Section 4

Best Management Practices and Measurable Goals

Description of the Six Minimum Measures

As required by the Final Phase II NPDES General Permit No. CAS000004 adopted by the SWRCB on April 30, 2003, Storm Water Management Plans (SWMPs) must address the six "Minimum Control Measures" that are described in general in Section 2, and described in more detail below.

The MRSWMP will implement and enforce a program designed to reduce the discharge of pollutants from the municipal separate storm sewer systems of the Participating Entities to the "maximum extent practicable" (MEP) to protect water quality. According to the General Permit, the MEP standard is an ever-evolving, flexible, and advancing concept, which considers technical and economic feasibility. As knowledge about controlling urban runoff continues to evolve, so does that which constitutes MEP. Reducing the discharge of storm water pollutants to MEP in order to protect beneficial uses requires review and improvement, which includes seeking new opportunities. To do this, the Permittee must conduct and document evaluation and assessment of each relevant element of its program and revise activities, control measures, BMPs, and measurable goals, as necessary to meet MEP.

For each of these six Minimum Control Measures there are BMPs and associated Measurable Goals that will be implemented during the course of the permit term. It is through the implementation and evaluation of these BMPs and Measurable Goals that the Participating Entities will ensure that the objectives of the Phase II NPDES Program will be met within the permit boundary of the MRSWMP.

SWMPs must describe BMPs, and associated measurable goals, that will fulfill the requirements of the following six Minimum Control Measures. The measurable goals must include, as appropriate, the months and years for scheduled actions, including interim milestones and frequency of the action. A more detailed discussion of the Minimum Control Measures, and why they are necessary, is provided below. The specific requirements, taken directly from the Final Phase II NPDES General Permit, are shown below under the headings "What is Required".

1. Public Education and Outreach

What is Required?

To satisfy this minimum control measure, the Permittee must:

1. Implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the potential impacts of storm water discharges on water bodies and the steps that the public can take to reduce pollutants in storm water runoff.
2. Determine the appropriate BMPs and measurable goals for this minimum control measure.

Why is it Necessary?

According to the Fact Sheet published by U.S. EPA regarding the *Public Education and Outreach* Minimum Measure, an informed and knowledgeable community is crucial to the success of a storm water management program since it helps to ensure the following:

1. Greater support for the program as the public gains a greater understanding of the reasons why it is necessary and important. Public support is particularly beneficial when operators of small MS4s attempt to institute new funding initiatives for the program or seek volunteers to help implement the program.

2. Greater compliance with the program as the public becomes aware of the personal responsibilities expected of them and others in the community, including the individual actions they can take to protect or improve the quality of area waters.

2. Public Participation/Involvement

What is Required?

To satisfy this minimum control measure, the Permittee must:

1. At a minimum comply with state and local public notice requirements when implementing a public involvement/participation program.
2. Determine the appropriate best management practices (BMPs) and measurable goals for this minimum control measure.

Why is it Necessary?

According to the Fact Sheet published by U.S. EPA regarding the Public Participation/Involvement Minimum Measure, the public can provide valuable input and assistance to a regulated small MS4's municipal storm water management program and; therefore, the Fact Sheet suggests that the public be given opportunities to play an active role in both the development and implementation of the program. An active and involved community is crucial to the success of a storm water management program because it allows for:

1. Broader public support since citizens who participate in the development and decision making process are partially responsible for the program and, therefore, may be less likely to raise legal challenges to the program and more likely to take an active role in its implementation.

2. Shorter implementation schedules due to fewer obstacles in the form of public and legal challenges and increased numbers of citizen volunteers.

3. A broader base of expertise and economic benefits since the community can be a valuable, and free, intellectual resource.

4. A conduit to other programs as citizens involved in the storm water program development process provide important cross-connections and relationships with other community and government programs. This benefit is particularly valuable when trying to implement a storm water program on a watershed basis, as encouraged by EPA.

3. Illicit Discharge Detection and Elimination

What is Required?

To satisfy this minimum control measure, the Permittee must:

1. Develop, implement, and enforce a program to detect and eliminate illicit discharges (as defined at 40 CFR §122.26(b)(2)) into the regulated small MS4.
2. Develop, if not already completed, a storm sewer system map, showing the location of all outfalls and the names and locations of all waters of the U.S. that receive discharges from those outfalls.
3. To the extent allowable under State or local law, effectively prohibit, through ordinance, or other regulatory mechanism, non-storm water discharges into the MS4 and implement appropriate enforcement procedures and actions. Develop and implement a plan to detect and address non-storm water discharges, including illegal dumping, to the system that are not authorized by a separate NPDES permit. Inform public employees, businesses, and the

general public of the hazards that are generally associated with illegal discharges and improper disposal of waste.

4. Address the following categories of non-storm water discharges or flows only where they are identified as significant contributors of pollutants to the small MS4.
   a. waterline flushing
   b. landscape irrigation
   c. diverted stream flows
   d. rising groundwaters
   e. uncontaminated groundwater infiltration to separate storm sewers
   f. uncontaminated pumped groundwater
   g. discharges from potable water sources
   h. foundation drains
   i. air-conditioning condensation
   j. irrigation water
   k. springs
   l. water from crawl space pumps
   m. footing drains
   n. lawn watering
   o. individual residential car washing
   p. flows from riparian habitats and wetlands
   q. dechlorinated swimming pool discharges
5. Determine the appropriate BMPs and Measurable Goals for this minimum control measure.

Why is it Necessary?

According to the Fact Sheet published by U.S. EPA regarding the *Illicit Discharge Detection and Elimination* Minimum Measure, discharges from MS4s often include wastes and wastewater from non-storm water sources. EPA reports that a study conducted in 1987 in Sacramento, California, found that almost one-half of the water discharged from a local MS4 was not directly attributable to precipitation runoff. A significant portion of these dry weather flows were from illicit and/or inappropriate discharges and connections to the MS4. Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, or paint or used oil dumped directly into a drain). The result is untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving water bodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health.

4. Construction Site Storm Water Runoff Control

What is Required?

To satisfy this minimum control measure, the Permittee must:

1. Develop, implement, and enforce a program to reduce pollutants in any storm water runoff to the Small MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of storm water discharges from construction activity disturbing less than one acre must be included in your program if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more.

2. Include in the program development and implementation of, at a minimum:
   a. An ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions, or other effective mechanisms, to ensure compliance, to the extent allowable under State, or local law;
   b. Requirements for construction site operators to implement appropriate erosion and sediment control BMPs;
   c. Requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality;
   d. Procedures for site plan review which incorporate consideration of potential water quality impacts;
   e. Procedures for receipt and consideration of information submitted by the public; and
   f. Procedures for site inspection and enforcement of control measures.
3. Determine the appropriate best management practices (BMPs) and measurable goals for this minimum control measure.

Why is it Necessary?

According to the Fact Sheet published by U.S. EPA regarding the Construction Site Runoff Control Minimum Measure, polluted storm water runoff from construction sites often flows to MS4s and ultimately is discharged into local rivers and streams. Of the pollutants listed in the table below, sediment is usually the main pollutant of concern. According to EPA, sediment runoff rates from construction sites are typically 10 to 20 times greater than those of agricultural lands, and 1,000 to 2,000 times greater than those of forestlands. During a short period of time, construction sites can contribute more sediment to streams than can be deposited naturally during several decades. Siltation, and other pollutants from construction sites, have the potential to cause physical, chemical, and biological harm to our nation's waters. For example, excess sediment can fill rivers and lakes, requiring dredging and destroying aquatic habitats.

Pollutants commonly associated with construction sites include:

Sediment
Solid and sanitary wastes
Phosphorous (fertilizer)
Nitrogen (fertilizer)
Pesticides
Oil and grease
Concrete truck washout
Paint, plaster washout

5. Post-Construction Storm Water Management in New Development and Redevelopment

What is Required?

