and Documentation from the Chesapeake Bay Program Water Quality Goal Implementation Team's BMP Verification Committee. August 11, 2014 Draft. Annapolis, MD.

Sample, D. et al. 2014. The Peculiarities of Pervious Cover: A Research Synthesis on Allocating Pollutant Loads to Urban Land Uses in the Chesapeake Bay Watershed. STAC Publication No. 14-006. Edgewater, MD. 54 pp.

Water Quality Goal Implementation Team (WQGIT). 2014. Revised Protocol for the Development, Review and Approval of Loading and Effectiveness Estimates for nutrient and Sediment Controls in Chesapeake Bay Watershed Model. Chesapeake Bay Partnership. July 14, 2014.

Appendix A: Revised Table 6 and 7 for Final Report

Table 6 Zero Credit for Basic IDDE Program
This includes MS4s that are currently in compliance with their minimum control measure for illicit discharge detection and elimination (IDDE) in their current stormwater NPDES permit, as summarized in Brown et al (2004)[1]. The basic permit conditions are as follows: • Adopt a local ordinance to prohibit illicit discharges to the storm drain system • Develop a storm drain map, including all outfalls 36 inches in diameter or larger • Provide IDDE education and outreach to public employees, businesses and the general public • Use visual indicators to screen outfalls for presence of illicit discharges • Develop and implement appropriate enforcement procedures to correct illicit discharge when they are discovered.
[1] There may be some minor differences in permit conditions among the Bay states, as well as between Phase 1 and Phase 2 MS4 communities.

Table 7 Credit for Advanced Nutrient Discovery Programs
The annual credit is equivalent to a maximum of 1% of the dry weather nutrient load within the jurisdiction, which is defined as 20% of the total annual N and P load discharged from urban pervious land in which advanced nutrient reduction programs are targeted.[1]
The locality will provide justification to indicate that they are operating at an advanced level. At a minimum, they will document the following in their annual MS4 permit report: • Methods used to analyze dry weather stream monitoring data to prioritize the catchments and/or sewer-sheds with the highest risk for nutrient and bacteria discharge that warrant targeted investigation. • Number of outfalls in the priority catchments/sewer-sheds identified during the Outfall Reconnaissance Inventory (ORI) as described in (Brown et al 2004). • Number of outfalls in the priority catchments/sewer-sheds that were subject to nutrient testing, using the Flow Chart Method (Brown et al 2004) or equivalent. The testing must focus on outfalls of all diameters. Nutrient testing should be conducted on at least 10% of flowing outfalls (as determined during the ORI) annually. • Specific methods and techniques they use to track a suspect illicit discharge to its source in the storm drain network (Table 3). • Number and type of illicit discharges that were discovered and actually eliminated each year. In addition, localities will need to document that they are conducting <u>at least two</u> of the following activities to discover and or prevent nutrient discharges to receive credit: • GIS assessments of storm and sanitary sewer network to identify high risk segments for cross-connections or exfiltration • Dry weather stream monitoring is used to prioritize the stream segments with the highest nutrient and bacteria levels that warrant further investigation • CCTV inspections, dye testing or other methods to investigate for sewer leaks in problem storm drain systems. • Targeted inspection and outreach to businesses and/or industrial facilities subject to high risk for illicit discharges or sewer clogging (e.g. restaurants, car rental agencies, etc.) • Detailed field assessments of the sewer network to identify segments with high risk of nutrient discharge due to exfiltration and/or dry weather overflows (i.e., sewer modeling and metering tools).
[1] The program credit is not additive; although a MS4 can increase acreage subject to targeted nutrient discharge investigations from year to year. MS4s can apply for the one-time program credit until 2017, after which they must report computed load reductions from individual nutrient discharges. The nutrient reduction associated with the program credit will lapse 5 years after a community first reports it in their MS4 annual report.