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August 26, 2009

Ms. Jeanine Townsend
Clerk of the Board
State Water Resources Control Board
1001 I Street, 24th Floor
Sacramento, CA 95814

Subject: 9/1-2/09 BOARD MEETING (Item 10: General NPDES Permit for Discharges of Stormwater Associated with Construction Activities (CGP))
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Delivered via email

Dear Ms. Townsend:

Flow Science Incorporated (Flow Science) respectfully submits these comments on the addendum (Staff Change Sheet #1, dated August 17, 2009) to the Draft General NPDES Permit for Discharges of Stormwater Associated with Construction Activities (CGP) (dated April 22, 2009). On behalf of the California Building Industry Association (CBIA), the Construction Industry Coalition on Water Quality (CICWQ), and the Building Industry Legal Defense Foundation (BILD), Flow Science has previously contributed to comments submitted by the CBIA, including a detailed report entitled "General Construction Permit: Action Levels and Numeric Effluent Limits Analysis and Recommendation of Alternatives," dated June 24, 2009.

The comments contained in this letter focus on the changes in Staff Change Sheet #1 ("Addendum"), and in particular on numeric effluent limits (NELs) for turbidity. Flow Science incorporates by reference both our prior comments and CBIA's prior comments on NALs and NELs.

It is our opinion that insufficient scientific data and evidence exist upon which NELs for turbidity and pH can be based, and that significant additional data collection is required before appropriate NELs can be established for stormwater discharges from construction sites.

As detailed in the Addendum, SWRCB Staff indicate that the turbidity NEL of 500 NTU is a technology-based numeric effluent limitation that was derived using three different analyses. These three analyses are discussed briefly below, as is the concept that the proposed NELs should be considered to be technology-based numeric effluent limitations.

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1. **Eco-region specific dataset developed by Simon et al. (2004).** As detailed in prior comments, the Simon et al. (2004) dataset indicates that background, median suspended sediment concentrations in receiving waters are likely to exceed the proposed NEL of 500 NTU over at least 40% of the State's area, and the assumed 1:3 relationship between turbidity and suspended sediment assumed in the analysis is faulty. The Addendum does not provide additional information to modify our prior conclusions. Additional comment is not provided here.

2. **Statewide Regional Water Quality Control Board enforcement data.** In the April 22, 2009 Fact Sheet, four (4) RWQCB enforcement data points were presented by SWRCB Staff. In the Addendum, fifteen (15) new data points have been added to the SWRCB Staff's analysis of enforcement data. Of these fifteen data points, thirteen (13) are for stormwater discharges from a single project (the Northstar Village project, located in the Lake Tahoe hydrologic area). These data are therefore completely unrepresentative of construction activity throughout the State. SWRCB Staff then perform statistical analyses on the revised dataset, but treat the 13 Northstar Village data points as independent data, which they are not. Several other errors are apparent in this analysis:

   - The total number of data points is 19, not 20 as detailed on p. 4 of the Addendum. This error (the use of 20 instead of 19) affects all the calculated parameters.
   - Flow Science's calculation of the sample mean and standard deviation of the dataset yield different values; as shown in Table 1, both the mean and the standard deviation for this dataset are higher than the values calculated by the SWRCB Staff.
   - Thirteen (13) of the 19 data points used in the SWRCB Staff calculation are from a single project (Station 6A31C325917, the Northstar Village project), and the turbidity values of this sub-dataset are significantly lower than turbidity data from all but one other station by one to two orders of magnitude. The analysis performed by the SWRCB Staff erroneously assumes that these are independent data points, when they are not. Use of either a mean or median of the Northstar Village sub-dataset results (i.e., treating these 13 samples as representative of one site), results in means and standard deviations that are significantly higher than indicated by SWRCB Staff. As shown in Table 1, the recalculated values are *more than double* the mean turbidity for the enforcement dataset as calculated by SWRCB Staff, and the upper end of the 95% confidence interval also *more than doubles*.

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Table 1. The ACL turbidity data (NTU) presented in p. 4-5 of the Addendum.