To satisfy this minimum control measure, the Permittee must:

1. Develop, implement, and enforce a program to address storm water runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the Small MS4 by ensuring that controls are in place that would prevent or minimize water quality impacts;

2. Develop and implement strategies, which include a combination of structural and/or non-structural BMPs appropriate for your community;
3. Use an ordinance or other regulatory mechanism to address post-construction runoff from new development and redevelopment projects to the extent allowable under State or local law. For those Small MS4s described in Supplemental Provision E, the requirements must at least include the design standards contained in Attachment 4 of the General Permit or a functionally equivalent program that is acceptable to the appropriate RWQCB;
4. Ensure adequate long-term operation and maintenance of BMPs.
5. Determine the appropriate BMPs and measurable goals for this minimum control measure.
6. Note: The General Permit does not require redesign of K-12 school or community college facilities that have been submitted to the Department of General Services, Division of the State Architect before adoption of the permit, and which receive final approval from the State Allocation Board or the Public Works Board, as appropriate, on or before December 31, 2004

Why is it Necessary?
According to the Fact Sheet published by U.S. EPA regarding the *Post-Construction Runoff Control* Minimum Measure, post-construction storm water management in areas undergoing new development or redevelopment is necessary because runoff from these areas has the potential to significantly effect receiving water bodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is a cost-effective approach to storm water quality management.

There are generally two forms of substantial impacts of post-construction runoff. The first is caused by an increase in the type and quantity of pollutants in storm water runoff. As runoff flows over areas altered by development, it can pick up potentially harmful sediment and chemicals such as oil and grease, pesticides, heavy metals, and nutrients (e.g., nitrogen and phosphorus). These pollutants can become suspended in runoff and carried to receiving waters, such as lakes, ponds, and streams. Once deposited, these pollutants can enter the food chain through small aquatic life, potentially entering the tissues of fish and humans. The second potential impact from post-construction runoff occurs by increasing the quantity of water delivered to the water body during storms. Increased impervious surfaces can interrupt the natural cycle of gradual percolation of water through vegetation and soil. Instead, water is collected from surfaces such as asphalt and concrete and routed to drainage systems where large volumes of runoff quickly flow to the nearest receiving water. The potential effects of this process include stream bank scouring and downstream flooding, which can result in loss of aquatic life and damage to property.

6. Pollution Prevention/Good Housekeeping for Municipal Operations

What is Required?
To satisfy this minimum control measure, the Permittee must:
1. Develop and implement an operation and maintenance program that includes a training component and has the ultimate goal of preventing or reducing pollutant runoff from municipal operations;
2. Using training materials that are available from U.S. EPA, the State, or other organizations, the program must include employee training to prevent and reduce storm water pollution from activities such as park and open space maintenance, fleet building maintenance, new construction and land disturbances, and storm water system maintenance;
3. Determine the appropriate best management practices (BMPs) and measurable goals for this

minimum control measure.

Why is it Necessary?
According to the Fact Sheet published by U.S. EPA regarding the *Pollution Prevention/Good Housekeeping* Minimum Measure, the pollution prevention/good housekeeping for municipal operations is a key element of the small MS4 storm water management program. This measure requires the small MS4 operator to examine and subsequently alter their own actions to help reduce the amount and type of pollution that can: (1) collect on streets, parking lots, open spaces, and storage and vehicle maintenance areas and discharge into local waterways, and (2) result from actions such as environmentally damaging land development and flood management practices or poor maintenance of storm sewer systems. While this measure is meant primarily to improve or protect receiving water quality by altering municipal or facility operations, it also can result in a cost savings for the small MS4 operator, since proper and timely maintenance of storm sewer systems can help avoid repair costs from damage caused by age and neglect.

Requirements for BMPs and Measurable Goals

The following are excerpts from the SWRCB's Fact Sheet describing the content and requirements of the General Order:

> " SWMPs must describe how pollutants in storm water runoff will be controlled and describe BMPs that address the six Minimum Control Measures. Each BMP must have accompanying measurable goals that will be achieved during the permit term, or within five years of designation if designated subsequent to permit adoption, as a means of determining program compliance and accomplishments and as an indicator of potential program effectiveness. The measurable goals should be definable tasks such as number of outreach presentations to make, number of radio spots to purchase, or percentage of pollutant loading to reduce (other examples of measurable goals can be found on U.S. EPA's web-site at http://cfpub.epa.gov/npdes/stormwater/measurablegoals/index.cfm). This approach provides the flexibility to target an MS4's problem areas while working within the existing organization."
>
> "It is not anticipated that the SWMP be fully implemented upon submittal with the NOI. It is the intent of this General Permit that SWMPs submitted with the NOI contain sufficient information such that RWQCB staff and interested parties understand the BMPs that will be implemented or will be developed and implemented over the course of the General Permit term or, for Small MS4s designated subsequent to permit adoption, over a five–year period from designation. It is also expected that SWMPs will protect water quality, contain measurable goals and schedules, and assign responsible parties for each BMP. It is anticipated that the SWMP initially submitted may be revised or modified based on review of RWQCB staff or on comments provided by interested parties in accordance with Provisions G and H.19 of the General Permit."
>
> "For example, it may be proposed that a storm water logo be developed (or an existing one modified) by the end of the first year; an ordinance prohibiting non-storm water discharges be adopted by the end of the second year; a survey of non-storm water discharges throughout the city be completed by the end of the second year; a brochure

targeting the restaurant community regarding proper practices to eliminate non-storm water discharges be developed or obtained by the end of the fourth year; and the brochure be distributed to 25 percent of the restaurants within the city during health department inspections by the end of the fifth year. (This example mentions only one activity each year. In fact, numerous activities will occur throughout the permit term that ensure that a SWMP addressing all six Minimum Control Measures is implemented by the end of the permit term, or within five years of designation for Small MS4s designated subsequent to adoption of the Permit.)"

"Many of the activities that a municipality already does can be recognized as a benefit to storm water or can be modified to add a storm water quality twist. A critical element of SWMP development is an assessment of activities already being conducted. For example, many communities already have a household hazardous waste program, which can be assumed to reduce illicit discharges to the MS4."

"The MS4 has the flexibility to target specific segments of its residential or employee population in ways that are most appropriate for that particular segment."

"In accordance with 40 CFR section 122.34(d)(2), SWRCB provides U.S. EPA's menu of BMPs to consider when developing a SWMP. This menu is available on U.S. EPA's internet site at http://cfpub1.epa.gov/npdes/stormwater/swphase2.cfm?program_id=6. The menu provides examples of BMPs and associated measurable goals; however, other BMPs and measurable goals may be used."

Selection of BMPs and Measurable Goals

The entities that are participants in the MRSWMP worked as a group to carefully review EPA's extensive list of potential BMPs and Measurable Goals (referred to above) for all six of the Minimum Control Measures. This group also referred to the Model Urban Runoff Program (MURP) which is a comprehensive how-to guide developed for local governments to address the issues of polluted runoff in the urban environment. The MURP provides options to help small municipalities develop their own urban runoff program for the Phase II process. The guide incorporates the essential elements of a strong urban runoff program with examples of ordinances, best management practices, illicit connections, new development and redevelopment, commercial and industrial facilities, reporting forms and an education and outreach program. The MURP was prepared by the City of Monterey, City of Santa Cruz, MBNMS, California Coastal Commission, Association of Monterey Bay Area Governments (AMBAG), Woodward-Clyde Consultants, and the Central Coast Regional Water Quality Control Board with money from a State 319 (h) grant. Many other local municipal agencies acted as peer reviewers throughout the development of the MURP through semi-annual meetings of the AMBAG Stormwater Task Force, now known as the Monterey Bay Stormwater Information Exchange.

This group then identified those BMPs and Measurable Goals that they felt would be most useful and effective in reducing the discharge of pollutants from storm sewer systems within the particular geographic area covered by the MRSWMP. The process of reviewing and selecting BMPs and Measurable Goals was carried out in a series of public meetings. Public input was received during those meetings, and was taken into consideration as part of the selection process.

