RICHARD R. HORNER, PH.D.
230 NW 55TH STREET
SEATTLE, WASHINGTON 98107
TELEPHONE: (206) 782-7400
FACSIMILE: (206) 781-9584
E-MAIL: rrhorner@msn.com

April 16, 2004

Bruce Fujimoto and Jarma Bennett
Division of Water Quality
State Water Resources Control Board
PO Box 1977
Sacramento, CA 95812-1977

Jennifer Bitting
Central Coast Regional Water Quality Control Board
895 Aerovista Place, Suite 101
San Luis Obispo, CA 93401

Re: Monterey Regional Storm Water Management Program

Dear Mr. Fujimoto, Ms. Bennett, and Ms. Bitting:

At the request of the Natural Resources Defense Council (NRDC) I reviewed the Monterey Regional Storm Water Management Program ("MRSWMP"). I wish to submit the following comments on my evaluation. I first provide a general overview of my opinion. Following a summary of my background and qualifications to perform the review, I then submit more detailed comments and recommendations.

It is my opinion that the MRSWMP falls very far short of the level it must reach to achieve the ultimate goal required of regulated entities by the State Water Resources Control Board's ("SWRCB") Water Quality Order No. 2003-0005-DWQ ("the Order), which is to reduce the discharge of pollutants to the maximum extent practicable ("MEP"); comply with discharge prohibitions; and, in the case of larger entities, lead to attainment of receiving water objectives. At this stage the "program" is not a program at all, but mostly only a set of vague statements of intention to comply at some point with the Order's provisions. These shortcomings are unacceptable under any circumstances, but made more so by the situation and setting of the Monterey region. The area already has a population exceeding 400,000, is growing comparatively rapidly[1] has a relatively

[1] California Institute for County Government projected a 20.7 percent growth for Monterey County as a whole from 2000 to 2010, compared to 14.9 percent during the preceding decade.

strong economic base; and drains to waters that are exceptionally sensitive to continuing and increasing pollutant discharges. The region has proposed a deficient MRSWMP while smaller, less economically favored jurisdictions with less influence on highly valuable ecosystems are already doing more, some for years now. Moreover, the MRSWMP ignores advances in the stormwater management field and available resources that could have helped the regional jurisdictions formulate a real program now, ironically including the Model Urban Runoff Program (MURP), of which one of the involved entities was co-author. I elaborate on these points, and what should be done to address them, following presentation of my credentials.

BACKGROUND AND QUALIFICATIONS

In evaluating the MRSWMP I applied the experience of my 26 years of work in the urban stormwater management field and 11 additional years of engineering practice. During this period I have performed research, taught, and offered consulting services on all aspects of the subject, including investigating the sources of pollutants and other causes of aquatic ecological damage, impacts on organisms in waters receiving urban stormwater drainage, and the full range of methods of avoiding or reducing these impacts.

I have helped to develop stormwater management programs in Washington State, California, and British Columbia and studied such programs around the nation. I was one of four principal participants in a U.S. Environmental Protection Agency-sponsored assessment of 32 state, regional, and local programs spread among 14 states in arid, semi-arid, and humid areas of the West and Southwest, as well as the Midwest, Northeast, and Southeast. This evaluation led to the 1997 publication of "Institutional Aspects of Urban Runoff Management: A Guide for Program Development and Implementation" (subtitled "A Comprehensive Review of the Institutional Framework of Successful Urban Runoff Management Programs").

My background includes over 10 years of work in Southern California, where I have been a federal court-appointed overseer of stormwater program development and implementation at the city and county level and for two Caltrans districts. I was directly involved in the process of developing the 13 volumes of Los Angeles County's Stormwater Program Implementation Manual, working under the terms of a settlement agreement in federal court as the plaintiffs' technical representative. My role was to provide quality-control review of multiple drafts of each volume and contribute to bringing the program and all of its elements to an adequate level. I have also evaluated the stormwater programs in Orange, Riverside, and San Bernardino Counties and been involved in extensive discussions with Orange County leading to upgrading its program. At the recommendation of San Diego Baykeeper, I have been a consultant on stormwater issues to the City of San Diego and the San Diego Unified Port District.

MRSWMP ASSESSMENT

General Comments

1. *The MRSWMP does not constitute a true program.*

My most basic criticism of the MRSWMP is that it is not actually a program, in a form that prescribes a comprehensive set of actions, to completed by designated dates, and measured for success according to objective criteria and means of evaluation. The NRDC in a companion comment letter addresses this point in detail, and I do not reiterate all of the justification for this view offered in that letter. I do cite certain egregious instances and offer several examples of how the regional cooperators should proceed posthaste to develop an actual program. I do wish to qualify that intention by clearly stating that it is not my role, and I have not set out, to outline anything like a complete program; I do want to exemplify a few elements both to bolster my critique and contribute to future progress.