Data			
Station #	All ACL data	ACL data with a mean of the subdata	ACL data with a median of the subdata
5S34C331884	1800	1800	1800
5S05C325110	1670	1670	1670
5S48C336297	1629	1629	1629
5R32C314271	1400	1400	1400
6A090406008	97.4	97.4	97.4
5S03C346861	1600	1600	1600
6A31C325917 (subdata)	900 190 36 180 130 290 100 28 23 32 12 60 34	155	60

Statistical parameter				
	State Board Calculation	Flow Science Calculation		
No. sample	20	19	7	7
Sample mean	**512.23**	537	1193	1179
Sample standard deviation	**686.85**	696	739	761
Margin of Error	321.45	336	683	704
Degree of freedom	19	18	6	6
t* at 95% and a given degree of freedom	2.093	2.10	2.447	2.447
Lower end of 95% CI	190.78	202	510	475
Upper end of 95%CI	833.63	873	1876	1884

- Use of a Student's t-distribution, an assumption made by SWRCB Staff due to small sample size, is inappropriate. A Student's t-distribution assumes that data are normally distributed, which this dataset does not appear to be, particularly when the Northstar Village data are treated as representative of turbidity in runoff from one location (as discussed above). Further, it is unclear why SWRCB Staff assumed that the

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proposed 500 NTU NEL was appropriate if it was included within the calculated 95% confidence interval about the mean from a small, non-representative dataset. Rather, a 95% confidence interval is indicative only of the range of expected turbidity values from the small dataset evaluated in the Addendum, and clearly indicates that many values from this dataset can be expected to exceed the proposed NEL.

- Most importantly, there is no reason to assume that the enforcement data cited in the Fact Sheet (including new values) are representative of construction sites across the State. All enforcement data are from either Region 5 or Region 6. The data for Region 6, in particular, are from an area of the State where natural background turbidity is low. There appear to be no data from either Ecoregions 6 or 14 (Simon et al., 2004), where median suspended sediment concentrations (and associated turbidity values) for receiving waters under natural conditions (1.5-year flow events) exceed the proposed NEL. Data presented by SWRCB Staff and by Flow Science (2009) indicate that turbidity varies widely between regions of the State. Based upon this, it is scientifically indefensible to require effluent from construction sites Statewide to meet a uniform turbidity NEL of 500 NTU.
- Finally, the Addendum states that "based on a constructed 95% confidence interval, construction sites will be subject to administrative civil liability (ACL) when their turbidity measurement falls between 190.78 – 833.68 NTU." This statement appears to imply that a turbidity measurement of 191 NTU (i.e., below the NEL of 500 NTU) could be considered a permit violation. This statement should be corrected.

3. **Published, peer-reviewed studies and reports on in-situ performance of best management practices in terms of erosion and sediment control on active construction sites.** SWRCB Staff cite only one report (Horner, Guedry, and Kortenhof, 1990) and a comment letter from Dr. Horner to the State Water Board in support of the proposed NEL. The tests in Horner et al. (1990) were conducted in Washington State, and while a total of thirteen (13) storms were tested, the rainfall intensity for those storms varied from 0.009 to 0.119 inches/hour. Rainfall intensities higher than this are common in California, particularly in mountainous regions. For example, Wieczorek (1987)[1] observed rainfall intensities of up to 1 inch/hour in the La Honda area (Santa Cruz Mountains) in 1983. The California Stormwater BMP Handbook (January 2003, Appendix D) provides rainfall intensities for 19 locations throughout the State of California; the percent of time that a rainfall intensity of 0.1 in/hr is exceeded at these locations ranges from about 8% of the time (Bakersfield Airport, Palm Springs) to about 23% of the time (Oxnard, Santa Susana). An example rainfall intensity plot (for

[1] Wieczorek, G.F. Effect of rainfall intensity and duration on debris flows in central Santa Cruz Mountains, California. Geological Society of America, Reviews in Engineering Geology, Volume VII. 1987.

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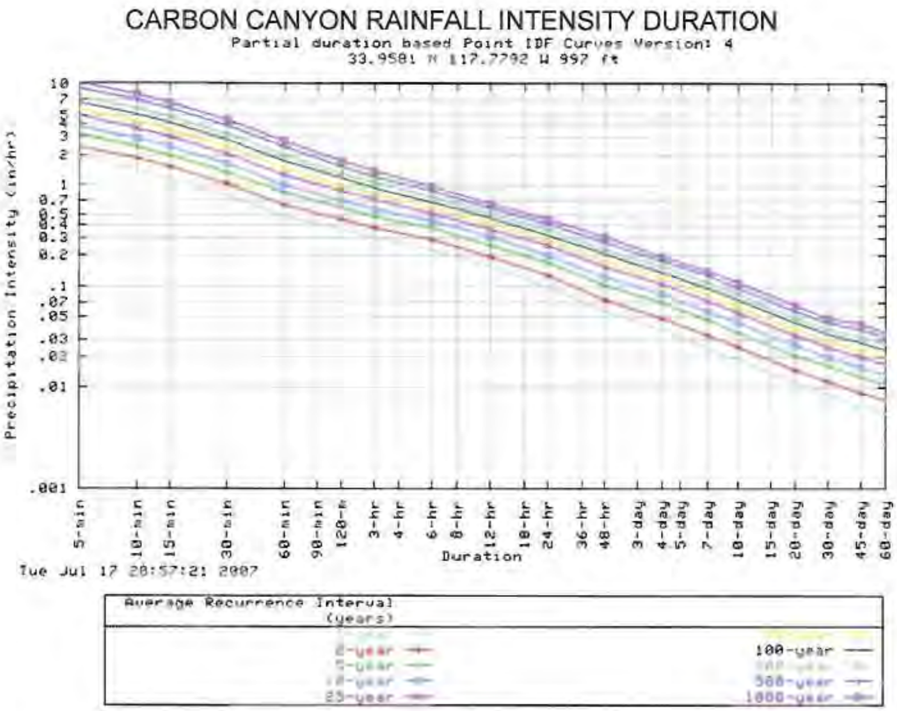
Carbon Canyon, in Orange County) from NOAA[2] is shown below. This plot demonstrates that a one-hour rainfall intensity for a storm with a 1-year recurrence interval is about 0.5 in/hr in Carbon Canyon.