The following is a description of the process used by the group to identify these BMPs and Measurable Goals:

1. Three subcommittees of two or more group members were formed. Each subcommittee was assigned to work on two of the Six Minimum Measures, and was given the task of recommending to the full group those BMPs and Measurable Goals that should be selected for those Minimum Measures.
2. Each subcommittee member was provided complete copies of these documents for their use in carrying out their assignments: EPA's "Storm Water Phase II Final Rule Fact Sheets", EPA's "Measurable Goals Guidance for Phase II Small MS4s", and EPA's "National Menu of Best Management Practices for Storm Water Phase II".
3. These documents provided far more information than was applicable to the area covered by the MRSWMP, so the subcommittees limited their considerations to those pertinent to the geographical region covered by the MRSWMP:

   Coastal California Communities
   Temperate Climate
   Residential, Commercial, light Industrial
   High Level of Tourist Activity
   High Dependence on Automobiles
   Existence of the Monterey Bay National Marine Sanctuary

4. Some of EPA's suggested measurable parameters were clearly not relevant, such as "Road Salt Application and Storage". Others did not appear to apply to the MRSWMP's geographic region, or were ambiguous in how they could be measured.
5. Subcommittee members then used their professional judgment and past experience to screen the number of BMPs and Measurable Goals down to a manageable level. This resulted in a first draft that consisted of 70 BMP's and 132 Measurable Goals.
6. At a subsequent meeting of the group, these BMPs and Measurable Goals were further screened to produce a final list consisting of 27 BMPs and 42 Measurable Goals. This final list was included as Table 4-1 in the first draft of the Monterey Regional Storm Water Management Program dated March 3, 2003.
7. After the SWRCB posted the first draft version of the MRSWMP on its website for public review, comments were submitted by several organizations. The Management Committee participated in a stakeholder meeting on June 8, 2004 with RWQCB Staff and commentors to gain a greater understanding of the concerns expressed in the comment letters. After this meeting, with coordination and assistance from the RWQCB, the Management Committee prepared revisions to MRSWMP, and revised the list of BMPs and Measurable Goals, in response to those comments. The revised BMP and Measurable Goals list was resubmitted to the RWQCB and posted for public comment on December 8, 2004. On March 15, 2005, a conference telephone call was conducted with RWQCB staff, commentors and some of the Participating Entities. As a result of this call, revisions were again made to the MRSWMP and it was resubmitted to RWQCB staff on April 8, 2005. The RWQCB held a public hearing on the MRSWMP on May 12, 2005. RWQCB Board members asked that further revisions be made to the MRSWMP, and that the revised version be submitted by October 31, 2005, with the intent of having the matter before them again at their February 2006 meeting.

The Participating Entities put considerable effort into further revising the MRSWMP to respond

to the issues raised by the RWQCB Board members, and believe that the BMPs contained in Table 4-1 constitute a comprehensive program that exceeds the requirements and objectives of the General Permit.

In identifying those BMPs and Measurable Goals they felt would be most useful and effective, the group took into account general information on storm water pollutants of concern compiled by Federal and State agencies, and the available data on specific storm water quality and pollutants of concern in the geographic area covered by the MRSWMP. This information is summarized below.

General Information on Storm Water Pollutants of Concern

The following information is generic, and does not necessarily pertain to the geographic area covered by the MRSWMP. Pollutants impact receiving waters when they are present at concentrations, frequencies, and durations that affect beneficial uses. Receiving water quality in the geographic area covered by the MRSWMP is generally considered excellent, especially marine and bay water, with relatively few impairments compared with other regions of the State.

Background

EPA widely regards urban runoff carrying non-point source pollution as the nation's leading threat to water quality. Pollutants may include toxic metals, hydrocarbons, nutrients, suspended solids, and many other chemicals that are detrimental to aquatic life. Urbanization and increases in population directly affect the type of pollution that enters storm drains. Impermeable surfaces such as roads, prevent storm water from soaking into the ground. These surfaces can become conduits for pollutants. Some examples include oil and grease that wash off roads, fertilizers and pesticides from lawns, and detergents from car washing and commercial activities.

Sediment

Sediment is a common component of stormwaters, and can be a pollutant. Sediment can be detrimental to aquatic life (primary producers, benthic invertebrates, and fish) by interfering with photosynthesis, respiration, growth, reproduction, and oxygen exchange in water bodies. Sediment can transport other pollutants that are attached to it including nutrients, trace metals, and hydrocarbons. Sediment is the primary component of total suspended solids (TSS), a common water quality analytical parameter.

Nutrients

Nutrients including nitrogen and phosphorous are the major plant nutrients used for fertilizing landscapes, and are often found in stormwater. These nutrients can result in excessive or accelerated growth of vegetation, such as algae, resulting in impaired use of water in lakes and other sources of water supply. For example, nutrients have led to a loss of water clarity in Lake Tahoe. In addition, un-ionized ammonia (one of the nitrogen forms) can be toxic to fish.

Bacteria and Viruses

Bacteria and viruses are common constituents in stormwater. For separate storm drain systems, sources of these contaminants may include animal excrement, decomposing plant matter, and sanitary sewer overflow. Sources can be natural (e.g., birds, other wildlife), as well as man-derived (e.g., pet waste). High levels of indicator bacteria in stormwater have led to the closure of beaches, lakes, and rivers to contact recreation such as swimming. However, current

indicator-based standards are based on health studies where people were exposed to human fecal wastes. The relevance of these indicator standards where human fecal wastes have not contaminated storm water is questionable.

Oil and Grease

Storm water often carries oil and grease that contain a wide array of hydrocarbon compounds, some of which are toxic to aquatic organisms at low concentrations. Sources of oil and grease include leakage, spills, cleaning and sloughing associated with vehicle and equipment engines and suspensions, leaking and breaks in hydraulic systems, restaurants, and waste oil disposal.

Metals

Metals including lead, zinc, cadmium, copper, chromium, and nickel are commonly found in stormwater. Many of the artificial surfaces of the urban environment (e.g., galvanized metal, paint, automobiles, or preserved wood) contain metals, which enter stormwater as the surfaces corrode, flake, dissolve, decay, or leach. Over half the trace metal load carried in stormwater is associated with sediments. Metals are of concern because they can be toxic to aquatic organisms, can bioaccumulate (accumulate to toxic levels in aquatic animals such as fish), and have the potential to contaminate drinking water supplies.

Organics

Organics may be found in stormwater in low concentrations. Often synthetic organic compounds (adhesives, cleaners, sealants, solvents, etc.) are widely applied and may be improperly stored and disposed. In addition, deliberate dumping of these chemicals into storm drains and inlets causes environmental harm to waterways.

Pesticides

Pesticides (including herbicides, fungicides, rodenticides, and insecticides) have been repeatedly detected in stormwater at toxic levels. As pesticide use has increased, so too have concerns about adverse effects of pesticides on the environment and human health. Accumulation of these compounds in simple aquatic organisms, such as plankton, provides an avenue for biomagnification through the food web, potentially resulting in elevated levels of toxins in organisms that feed on them, such as fish and birds.

Gross Pollutants

Gross Pollutants (trash, debris, and floatables) are often carried by storm water and may include heavy metals, pesticides, and bacteria. Typically resulting from an urban environment, industrial sites and construction sites, trash and floatables may create an aesthetic "eye sore" in waterways. Gross pollutants also include plant debris (such as leaves and lawn-clippings from landscape maintenance), animal excrement, street litter, and other organic matter. Such substances may harbor bacteria, viruses, vectors, and depress the dissolved oxygen levels in streams, lakes, and estuaries sometimes causing fish kills.

Specific Storm Water Quality and Pollutants of Concern

The following information is adapted from the "First Flush Report in the Cities of Capitola, Monterey, Pacific Grove, and Santa Cruz", November 7, 2002, prepared by the Monterey Bay Sanctuary Citizen Watershed Monitoring Network. This information pertains to portions of the geographic area covered by the MRSWMP, specifically Monterey and Pacific Grove.

First Flush occurs when sheeting rain flushes roadways and impermeable surfaces and carries accumulated contaminants and debris into the ocean. More than an inch of rain pelted the Central Coast with water and winds that brought down trees. Capitola and Santa Cruz volunteers mobilized at 2:30 AM while Monterey and Pacific Grove volunteers eagerly waited until 5:30 PM for the storm to arrive on the south end of the bay.

The Monterey Bay Sanctuary Citizen Watershed Monitoring Network and the Coastal Watershed Council in collaboration with the Cities of Capitola, Monterey, Pacific Grove, and Santa Cruz coordinated First Flush 2002. When the storm arrived, 19 storm drain outfalls were monitored. All sites were monitored two to four times at approximately 30 minute intervals to determine any change in contaminants over time.

All of the sites were monitored for the parameters listed below.

- conductivity
- water temperature
- pH
- nitrate as N
- orthophosphate as P
- total coliform
- toxicity
- zinc
- copper
- lead
- oil and grease
- total suspended solids (TSS)
- total dissolved solids (TDS)
- Escherichia coli (*E. coli)* or fecal coliform

November 2002 was the third annual First Flush monitoring event in Monterey and Pacific Grove and the second annual event in Capitola and Santa Cruz. With three years of data, time series results and the additional toxicity analysis, some trends are beginning to appear. There are distinct trends between sites and between years. For example, copper, lead and zinc concentrations have increased every year at most of the sites. Average nitrate concentrations have been consistently low for all three years.