2. *The Monterey area is obliged to comply with the same MEP standard specified for Phase I locations. The MRSWMP gives no indication or confidence that it will do so.*

A bedrock standard on which programs are to be judged under the Order is MEP. Although this standard is flexible and evolving, experience with applying it over the last decade has solidified some tenets that program developers, and agencies and citizens that evaluate the results, can use in gauging compliance.

One clear provision in the Order (page 9) is that, "The MEP standard applies to all regulated MS4s, including those in Phase I and Small MS4s regulated by this General Permit." One of the tenets of applying the MEP standard that has come to the fore is the technical feasibility of prospective best management practices ("BMPs"). The Order states in the same paragraph that to meet the standard a permittee must employ all applicable BMPs, except those that are not technically feasible or whose cost exceeds potential benefit. It is my strong opinion that the stormwater management field has developed to the point that the technical feasibility, benefits, and costs of a whole host of BMPs are well established. Phase I municipalities, as well as some that fit into Phase II, have employed these BMPs; now all Phase II permittees must do so as well, although on the extended schedule allowed for Phase II. The MRSWMP does not generally indicate that it encompasses this concept, and in fact is too underdeveloped to say if the applicable BMPs will ever be introduced. Therefore, it violates the requirement to reduce pollutant discharges to the MEP.

3. *It is appropriate for the Monterey area to comply with the same MEP standard specified for Phase I locations.*

It is entirely appropriate that the Monterey area jurisdictions be required to implement the same BMP slate, as appropriate, as the Phase I entities, in that their pollutant releases are,

in fact, comparable in both cases. On the broad scale the U.S. Environmental Protection Agency's (USEPA) Nationwide Urban Runoff Program (NURP), completed in 1983, measured pollutant discharge characteristics in 28 municipalities representing what have become both Phase I and Phase II jurisdictions. In the end the program could not statistically distinguish pollutant yields based on size (USEPA 1983, Driscoll 1983, Schueler 1987, Horner et al. 1994)[1]. It published data amalgamated from the participating locations and procedures for use in assessing urban runoff pollutant potential nationwide. Attachment A provides these data from the last source. Considered on a more localized scale, it is also appropriate that the Monterey permittees meet the MEP standard in the same fashion as Phase I jurisdictions. An auto repair shop, a restaurant, and a freeway, as examples, have the same polluting potential, if they are equivalent in size and scope, wherever they are located. The accumulation of all of the auto repair shops, restaurants, freeways, etc. serving a population of more than 400,000 in a Phase II area add up to a similar pollution burden as in a Phase I area of the same size, and more than the smaller Phase I communities.

4. *It is feasible for the Monterey area to comply with the same MEP standard specified for Phase I locations.*

There is yet another reason why the Monterey area should be held to the same standard on BMP implementation as the Phase I permittees: in fact, a number of relatively small cities, whose population ordinarily would entitle them to Phase II status, have been assimilated in Phase I permits by virtue of sharing a common separate stormwater drainage system with one or more large municipalities. The five counties of southern California, from Los Angeles and San Bernardino Counties south, represent this situation. Many cities comparable to and smaller than the Monterey County entities are complying. Moreover, many in this set of communities have far fewer financial resources than the Monterey area entities. This experience demonstrates that relatively small, and even relatively poor, municipalities can cope with the requirements of the Clean Water Act.

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[1] U.S. Environmental Protection Agency. 1983. Results of the Nationwide Urban Runoff Program, Vol. 1, Final Report. U.S. Environmental Protection Agency, Water Planning Division, Washington, D.C.

Driscoll, E.D. 1983. Rainfall/Runoff Relationships from the NURP Runoff Database. Presented at the Stormwater and Water Quality Model Users' Group Meeting, September 8-9, 1983, Montreal, Quebec.

Schueler, T.R. 1987. Controlling Urban Runoff: A Practical Manual for Planning and Designing Urban BMPs. Metropolitan Washington Council of Governments, Washington, D.C.

Horner, R.R., J.J. Skupien, E.H. Livingston, and H.E. Shaver. 1994. Fundamentals of Urban Runoff Management: Technical and Institutional Issues. Terrene Institute, Washington, D.C.