Further, it is unlikely that the underlying geology in the tests of Horner et al. (1990) covered the range of soil types and ecoregions present throughout the State of California. As noted by Horner in the quotation included in the Addendum, the most effective erosion control included grass seed applied "in sufficient time before the tests to achieve germination." It is not possible to keep an active construction site fully covered by erosion control measures, particularly in grading or underground construction phases (e.g., laying of utilities). Finally, Horner et al. (1990) conducted their studies on sites associated with highway construction, and did not evaluate erosion control measures on other types of construction sites. Thus, while Horner et al. (1990) provide useful information on the effectiveness of certain erosion control measures, SWRCB Staff have not established that this information is applicable to the range of construction sites

[2] Point precipitation frequency estimates from NOAA Atlas 14. Available at http://hdsc.nws.noaa.gov/cgi-bin/hdsc/buildout.perl?type=idf&units=us&series=pd&statename=SOUTHERN+CALIFORNIA&stateabv=sca&study=sa&season=All&intype=1&plat=&plon=&liststation=CARBON+CANYON+WORKMAN++++CA+%2C+04-1520&slat=lat&slon=lon&mlat=34.085&mlon=-113.894

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and site conditions in California, nor that it is feasible to apply the suggested erosion control measures to construction sites throughout the State and in all phases of construction.

4. **BAT/BCT requirements.** The Addendum states that "none of the requirements in this permit are more stringent than the minimum federal requirements, which include technology-based requirements achieving BAT/BCT and strict compliance with water quality standards." The Clean Water Act requirements for BAT and BCT are as follows:

Section 304 of CWA

- 33 USC 1314: 304(b)(4)(B): "Factors relating to the assessment of best conventional pollutant control technology (including measures and practices) shall include
  - consideration of the reasonableness of the relationship between the costs of attaining a reduction in effluents and the effluent reduction benefits derived, and the comparison of the cost and level of reduction of such pollutants from the discharge from publicly owned treatment works to the cost and level of reduction of such pollutants from a class or category of industrial sources, and shall take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate."
- 33 USC 1314: 304(b)(1)(B): "Factors relating to the assessment of best practical control technology currently available to comply with subsection (b)(1) of section 301 of this Act shall include
  - consideration of the total cost of application of technology in relation to the effluent reduction benefits to be achieved from such application, and shall also take into account the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate;"
- 33 USC 1314: 304(b)(2)(B): "Factors relating to the assessment of best available technology shall take into account
  - the age of equipment and facilities involved, the process employed, the engineering aspects of the application of various types of control techniques, process changes, the cost of achieving such effluent reduction, non-water quality environmental impact (including energy requirements), and such other factors as the Administrator deems appropriate;"

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Flow Science finds no evidence, in either the proposed draft CGP/Fact Sheet or the Addendum, that these factors were considered. Thus, the proposed NELs cannot be regarded as equivalent to BAT/BCT.

The Addendum also states that "the use of NELs to achieve compliance with water quality standards is not a more stringent requirement than the use of BMPs." As detailed in our prior comments and in Item 3, above, SWRCB Staff have provided no evidence to establish that BMPs would be effective in meeting the NELs proposed in the draft CGP for locations throughout the State or for the wide range of storm conditions that can be expected at construction sites. Based on information provided here and in prior comments, including Flow Science (2009), we conclude that while BMPs can and do improve water quality, BMPs may not be sufficient to consistently achieve the proposed NELs under all storm and site conditions.

Thank you for the opportunity to provide these comments. Please contact me if you have any questions.

Sincerely,

Susan C. Paulsen

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Vice President and Senior Scientist