Toxicity analysis of three different marine organisms indicated that the water from the First Flush was toxic to the test organisms at the majority of sites. Preliminary findings identify copper and zinc concentrations as possibly contributing to the toxicity.

The data that was collected indicates that there are sites that stand out from the rest with higher pollutant concentrations. Each city had at least one site that warrants more investigation and upstream monitoring. The Network Coordinator will work closely with the Coastal Watershed Council and participating cities to evaluate what future monitoring can be done to track sources and reduce the amount of pollutants entering the Bay.

It is important to identify pollutants in stormwater that flows into the Monterey Bay National Marine Sanctuary. In addition, a dry weather monitoring program, called Urban Watch, has been conducted by citizen volunteers for the past five years in Monterey and four years in Pacific Grove. The Natural Resources Defense Council referenced this program in the 1999 report titled "Stormwater Strategies: Community Responses to Runoff Pollution" as an "effective, economically advantageous" program "that can provide collateral benefits to the community". Volunteers monitor storm drain outfalls twice a month during the dry weather season, typically between June and November. The pollution detection kit that is used for Urban Watch was developed by a National Pollutant Discharge Elimination System (NPDES) Phase 1 City using indicators to identify pollutants typically found from illegal storm drain connections and

discharges. Because of this program, it is generally known which outfalls discharge urban runoff that contain indicators of certain contaminants, and education efforts are underway to reduce those pollutants.

This First Flush event is the finale to the Urban Watch season. The same outfalls are monitored for both programs. First Flush marks the change from the dry weather Urban Watch season to the beginning of the rainy season. The data collected is vital information, because the heavy rains flush contaminants that have collected on impermeable surfaces during the long dry season. The pollutants are washed into storm drains and subsequently out into the Bay. The samples collected during the First Flush represent the worst-case scenario of the amount of pollutants flowing into the Sanctuary when it rains.

It is important to state that the General Municipal Storm Water Permit does not set numeric effluent limits. The Permit states "…the inclusion of BMPs (Best Management Practices) in lieu of numeric effluent limitations is appropriate in storm water permits."[1] The information presented here is not numeric, but the narrative represents information that has been collected in order to get a sense of the pollutants that we should be most concerned about, in an effort to use available money in the most effective manner. The numeric data will be included in future Annual Reports for comparison purposes and to assist with future refinement of our Storm Water Management Plan and BMPs.

Field Observations. While on site, volunteers documented observations of odors, bubbles, scum, trash, sewage odor, and oil sheen. Bubbles were observed at 13 of the 19 stations indicating the possible presence of detergents. Seven sites observed trash, and no site recorded a sewage odor or oil sheen.

Nutrients. Nitrogen and phosphorous species are typically the most common nutrients found in storm water. Possible sources of nitrate include runoff from fertilized lawns, agricultural and pasture lands, construction sites and septic leachate. Nutrients have not been found to be a major problem at any of the regular monitoring sites.

Orthophosphate is a form of phosphorus commonly found bound to soil particles, in sewage, fertilizers, and in detergents that contain phosphates. Orthophosphate is rapidly taken up by algae and other larger marine plants. With excessive amounts present, large algal blooms can occur. Orthophosphate has been found at all regular monitoring sites and is a pollutant that will be targeted through our Public Education Program.

Bacteria. Total coliform, fecal coliform and *Escherichia coli* (*E. coli)* are types of bacteria. They are of concern because they are indicators of the potential presence of pathogens that can have adverse human health effects. *E. coli* is a member of the fecal coliform group, which is a part of the total coliform group. The presence of these types of bacteria indicate there could be pathogens present. Indicator bacteria have been present at high levels in the majority of samples tested. The difficulty with this pollutant is that there is some "background" level of bacteria that will always be present in the natural environment. The storm drain systems including natural

---

Note: "Permittees must implement Best Management Practices (BMPs) that reduce pollutants in storm water runoff to the technology-based standard of Maximum Extent Practicable (MEP) to protect water quality. In accordance with 40 CFR section 122.44(k)(2), the inclusion of BMPs in lieu of numeric effluent limitations is appropriate in storm water permits." General Municipal Storm Water Permit, "Effluent Limitations", pg. 6.

creeks in our area are often homes to wildlife such as deer, raccoons and birds that contribute to bacteria levels. The "unnatural" sources of this pollutant will be addressed through several illicit discharge program BMPs targeted at issues related to sanitary sewer, septic system, and illegal dumping.

Metals. The effects of high concentrations of metals can include reduced reproduction, developmental deformities, and mortality. In this monitoring event, samples were analyzed for zinc (Zn), copper (Cu), and lead (Pb). Metals are a concern at all regularly tested sites, although values are often erratic. The Municipal Good Housekeeping BMP for Street Sweeping targets metals concentrations.

Oil and Grease. Although oil and grease was present in some samples, they were at very low levels across the board. In the visual observations no oil sheen was reported at any of the test sites.

Total Suspended Solids(TSS). Total suspended solids (TSS) are important to measure, because the suspended solids can carry other pollutants. The suspended solids provide a media or polar charge to attract contaminants. High amounts of sediment are harmful to fish populations, because they destroy habitat, can suffocate eggs, and/or limit the food supply. Sediment may also clog gills or impair an organism's vision when feeding. No pattern was found in TSS results, and only one high result at one site has been observed in three years of testing.

Total Dissolved Solids (TDS). Total dissolved solids are a measurement of the amount of dissolved solids in a sample of water. These solids are usually ions of salts such as sodium, chloride, calcium, carbonate, potassium, or magnesium. These ions are conductors of electricity, and therefore the results can be compared to conductivity measurements taken with a pocket meter. Only one sample has shown high TDS at one site in three years of testing.

Toxicity. The Basin Plan General Objectives, Toxicity section states that, "All waters shall be maintained free of toxic substances in concentrations which are toxic to, or which produce detrimental physiological responses in, human, plant, animal, or aquatic life." Toxicity tests were conducted on three different types of marine organisms, with varied results. It is believed that this toxicity is directly related to high metals concentrations. Further work is anticipated to confirm this assumption during future monitoring events at these sites.

Conclusions. After three years of analyzing data and observing the thirteen sites used in this event, there are several pollutants of concern that we believe justify being targeted more heavily than other constituents, with appropriate BMPs. Bacteria and metals remain our pollutants of greatest concern, with orthophosphates also topping the list. The results of the laboratory analysis indicated that concentrations of most of the parameters were higher this year than in previous years. More rain this year than other years is possibly responsible for higher metals, oil and grease, TSS, and bacteria, and lower nitrate concentrations because of dilution. Although the data presented here is in narrative form, existing numerical data will be used as a baseline for comparison in future Annual Reports and to help focus our efforts. Modifications to the Storm Water Management Plan and to our BMP list may be deemed appropriate based on that data.

BMPs which address bacteria include those pertaining to illicit discharge and illegal connection detection and elimination, as listed under Minimum Control Measure No. 3 in Table 4-1, and those pertaining to catch basin cleaning, as listed under Minimum Measure No. 6 in Table 4-1.

BMPs which address metals include those pertaining to parking lot and street sweeping, as listed under Minimum Measure No. 6 on pages 24 through 33 of Table 4-1. BMPs which address orthophosphate include those pertaining to restaurant employee education, inspection of restaurants, and illicit discharge and illegal connection detection and elimination, as listed under Minimum Control Measures No. 1, 2, and 3 in Table 4-1.

This monitoring event and report, along with more community outreach, should help to educate the general population that their actions do contribute to the quality of the water flowing off the streets. Followup is planned through the permit cycle to attempt to identify major sources of pollutants that have been found at high levels.

BMPs and Measurable Goals

Using the process described under "Selection of BMPs and Measurable Goals," the group of Participating Entities identified the BMPs and Measurable Goals they felt would be most useful and effective in reducing the discharge of pollutants from storm sewer systems within the particular geographic area covered by the MRSWMP. Those that were selected constitute the BMPs and Measurable Goals for the MRSWMP. This list is contained in Table 4-1, located at the end of this Section. The terms used in Table 4-1 under the column heading "Implementers" are defined in Appendix D.

The paragraphs below explain why the group selected these BMPs and Measurable Goals for the MRSWMP.