Not only does the MRSWMP fail to give an indication that it will meet the MEP standard required of Phase I municipalities, but it further gives no confidence that the Monterey area will rise to the level already demonstrated by well performing small jurisdictions that are just now coming under Phase II. In the Puget Sound area for over 10 years, and now throughout western Washington state, all city and county jurisdictions are required to comply at the same level. As the Washington Department of Ecology's Stormwater Management Manual for Western Washington puts it, "... Ecology intends to require the Phase II municipalities of Western Washington to adopt ordinances, minimum requirements, and BMPs equivalent to those in this updated manual. Essentially, this would be the same permit condition as currently required of Phase I municipalities."

The Puget Sound Water Quality Management Plan initially instituted even requirements regardless of size in the 12 counties draining to Puget Sound. Many jurisdictions, just now coming under the Phase II permit, already have quite advanced programs and could be named as examples. Two that come to mind are Bellevue, a city that recently passed 100,000 population located within the Seattle conurbation but having a separate stormwater system, and Olympia, a city of approximately 35,000 that has been a regional leader in innovation. Both of these cities, as well as numerous others in the region, have long been well developed in all six program areas now required by Phase II. Both have many permanent runoff treatment BMPs installed; well enforced construction site pollution control requirements, demanding use of the most effective available BMPs; and complete public education programs. They prove that smaller entities can meet the MEP standard at least as well as larger ones.

5. *The Monterey region's waters are highly susceptible to contaminated urban runoff discharges and deserve a higher level of protection than it appears the MRSWMP would provide.*

The runoff from the homes, businesses, roads, and other urban installations of more than 400,000 people drains to waters hosting five state-designated Areas of Special Biological Significance ("ASBSs"), a Sea Otter Refuge, an Ecological Reserve, and a National Marine Sanctuary. These places comprise an exceptional aquatic resource for any place, and especially for an urban area. It is an ecological axiom that many of the organisms inhabiting rich communities like these are intolerant of the contaminants and other stresses to which they are subjected by human activities. They will decline further than they have if these conditions are not relieved. The MRSWMP promises no relief. In fact, in the face of approximately 100,000 new residents arriving in this decade, the MRSWMP's weakness portends pollutant discharge increasing substantially through the decade. To avoid this outcome, and its probable ecological consequences, the MRSWMP must be very significantly upgraded to meet the requirement to reduce pollutant discharges to the maximum extent practicable and to comply with the discharge restrictions and water quality standards specified in the General Permit and its attachments.

6. *The Monterey area is both at a critical point and has a good opportunity to make a real difference with a strong MRSWMP.*

California Institute for County Government statistics show the cities in Monterey County to be holding about even in population overall in recent years, as the county overall experiences quite rapid growth. These figures can be interpreted to mean that previously undeveloped locations in unincorporated areas of the county are experiencing most of the growth. With this pattern it may be expected that the considerable growth projected will occur in similar locations, and thus extend the urban footprint substantially. The time to get the drainage from this development under control is now. Options are greater when stormwater management is planned from the beginning than if retrofitted to existing development or fit in with redevelopment. Monterey's land use change appears to be primarily in areas not heretofore developed. Its program should accordingly move quickly to regulate these areas while the opportunity is there to select the best options and install them at lower cost than in already built places. That is not to say at all that retrofitting and redevelopment measures should not be taken as appropriate and needed to meet permit requirements; they should and the MRSWMP should reflect them too.

7. *The supplemental provisions of the Order should apply to the Monterey region, and the MRSWMP should exercise them.*

It is simply incomprehensible why a metropolitan area of more than 400,000 experiencing a growth rate over 20 percent should not be subject to the supplemental provisions. It becomes particularly unbelievable when the area's characteristics are compared to those of some of the municipalities subject to the requirements. The exclusion is not even in the Monterey area's self-interest, in that it threatens the health of its aquatic ecosystems and the industries that depend on them. Whether listed or not, the co-permittees should install in the MRSWMP the design standards and receiving water limitations in the supplemental provisions. These measures are particularly well justified in view of the high quality and sensitivity of the resources involved.

8. *The state of the stormwater management field offers a strong foundation on which to base a true program reaching the level defined in this letter. The MRSWMP has not taken advantage of these resources but must to be adequate.*

The field nationally and within California has developed to the point where guidance and detailed technical specifications are available for adoption or adaptation by permittees. The state recently updated its stormwater management handbooks. The City of Monterey et al. published a Model Urban Runoff Program in 1998, revised in 2002 by the California Coastal Commission. These documents, and others developed elsewhere, offer a wealth of information. It is unacceptable that the Monterey area jurisdictions did not tap this lode to generate a complete program now. The MRSWMP must say specifically what BMPs presented in these resources are to be considered, as appropriate to the situation in question; how they are to be used; when various requirements will take effect; and how BMP implementation and effectiveness are to be evaluated.