Minimum Control Measure 1: Public Education and Outreach

EPA has concluded that an informed and knowledgeable community is crucial to the success of a storm water management program. In the Fall of 2001 the City of Monterey did a survey through its quarterly City newsletter *City Focus*. Results from that survey show that approximately 55% of respondents (800 responses out of 15,000 mailed) know about storm water laws, approximately 80% know about proper disposal of household hazardous waste, car oil and the difference between a sanitary sewer and the storm drain. Though these percentages of knowledge about the program are quite high, the response received from this survey was only 5.3% overall, and may represent a more environmentally educated segment of the population. Based on EPA's conclusions and the limited local survey response data that is available, the Participating Entities believe that the BMP Intent described below will help accomplish the objectives of the MRSWMP.

BMP Intent: ***Provide public education to increase awareness of what constitutes poor stewardship of storm water as a resource. The education and outreach plan will focus on topics such as reducing pollution from lawn and gardening activities, improper disposal of household hazardous wastes, illegal disposal activities, pet wastes, improper handling and disposal of trash, restaurant activities, and automotive activities. Increased education will ultimately result in decreased pollution.***

BMPs

1-1.a and 1-1.b: EPA's guidance documents state that the public education program should inform individuals and households about the steps they can take to reduce storm water pollution, such as ensuring proper septic system maintenance, ensuring the proper use and disposal of landscape and garden chemicals including fertilizers and pesticides, protecting and restoring riparian vegetation, and properly disposing of used motor oil and household hazardous wastes. EPA recommends that the program inform individuals and groups how to become involved in local stream and beach restoration activities, as well as activities that are coordinated by youth service and conservation corps or other citizen groups. EPA recommends that the public education program be tailored, using a mix of locally appropriate strategies, to target specific audiences and communities. Examples of strategies include distributing brochures or fact sheets, sponsoring speaking engagements before community groups, providing public service announcements, implementing educational programs targeted at school age children, and conducting community-based projects such as storm drain stenciling and watershed and beach cleanups. In addition, EPA recommends that some of the materials or outreach programs be directed toward targeted groups of commercial, industrial, and institutional entities likely to have significant storm water impacts. For example, providing information to restaurants on the impact of grease clogging storm drains, and to garages on the impact of oil discharges.

The following paragraphs describe the specific pollutants of concern that will be addressed through these BMPs:

Metals and Pesticides

Many of the existing public education materials described below have been developed to address specific problems found through the Urban Watch volunteer monitoring program (for more

information see Public Involvement write-up). Other sources of information that were researched, include the State 303(d) list. Two TMDL's are currently scheduled in the region, including "pesticides- Monterey Bay South" and "metals- Monterey Harbor." Data is currently being collected by the Central Coast Regional Water Quality Control Board for the metals TMDL, and initially it looks like there is a point source cause for this listing. If further data suggests a different conclusion, a specific metals education piece will be considered in the future.

Research throughout the state of California relates specific pesticides to listings of water bodies for chlorpyrifos and diazinon. These listings have led to a campaign at the national level to phase out these and other pesticides that, when used legally according to package directions, are still toxic to flora and fauna in the water bodies. The California Association of Stormwater Quality Agencies (CASQA- formerly the California Storm Water Quality Task Force) has taken a lead role in championing this at the national level. The City of Monterey is a member agency of CASQA, the Phase II Work Group leader for CASQA, and updates from that group are brought back to the Participating Entities in order to aid in decision making.

Household Hazardous Waste

All of the member agencies support existing household hazardous waste programs for their citizens. The Monterey Regional Waste Management District, which covers all of the member agencies, runs a full-time household hazardous waste drop-off center free of charge to residents of the district. Information about this service is inserted in trash bills, on the website, and through 1-800-Cleanup (www.earths911.org).

Trash

Each year Coastal Cleanup Day occurs on the third Saturday in September. Trash collected at this event last year totaled over 860,000 pounds in California, which tops the list for pounds of trash collected. Of that, over 30% by weight was cigarette butts. With the adoption of smoking bans for bars and restaurants in January 1998, smokers moved outdoors. In many places, this means that smokers stand outside the front door and place spent cigarette butts on the sidewalk or in street gutters. This is a major pollutant of concern for our area, where restaurants and tourist-serving businesses are one of the main industries. The City of Carmel currently hosts a monthly beach cleanup.

Restaurant Industry

The restaurant industry is one of the main industries in several cities in the region. Over the past six years, data has shown that in two local communities, the most often occurring pollutant of concern is detergents. Tracing the soap suds up the system led to the discovery that many local restaurants were washing their mats outside where the suds, grease, and food particles could make their way to the gutter and from there to the storm drain. Since that time a survey of over 100 local restaurants in Monterey and Pacific Grove led to the request from restaurant owners and managers to develop an educational program for their employees. A restaurant training video was produced by the City of Monterey. That training video is currently used in the City of Watsonville and Santa Barbara County.

Automotive Industry

The local automotive industry has been a concern in many local jurisdictions over the years. Personal accounts from leaders in the Independent Garage Owners group as well as complaint calls from citizens have alerted local jurisdictions to the need for an education and enforcement program for this industry. The automotive industry by its very nature is one that deals with

hazardous materials, toxic chemicals, and hazardous wastes. If disposal is not accomplished legally, this industry has the potential for contributing extremely hazardous pollutants to our environment.

These BMPs were selected because implementation of a public education program is specifically required by the General Permit, because EPA's research has led them to conclude that an informed and knowledgeable community is crucial to the success of a storm water management program, and because each of the Participating Entities believe that such a program will be an essential and effective means of achieving the BMP Intent.

Measurable Goals

For BMP 1-1.a: This Measurable Goal was selected because development of the Public Education and Outreach Program is specifically required by Section D.2.a of the General Permit. The achievement of this Goal can be measured by determining whether or not it was completed by the specified date. The Program has already been developed and is described in Appendix E. It is expected that in its first year of implementation the Program will consist of:

- Hiring a Public Education Coordinator
- Logo Development
- Airtime/ Free Promotions for Existing Bilingual Radio Ads
- Four spots - Storm Drain, First Flush, Used Motor Oil, Cigarette Butts
- Printed Materials for distribution at schools, events, etc.
- Movie Ads (November – February)
- Dirty Words PSA TV ads to accompany radio ads
- Print Ads or Bus Ads

For BMP 1-1.b: As explained in the SWRCB's Fact Sheet for the General Permit, each annual report provides the opportunity to update both BMPs and Measurable Goals. This Measurable Goal was selected so that the Public Education and Outreach Program can be implemented for the permit period and revised each year based on public input and experience gained from conducting the program.

Minimum Control Measure 2: Public Participation/Involvement

Based on the findings of EPA about the general nature of pollutants contained in storm water, and the specific findings of the First Flush report, it is clear that public participation and involvement will be necessary to effectively carry out the objectives of the MRSWMP. The Participating Entities believe having the public participate and be involved in the MRSWMP through the proposed BMPs for this Minimum Measure will help achieve the BMP Intents described below.

BMP Intent: ***Increase public awareness of what constitutes poor stewardship of storm water as a resource and increase public actions such as reporting of problems to authorities. This ultimately will result in decreased pollution.***

BMPs

2-1.a, 2-1.b, 2-1.c, and 2-1.d: EPA's guidance documents recommend that the public be included in the development and implementation of storm water management programs. These BMPs were selected because they carry out this recommendation, because they will provide the opportunity for the public to be involved in identifying and managing storm water problems, and because the Participating Entities believe they will help achieve the BMP Intent.

2-2.a, 2-2.b, 2-2.c, and 2-2.d: EPA's guidance documents recommend that the public be provided the opportunity to participate in activities that will help reduce storm water pollution. These BMPs were selected because they carry out this recommendation, because they will promote a general public understanding and awareness of storm water problems, and because the Participating Entities believe they will help achieve the BMP Intent.

Measurable Goals

For BMP 2-1a: EPA's guidance documents recommend that permittees provide opportunities for members of the public to be involved in program development and implementation through such things as serving as citizen representatives on a local storm water management panel and attending public meetings on storm water activities and programs. This Measurable Goal was selected to meet the public involvement objective by providing the public with the opportunity to learn about the General Permit requirements and the MRSWMP, and to provide their input to help update the BMPs and Measurable Goals as appropriate in each year's annual report.

For BMPs 2-1.b, 2-1.c, and 2-1.d: These Measurable Goals were selected because they will indicate the effectiveness of the public outreach program by measuring the number of members of the public who participate in the Public Involvement Workshops.

For BMPs 2-2.a, 2-2.b, 2-2.c, and 2-2.d: EPA's guidance documents recommend that the public be provided opportunities to work as citizen volunteers to educate other individuals about the storm water program, to assist in program coordination with other pre-existing programs, and/ or to participate in volunteer monitoring efforts. These Measurable Goals were selected because they meet the public participation objective by involving the public in "hands on" activities that have been shown to reduce storm water pollution, and because they will provide support for these programs. The sections below describe the principal public participation programs that are

either already established, or may be established based on public response:

Coastal Cleanup Day (BMPs 2-2.a and 2-2.b): Marine debris in our oceans and watersheds is dangerous to humans and animals, causes economic impacts, and is unsightly. To a sea turtle, a floating plastic bag looks like a jellyfish meal. Fishing line entangles marine mammals and birds, and also damages fishing gear, increasing the cost of marine-based products. Years of Coastal Cleanup Day data have revealed 60% of beach debris originates from inland sources of pollution such as cigarette butts and plastic drink bottles. Much of this debris washes down storm drains directly to our oceans. Coastal Cleanup Day is a statewide program sponsored by the California Coastal Commission. Each year Coastal Cleanup Day occurs on the third Saturday in September. Last year, California had 46,000 volunteers remove 860,000 pounds of trash and recyclables from 2,500 miles of shoreline. In Monterey County alone, over 1,600 volunteers at 24 local sites cleared over 8,000 pounds (over 4 tons!) of trash and recyclable materials. Of that, over 30% by weight was cigarette butts. With the adoption of smoking bans for bars and restaurants in January 1998, smokers moved outdoors. In many places, this means that smokers stand outside the front door and place spent cigarette butts on the sidewalk or in street gutters. This is a major pollutant of concern for the area covered by the MRSWMP, where restaurants and tourist-serving businesses are one of the main industries. Within the area covered by the MRSWMP there are over 10 Coastal Cleanup Day sites that will be active in this event in 2003. According to William J. Douros, MBNMS superintendent, Coastal Cleanup Day is an excellent way for citizens to get involved in protecting their sanctuary, and the event also brings together many groups and organizations that are interested in improving our marine environment.

Storm Drain Stenciling (BMP 2-2.c): Each individual city should coordinate this within their own boundaries. Stenciling kit supplies and costs are normally provided. This is often best done by an Eagle Scout or service group. The City pays for materials and provides them to the group, the City provides maps, the group then coordinates the project. This has successfully been done in the City of Monterey, City of Pacific Grove, and City of Carmel.

Volunteer Monitoring Program (Urban Watch) (BMP 2-2.d): This has been done by the Cities of Monterey and Pacific Grove for several years. Volunteers are trained in May and monitor storm drain outfalls during the dry weather season between June and October/November. Volunteer groups take samples approximately twice each month and analyze the samples for specific indicators with an EPA-approved LaMotte testing kit. This is a good way to ascertain the baseline level of water quality for your city. It helps to pinpoint areas with problems from detergents, solvents, etc. Volunteers also act as educators to the public answering questions about their efforts.

BMP Intent: Collaborate and participate in ongoing volunteer water quality monitoring efforts by becoming an active participant in the Citizen Water Quality Monitoring Network. This will ensure collaboration and participation in the ongoing volunteer water quality monitoring efforts and give permit holders a clearer understanding of the contaminants of concern in their jurisdiction.

BMPs

2-3.a and 2-3.b: As discussed earlier in this MRSWMP there are numerous groups and

organizations that are working to monitor and improve the quality of storm water discharges. The Citizen Water Quality Monitoring Network provides an excellent forum for communication and coordination between these parties. These BMPs were selected in order to ensure that the Public Participation and Involvement activities of the MRSWMP are carried out in close coordination and cooperation with these other parties.

Measurable Goals

For BMP 2-3.a: This Measurable Goal was selected because it will demonstrate the coordination and communication between the activities of the MRSWMP and the activities of the other parties that are working to monitor and improve the quality of storm water discharges.

For BMP 2-3.b: These Measurable Goals were selected because they will demonstrate assistance in improving the existing monitoring programs.

Minimum Control Measure 3: Illicit Discharge Detection and Elimination

The Water Quality Issues listed under the heading of "MS4 Administration" are in reality administrative actions the Participating Entities need to take to carry out the MRSWMP. The Water Quality Issues listed under the heading "Residents, Homeowners, and Businesses" have been identified in EPA's guidance documents as being typical for most urbanized areas. Lacking any information to the contrary, the Participating Entities believe the BMP Intents described below are applicable to the area covered by the MRSWMP, and that the proposed BMPs will help achieve these BMP Intents.

BMP Intent: ***Promote the reporting of illicit discharges by having a system for receiving such reports.***

BMPs

3-1.a through 3-1.c: These BMPs were selected because they are part of an illicit discharge detection program, as required by Sections D.c.1 and D.c.4 of the General Permit, and because they help to comply with the requirement of Section D.c.5 of the General Permit.

Measurable Goals

For BMPs 3-1.a and 3-1.b: These Measurable Goals were selected because they are a simple measure of their associated BMPs.

For BMP 3-1.c: This Measurable Goal was selected because it will be a good indicator of progress being made toward curbing illegal disposal activities.

BMP Intent: ***Have accurate storm drain maps to help locate illicit discharges and/or dischargers.***

BMPs

3-2.a and 3-2.b: These BMPs were selected because they fulfill the requirements of Section D.c.2 of the General Permit.

Measurable Goals:

For BMPs 3-2.a and 3-2.b: These Measurable Goals were selected because they are a simple measure of their associated BMPs.

BMP Intent: ***Reduce pollution from illicit connections and/or discharges***.

BMPs

3-3.a through 3-3.e: These BMPs were selected because they are part of an illicit discharge detection program, as required by Sections D.c.1 and D.c.4 of the General Permit.

Measurable Goals

For BMPs 3-3.a through 3-3.c: These Measurable Goals were selected because they will be

good indicators of the progress being made toward detecting the presence of illicit connections or discharges.

For BMP 3-3.d and 3-3.e: These Measurable Goals were selected because they will verify that illicit connections are being eliminated.

***BMP Intent:* Reduce pollution from illegal disposal activities.**

BMPs

3-4.a through 3-4.c: EPA's guidance documents define illicit connections as "illegal and/or improper connections to storm drainage systems and receiving waters". Many building owners or operators are not aware that improper connections exist in their facilities. This is illustrated by the experience of one large wastewater agency (not within the geographic area of this MRSWMP) that, over an 11-year period, investigated 3,851 businesses and industries for illicit connections to its storm sewer system. Of those investigated, about 8 percent had illicit connections, and where one illicit connection was found, there was an average of 2.4 improper connects at that business. Based on this experience and similar experiences elsewhere, EPA has concluded that identifying and removing illicit connections is a measure for reducing storm water pollution, especially in areas where pollutants with unknown sources have been detected in receiving waters. These BMPs were selected because they fulfill the requirements of Section D.c.3 of the General Permit and because, based on the EPA guidance information, it is reasonable to investigate whether storm water pollution within the area covered by the MRSWMP may be coming from illicit connections and/or discharges. The language in these BMPs was based on information taken from the MURP and the CASQA Handbooks, as well as from other entities listed at the SWRCB and/or CASQA websites.

Measurable Goals

For BMPs 3-4.a through 3-4.c: These Measurable Goals were selected because they are a simple measure of their associated BMPs.

***BMP Intent:* Reduce pollution from recreational vehicles and boats.**

BMPs

3-5.a: EPA's guidance documents state that recreational sewage management measures are needed to regulate wastewater generated from outdoor activities such as boating or camping by providing alternative methods to waste disposal in place of illegal overboard discharge. EPA goes on to say that the proper disposal of recreational waste is necessary to avoid the impacts that these activities and their associated developments (i.e., marinas and campgrounds) can have on aquatic environments. Marina and recreational boat sewage can impact water quality by introducing bacteria, nutrients, and hazardous chemicals into waterways. It has been reported that a single overboard discharge of human waste can be detected in up to a 1-square-mile area of shallow enclosed water. These human wastes can include *Streptococci*, fecal coliform, and other bacteria which contribute to incidences of human disease, shellfish bed closures, alerts on eating fish, and algal blooms. Boats can be a significant source of fecal coliform bacteria in areas with high boating densities and low hydrologic flushing, and fecal coliform levels become elevated near boats during periods of high occupancy and usage. Holding tanks on boats also concentrate pollutants and use increased levels of oxygen during decomposition.