Specific Comments

The companion comment letter by NRDC extensively criticizes the MRSWMP's treatment of the six minimum control measures. I agree with those criticisms but do not generally reiterate them in my letter. Instead, I concentrate on several points closest to my own experience to comment upon and offer recommendations for improvement. I again want to state that I do not regard the limited, selective recommendations I can make in a letter in any way to delineate a comprehensive program, but only to exemplify what one should contain.

Minimum Measure No. 4: Construction Site Runoff Control

Construction site runoff control is a well-developed field that could be represented in a comprehensive fashion in the MRSWMP now instead of with the two-year delay programmed in Table 4-10. Moreover, the sketchy coverage of the MRSWMP gives little confidence that comprehensiveness will ultimately be achieved. Any number of existing programs and technical resources could be consulted for program structure templates and guidance to formulate a sound program quickly.

Although examples are plentiful around the nation, the co-permittees do not even have to look beyond California for sources. Los Angeles County issued Implementation Manuals for private and public agency construction projects in February 1998. These manuals encompass: (1) requirements applying to construction projects in different categories, (2) design review, (3) permit approval, (4) inspection and enforcement, (5) legal authority, (6) training and outreach, (7) candidate BMPs, and (8) program evaluation. These elements represent the core of a complete program, and materials already produced by Los Angeles County and others are good models allowing easy adaptation to local circumstances.

For technical guidance California has one of the best and most up-to-date set of stormwater management handbooks in the nation. The Construction Handbook is available for referencing, so that permittees do not have to produce themselves the BMP selection, design, installation, and maintenance specifications. With these resources at hand it is unnecessary and unacceptable to delay coverage for two years.

Minimum Measure No. 5: Post-Construction Runoff Control in New Development and Redevelopment

The MRSWMP treatment of this measure is a shell consisting only of a proposal to draw up an ordinance in another year and implement plan review and site inspection in two years. There is no sign that the co-permittees appreciate the various considerations involved in this subject. If they do not, it is highly unlikely that they will be able to develop a successful program.

Key considerations include the urban stormwater mitigation planning; guidance for the planning process; the applications and selection of various classes of BMPs (site design, source control, runoff quantity control, and runoff treatment); and how to design, build, and maintain these BMPs. This is the most engineering-intensive aspect of the stormwater management program. In addition, it involves such programmatic considerations as design review and approval, inspection and enforcement, legal authority, and program evaluation.

Fortunately, once again this is a well-developed field with copious models and resources. All of the urban counties of southern California have worked through the process and built their post-construction programs around standard urban stormwater management plans ("SUSMPs") for specified development categories. These plans provide minimum requirements, templates, and guidance but still allow flexibility in selecting specific BMPs to be most appropriate for site conditions. For technical guidance, again the recently updated California stormwater handbooks, in this case the Municipal Handbook, supply all necessary detail for implementing BMPs.

The strong foundation available already would allow the Monterey area communities to produce a full program within the two years anticipated just to write an ordinance and set up review and inspection. They must outline such a path now, provide sufficient information to convey confidence in what the result will be, and commit to finishing the job within two years.

Minimum Measure No. 6: Pollution Prevention and Good Housekeeping for Municipal Operations

As elsewhere, the MRSWMP is scant on this measure. The program outlined includes only employee education and training, hazardous materials storage inspection, used motor oil disposal, and bridge and street maintenance. For these few out of the many activities in which a municipality can be engaged, the document is typically vague in what will actually be accomplished.

To be complete and adequate a municipal operations program must include stormwater-related aspects of the management and maintenance of: (1) the storm drain system, (2) the sanitary sewer system (prevention of flow to storm drains), (3) streets and bridges, (4) parks and recreation facilities, (5) airports (if present and operated by a permittee), and (6) corporation yards. Each location has its characteristic activities, potential pollutants, and appropriate BMPs to avoid or minimize pollutant releases. Each must be analyzed and be specified in terms of the BMPs and how they should be used. Common potential pollutant sources for these locations are vehicles (fueling, maintaining, cleaning, and parking), materials used in the work, and wastes produced. BMPs typically isolate pollutant sources from contact with rainfall or runoff. As with other elements, programmatic considerations of training, inspection and enforcement, and program evaluation must also be developed.

As also seen with Minimum Measures 4 and 5, others have already developed complete municipal operations stormwater programs. Los Angeles County's first Implementation Manual for county facilities came out in December 1998. The Municipal Handbook in the California stormwater handbooks set contains specifications for a number of BMPs that serve potential problem areas in municipal facilities. With these resources there is no reason why the Monterey area cooperators cannot have a complete program in operation in a year.

I would be pleased to discuss my comments and elaborate on the examples I have given. I invite you to contact me if you wish.

Sincerely,

Richard R. Horner

Attachment

ATTACHMENT

Fundamentals of Urban Runoff Management:

Technical and Institutional Issues

By

Richard R. Horner

Joseph J. Skupien

and

Eric H. Livingston and H. Earl Shaver

Watershed Management Institute

Produced by

Terrene Institute

Washington, DC

in cooperation with

U.S. Environmental Protection Agency

August 1994

almost always bound estimates made independently by Hydrologic Simulation Program-Fortran (HSPF) computer modeling (see Method 5).

▮ ***Method 2—Simple Empirical Model.*** The best example of this method is Schueler's Simple Model (1987):

$$L = 0.23 \cdot P \cdot Pj \cdot Rv \cdot C \cdot A \quad [2]$$

where: L = Loading (lbs);
0.23 = Conversion factor;
P = Precipitation depth (inch) over the desired time interval;
Pj = Factor that corrects for storms that produce no runoff;
Rv = Runoff coefficient;
C = Pollutant EMC;
A = Area of the contributing catchment (acres).

For annual loading estimation, P is the area's average annual precipitation. Schueler recommends using 0.9 for Pj for annual and seasonal loading calculations. He uses NURP and Washington, D.C., area data to derive a regression equation ($r^2 = 0.71$) for Rv:

$$Rv = 0.05 + 0.009 \cdot I \quad [3]$$

where: I = Percentage of the catchment area that is impervious.

Relative to C, Schueler notes that NURP data analysis finds no statistically significant differences in EMCs among sites and no correlations between EMCs and storm volume or intensity. Therefore, for rough estimates, these national NURP average EMCs can be used:

Total phosphorus	0.46	mg/L
Total soluble phosphorus	0.16	mg/L
Total nitrogen	3.31	mg/L
Total Kjeldahl nitrogen	2.35	mg/L
Nitrate-nitrogen	0.96	mg/L
Chemical oxygen demand	90.8	mg/L
Biochemical oxygen demand	11.9	mg/L
Zinc	0.176	mg/L
Lead	0.180	mg/L
Copper	0.047	mg/L

Of course, EMCs from local measurements should yield superior estimates. Data from other sources (like Table 2.2) can supplement this listing. A recent comparison of several West Coast watersheds found that Simple Model loading estimates usually agreed, within a factor of two, with estimates made by much more involved and expensive modeling procedures. Either approach will produce the same management conclusions (Chandler, 1993).

▮ ***Method 3—Published Regression Equations.*** The regression method is best represented by an extensive compilation made by the USGS using its own and NURP data (Driver and Tasker, 1990). This analysis produced multiple regression equations for three national regions for runoff volume and pollutant loadings and concentrations as functions of several independent variables. Independent variables include various meteorological, land use, and other characteristics. Standard errors for the equations were provided as a measure of uncertainty. For a detailed reference, refer to Driver and Tasker's large and complex tables.

▮ ***Method 4—Site-Specific or Modeled Flow Data.*** To use this method conveniently, arrange the calculations on computerized spreadsheets. Depending on local data, calculations can be performed in several ways. The best situation is to have continuously recorded local flow data and a series of representative local EMC readings. Assuming a log-normal distribution of EMCs, calculate the mean of the EMCs (a) using a statistical equation appropriate for the distribution (Marsalek, 1990). First, take the natural logs (ln) of the EMC values and compute the mean (μ) and variance (s^2) of the natural logs. Then

$$a = e^{(\mu + s^2/2)} \quad [4]$$

where: e = Base of natural logarithms.

Calculate the confidence interval (C.I.) of the mean EMC estimate using the following equation:

$$C.I. = a \cdot e^{\pm \theta \cdot [s^2/n + 2 \cdot (s^2)^3/(n-1)]^{0.5}} \quad [5]$$

where: + Is used for upper confidence limit;
− Is used for lower confidence limit;
θ = 1.96 for 95% confidence interval and 1.69 for 90%;
n = Number of EMC values used to find μ.

Consult a flow record to obtain the total flow volume for the loading estimate period. Multiply that volume by the mean EMC to get the loading; then multiply it by the upper and lower confidence limits to get the estimate bounds.