This BMP was selected because of the high levels of tourist activity and high use of campers and

watercraft within the area covered by the MRSWMP. The language in this BMP was based on information taken from the MURP and the CASQA Handbooks.

Measurable Goals
For BMP 3-5.a: This Measurable Goal was selected because it will verify that discharges from RVs and boats are being regulated.

BMP Intent: ***Inform employees, businesses, and the general public of the hazards that are generally associated with illegal discharges and improper disposal of waste.***

BMPs
3-6.a: This BMP was selected to ensure that public education regarding the hazards associated with illegal discharges and improper disposal of waste is included in the Public Education and Public Outreach Program conducted under Minimum Control Measure 1.

Measurable Goals
For BMP 3-6.a: This Measurable Goal was selected because it is a simple measure of its associated BMP.

Minimum Control Measure 4: Construction Site Storm Water Runoff Control

EPA's guidance documents state that polluted storm water runoff from construction sites often flows to MS4s and ultimately is discharged into local rivers and streams. Sediment is usually the main pollutant of concern, although other pollutants may include solid and sanitary wastes, fertilizers, pesticides, oil and grease, concrete truck washout, construction chemicals, and construction debris. To date, the only pollutant from construction sites found by SWRCB to have a reasonable potential to cause excursions of water quality standards is sediment.

Several of the common pollutants associated with construction site runoff have been identified in the First Flush Report previously cited under the heading "Specific Storm Water Quality and Pollutants of Concern" in this Section 4 of the MRSWMP. There is considerable construction activity throughout the area covered by the MRSWMP. Therefore, lacking any information to the contrary, the Participating Entities believe the BMP Intent described below is applicable to the area covered by the MRSWMP, and that the proposed BMPs will help achieve this BMP Intent.

BMP Intent: ***Reduce pollution from construction sites by developing guidelines and standards for construction site runoff. These will address erosion and sediment controls, and shall contain requirements for construction site operators to: implement appropriate erosion and sediment control BMPs; to control wastes that have the potential to impact water quality such as discarded building materials, concrete truck washout, paint and plastering wash down, chemicals, litter, and sanitary waste at the construction site.***

BMPs

4-1.a: This BMP was selected because it will fulfill the requirements of Sections D.2.d.1 through D.2.d.3 of the General Permit. The language in these BMPs was based on information taken from the MURP and the CASQA Handbooks, as well as from other entities listed at the SWRCB and/or CASQA websites.

4-2.a and 4-2.b: These BMPs were selected because they will fulfill the requirements of Section D.2.d.4 of the General Permit. The language in these BMPs was based on information taken from the MURP and the CASQA Handbooks.

4-3.a and 4-3.b: These BMPs were selected because they will fulfill the requirements of Section D.2.d.6 of the General Permit. The language in these BMPs was based on information taken from the MURP.

4-4.a and 4-4.b: These BMPs were selected because they will fulfill the requirements of Section D.2.d.5 of the General Permit. In addition EPA's guidance documents state that this will further reinforce the public participation component of the regulated small MS4 storm water program and help to recognize the crucial role that the public can play in identifying instances of noncompliance.

Measurable Goals

For BMP 4-1.a: This Measurable Goal was selected because it will ensure that progress is being made in implementing its associated BMP.

For BMPs 4-2.a and 4-2.b: These Measurable Goals were selected because they will ensure that progress is being made in implementing their associated BMPs.

For BMPs 4-3.a and 4-3.b: These Measurable Goals were selected because they will verify that the ordinance requirements pertaining to construction site runoff control are being enforced.

For BMPs 4-4.a and 4-4.b: These Measurable Goals were selected because they will ensure that progress is being made in implementing their associated BMPs.

Minimum Control Measure 5: Post-Construction Storm Water Management in New Development and Redevelopment

EPA has concluded that post-construction storm water management in areas undergoing new development or redevelopment is necessary because runoff from these areas can significantly affect receiving water bodies. Many studies indicate that prior planning and design for the minimization of pollutants in post-construction storm water discharges is one of the most cost-effective approaches to storm water quality management.

Based on the EPA guidance information, and absent contrary information, it is reasonable to believe storm water runoff from new development and redevelopment has the potential to contribute to storm water pollution within the area covered by the MRSWMP, and that the BMP Intent described below is also applicable to that area. The proposed BMPs will help achieve this BMP Intent.

***BMP Intent*: Reduce post-construction pollution by developing post construction guidelines and standards for storm water runoff from new development and redevelopment, to address potential pollutants such as sediments, chemicals, oils and grease, metals, and nutrients, as well as erosion and flooding.**

BMPs

5-1.a: This BMP was selected because it is essentially required by Sections D.2.e.1 through D.2.e.4 of the General Permit. In addition implementation of this BMP will be consistent with EPA's recommendations that permittees adopt a planning process that includes implementation strategies (e.g., adopt a combination of structural and/or non-structural measures), operation and maintenance policies and procedures, and enforcement procedures. The language in this BMP was based on information taken from the MURP and the CASQA Handbooks.

5-2.a and 5-2.b: These BMPs were selected to ensure that the ordinance requirements of BMP 5-1.a are applied during design and construction.

5-3.a and 5-3.b: These BMPs were selected to ensure that the ordinance requirements of BMP 5-1.a are applied after the developments are completed and in use. The language in these BMPs was based on information taken from the MURP and the CASQA Handbooks.

Measurable Goals

For BMP 5-1.a : This Measurable Goal was selected because it will ensure that progress is being made in implementing its associated BMP.

For BMPs 5-2.a and 5-2.b: These Measurable Goals were selected because they are simple measures of their associated BMPs.

For BMPs 5-3.a and 5-3.b: These Measurable Goals were selected because they will verify that the storm water pollution prevention systems that are being constructed are being properly operated and maintained.

Minimum Control Measure 6: Pollution Prevention/Good Housekeeping for Municipal Operations

EPA's guidance documents state that the Pollution Prevention/Good Housekeeping for municipal operations minimum control measure is a key element of the small MS4 storm water management program. This measure requires permittees to examine and subsequently alter their own actions to help reduce the amount and type of pollution that: (1) collects on streets, parking lots, open spaces, and storage and vehicle maintenance areas and may be discharged into local waterways; and (2) results from actions such as environmentally damaging land development and flood management practices or poor maintenance of storm sewer systems. This measure is meant primarily to improve or protect receiving water quality by altering municipal or facility operations. Additionally, it may also result in a cost savings for the Permittee, because proper and timely maintenance of storm sewer systems can help avoid repair costs from damage caused by age and neglect.

The audiences to which the BMPs described below will be directed comprise the segments of the Participating Entities' staffs that are directly involved in work and activities that can have an impact on storm water quality. In selecting the BMP Intents to be addressed under this Minimum Measure, the Participating Entities assessed their municipal activities to determine which activities were most likely to have an impact on storm water quality. Based on that assessment, the BMP Intents described below pertain to what the Participating Entities believe are the principal types of pollution to which their municipal activities may be contributing.

***BMP Intent:* Minimize pollution from improper discharge or disposal of materials.**

BMPs

6-1.a: This BMP was selected because it will fulfill the requirements of Section D.2.f.1 of the General Permit.

6-2.a: EPA's guidance documents state that failure to properly store hazardous materials increases the probability that they will end up in local waterways. Most municipalities have some types of hazardous chemicals stored in their facilities. Practices such as covering hazardous materials and storing them properly can have important benefits. Hazardous material storage is relevant to both urban and rural settings and all geographic regions. The effects of hazardous material leakage may be more pronounced in areas with heavier rainfall, due to the greater volume of runoff. This BMP was selected based on EPA's recommendations, and the fact that most of the Participating Entities store some types of hazardous materials in locations where leakage or spillage potentially could flow to Monterey Bay or another nearby waterway.

Measurable Goals

For BMP 6-1.a: This Measurable Goal was selected because it is a simple measure of its associated BMP.

For BMP 6-2.a: This Measurable Goal was selected because it is a good indicator of the implementation of its associated BMP.

BMP Intent: ***Minimize pollution from used motor oil being disposed of improperly.***

BMPs

6-3.a: EPA's guidance documents state that used motor oil is one type of hazardous waste because it contains heavy metals picked up from the engine during use. Motor oil is toxic to humans, wildlife, and plants; it should be disposed of at a local recycling or disposal facility. EPA reports that estimates show that each year over 180 million gallons of used oil is disposed of improperly and that a single quart of motor oil can pollute 250,000 gallons of drinking water. This BMP was selected based on EPA's recommendations, and the fact that most of the Participating Entities generate and/or store used motor oil in locations where leakage or spillage potentially could flow to Monterey Bay or another nearby waterway, and to ensure that proper procedures for storage and disposal of used motor oil are being employed.

Measurable Goals

For BMP 6-3.a: This Measurable Goal was selected it is a good indicator of the implementation of its associated BMP.

BMP Intent: ***Minimize pollution from landscaping & lawn care management and pest control management activities.***

BMPs

6-4.a and 6-4.b: EPA recommends these BMPs to control potential storm water impacts of landscaping and lawn care practices through education and outreach on methods that reduce nutrient loadings and the amount of storm water runoff generated from lawns. Research has indicated that nutrient runoff from lawns has the potential to contribute eutrophication in streams, lakes, and estuaries. Nutrient loads generated by municipal properties can be significant, and recent research has shown that lawns may produce more surface runoff than previously thought. Pesticide runoff can contribute pollutants that contaminate drinking water supplies and are toxic to both humans and aquatic organisms. EPA has concluded that informing municipal parks staffs on methods to reduce storm water pollution from over irrigation and improper timing of the application of pesticides can help alleviate the potential impacts from these sources.

These BMPs were selected because the First Flush Report showed that there were slightly elevated nutrient levels in some of the storm water outfalls, because all of the Participating Entities have landscaping that their staffs maintain, and because some of them have extensive lawn and/or park areas very close to Monterey Bay or other water bodies. Also, these BMPs fulfill the requirements of Section D.2.f.2 of the General Permit.

Measurable Goals

For BMPs 6-4.a and 6-4.b: This Measurable Goal was selected because it is a good indicator of the implementation of its associated BMP.

BMP Intent: ***Minimize pollution for improper discharge of chlorinated and/or brominated water from swimming pools & spas.***

BMPs

6-5.a: EPA's guidance documents state that chlorinated water discharged to surface waters has an adverse impact on local water quality. Swimming pools are a source of chlorinated water discharged into sanitary and storm sewer systems. An average swimming pool holds 19,000

gallons of chlorinated water. Pools have high concentrations of chlorine, which is toxic to wildlife and fish. Chlorinated pool water should not be discharged to the storm sewer system or directly into a water body. Instead, alternative discharge options should be used, or the water should be dechlorinated prior to discharge. This BMP was selected based on EPA's recommendations, and because some Participating Entities have municipal pools. If those pools were drained to the storm water system, the chlorinated water would flow to Monterey Bay or another nearby waterway. The language in this BMP was based on information taken from the MURP and the CASQA Handbooks.

Measurable Goals

For BMP 6-5.a: This Measurable Goal was selected because it is good indicator of the implementation of its associated BMP.

BMP Intent: ***Minimize pollution from street and parking lot cleaning.***

BMPs

6-6.a and 6-6.b: EPA's guidance documents recommend that street sweeping be performed on a regular basis to minimize pollutant export to receiving waters. These cleaning practices are designed to remove from road and parking lot surfaces sediment debris and other pollutants that are a potential source of pollution impacting urban waterways. Although performance monitoring done in the early 1980s for the Nationwide Urban Runoff Program indicated that street sweeping was not very effective in reducing pollutant loads, recent improvements in street sweeper technology have enhanced the ability of present day machines to pick up the fine-grained sediment particles to which many pollutants preferentially bind. Street sweeping is practiced in most urban areas, often as an aesthetic practice to remove sediment buildup and large debris from curb gutters. The frequency and intensity of rainfall for a region are key variables in determining how streets need to be swept to obtain a desired removal efficiency. This BMP was selected based on EPA's findings regarding the significance of the storm water quality impacts of pollutants discharged with street and parking lot runoff, and because all of the Participating Entities have streets and parking lots that they maintain.

Measurable Goals

For BMP 6-6.a: This Measurable Goal was selected because it is a good indicator of the implementation of its associated BMP.

For BMP 6-6.b: This Measurable Goal was selected because it will help to determine how effective street sweeping is in removing pollutants of concern.

BMP Intent: ***Minimize pollution from automotive maintenance activities.***

BMPs

6-7.a through 6-7.f: EPA recommends that these pollution prevention measures be employed to create a program of targeted outreach and training for municipal fleets (public works, school buses, fire, police, and parks) involved in automobile maintenance about practices that control pollutants and reduce potential storm water impacts. EPA considers automotive maintenance facilities to be storm water "hot spots" where significant loads of hydrocarbons, trace metals, and other pollutants can be produced that can affect the quality of storm water runoff. Some of the waste types generated at automobile maintenance facilities include the following:

- Solvents (paints and paint thinners)
- Antifreeze
- Brake fluid and brake lining
- Batteries
- Motor oils
- Fuels (gasoline, diesel, kerosene)
- Lubricating grease.

Because of their high potential to contribute to storm water pollution, automotive maintenance facilities' discharges to storm and sanitary sewer systems need to be highly regulated. Fluid spills and improper disposal of materials result in pollutants, heavy metals, and toxic materials entering ground and surface water supplies, creating public health and environmental risks. Alteration of practices involving the cleanup and storage of automotive fluids and cleaning of vehicle parts can help reduce the potential influence of automotive maintenance practices on storm water runoff and local water supplies. These BMPs were selected based on EPA's findings regarding the pollution potential of automotive facilities, and the fact that most of the Participating Entities have such facilities. The language in these BMPs was based on information taken from the MURP and the CASQA Handbooks.

Measurable Goals
For BMPs 6-7.a through 6-7.f: These Measurable Goals were selected because they are good indicators of the implementation of their associated BMPs.

BMP Intent: ***Minimize pollution from municipal vehicle washing activities.***

BMPs
6-8.a and 6-8.b: Outdoor vehicle washing has the potential to result in a high load of nutrients, metals, and hydrocarbons during dry weather conditions in many watersheds, as the detergent-rich water used to wash the grime off the vehicles flows down the street and into the storm drain. EPA's guidance documents recommend educating municipal fleets (public works, school buses, fire, police, and parks) on the water quality impacts of the outdoor washing of vehicles and how to avoid allowing polluted runoff to enter the storm drain system. These BMPs were selected based on EPA's recommendations, and because most of the Participating Entities have washing facilities for their municipal vehicles. The language in these BMPs was based on information taken from the MURP and the CASQA Handbooks.

Measurable Goals
For BMPs 6-8.a and 6-8.b: These Measurable Goals were selected because they are good indicators of the implementation of their associated BMPs.

BMP Intent: ***Minimize pollution from roadway and bridge maintenance.***

BMPs
6-9.a: Roadway systems are a large part of the infrastructure of urban areas, and require regular repairs and maintenance due to traffic use and climatic conditions. EPA's guidance documents state that substantial amounts of sediment and pollutants can be generated during roadway and bridge repair operations, and these pollutant loadings can threaten local water quality by contributing heavy metals, hydrocarbons, sediment, and debris to storm water runoff. Numerous pathways for pollutant deposition on roadways and bridges influence the water quality of storm

water runoff. This BMP was selected based on EPA's findings, and because all of the Participating Entities have roadway systems which they repair and maintain on a routine basis.

Measurable Goals
For BMP 6-9.a: This Measurable Goal was selected because it is a good indicator of the implementation of its associated BMP.

***BMP Intent:* Minimize pollution from contaminants accumulated in storm sewer systems.**

BMPs
6-10.a through 6-10.f: EPA's guidance documents recommend that storm drain systems be cleaned regularly. Routine cleaning reduces the amount of pollutants, trash, and debris both in the storm drain system and in receiving waters. Clogged drains and storm drain inlets can cause the drains to overflow, leading to increased erosion. Benefits of cleaning include increased dissolved oxygen, reduced levels of bacteria, and support of instream habitat. Areas with relatively flat grades or low flows should be given special attention because they rarely achieve high enough flows to flush themselves. This BMP was selected based on EPA's recommendations, and because all of the Participating Entities have storm drain systems that they operate and maintain.

Measurable Goals
For BMPs 6-10.a through 6-10.e: These Measurable Goals were selected because they are good indicators of the implementation of their associated BMPs.

For BMP 6-10.f: This Measurable Goal was selected because it will help to determine how effective catch basin cleaning is in removing pollutants of concern.