

Program Evaluation Report

Santa Clara Valley Urban Runoff Pollution Prevention Program: Monitoring Evaluation (NPDES Permit No. CAS029718)

1.0 Introduction

1.1 Monitoring Evaluation Purpose

The purposes of this evaluation were to evaluate the overall monitoring program components and their respective contributions toward satisfying the requirements of National Pollutant Discharge Elimination System (NPDES) permit (CAS029718 and Board Order No. 01-024 and 01-119), and to evaluate the current implementation status of the multi-year monitoring plan with respect to the overall purposes of the monitoring program: to characterize drainage areas and stormwater discharges; assess existing or potential adverse impacts on beneficial uses; identify potential pollutant sources; and collect data that will assist in the evaluation of the effectiveness of the overall stormwater pollution prevention program. Other goals of this evaluation included:

- Review the overall effectiveness of the monitoring program relative to the permit goals and requirements.
- Identify strengths of the program that could benefit other Phase I and Phase II municipalities. Noteworthy strengths in the program are discussed in this report as observations.
- Identify weaknesses in the program that may prevent satisfaction of permit requirements. Opportunities for improvement in the program are included as findings in this report.

40 CFR 122.41(i) provides the authority to conduct the program evaluation.

1.2 Permit History

The permit was issued on February 21, 2001, amended October 17, 2001, and is scheduled to expire on February 21, 2006. The current permit, the third issued to the Co-permittees, requires the monitoring program to characterize representative drainage areas and stormwater discharges; assess existing or potential adverse impacts on beneficial uses caused by pollutants of concern; identify potential sources of pollutants; and evaluate the effectiveness of representative stormwater pollution prevention and control measures.

The Santa Clara Valley Urban Runoff Pollution Prevention Program (SCVURPPP, also referred to as the Program) is an association of thirteen cities and towns in Santa Clara Valley, the County of Santa Clara, and the Santa Clara Valley Water District (“Co-permittees”) that share a common permit to discharge stormwater to South San Francisco Bay. SCVURPPP had a budget of \$3.2

million in FY 02-03 (note that this does not include the budgets for individual permittees to comply with the permit).

1.3 Logistics and Program Evaluation Preparation

Before initiating the on-site program evaluation, Tetra Tech, Inc., briefly reviewed the following program materials:

- NPDES Permit No. CAS029718 Provisions 7 and 9
- Executive Summary, FY 00-01 Annual Report
- FY 2002-2003 Annual Report, specifically sections 4-8 and their appendices
- Multi-Year Receiving Waters Monitoring Plan
- FY 03-04 Annual Monitoring and Watershed Management Measures Work Plan
- Demonstration of Stormwater Environmental Indicators in the Coyote Creek Watershed and the Walsh Avenue Catchment, Silicon Valley, CA
- PCB Two-Year Case Study Investigating Elevated PCBs in Storm Drain Sediments in San Jose, California
- First Flush Study – Evaluation of First Flush Pollutant Loading and Implications for Water Resources and Urban Runoff Management
- Mercury, Copper and Nickel, Pesticide, and PCBs Control Programs
- Dioxin Information Review and Control Program
- Control Program for Dioxin-like Compounds
- Assessment of Watershed Assessment Methods
- California Stream Bioassessment Procedure (Protocol Brief)
- Surface Water Ambient Monitoring Program (SWAMP) Quality Assurance Management Plan

On December 2-4, 2003, Tetra Tech, Inc., with assistance from the Regional Board, conducted the program evaluation. The evaluation schedule was as follows:

Tuesday, December 2	Wednesday, December 3	Thursday, December 4
<ul style="list-style-type: none"> • <u>Program Overview</u> – Stormwater agencies and Regional Program Participation • <u>Multi-Year Plan</u> <ul style="list-style-type: none"> – Plan – Methods and Protocols – FY 02-03 Monitoring Report – Revisions • <u>Pollutant-specific Monitoring and Assessment</u> <ul style="list-style-type: none"> – Hg/PCBs, OC Pesticides – PCB Case Studies – Trash Assessments – Sediment • <u>Special Studies</u> <ul style="list-style-type: none"> – First Flush 	<ul style="list-style-type: none"> • <u>Special Studies</u> (cont'd) <ul style="list-style-type: none"> – Coyote Creek Pilot Assessment – Stormwater Environmental Indicators Project – Evaluation of Watershed Assessment Methods – WMI Watershed Assessment and Characterization Reports 	<ul style="list-style-type: none"> • <u>Questions and Answers – Process and Performance Focused</u> <ul style="list-style-type: none"> – Program Management and Quality Assurance – Subcontractor Evaluation and Performance Metrics – Subcontractor QA – Deliverables and Program Complexity

1.4 Program Areas Evaluated

The following monitoring program areas were evaluated:

- Program management, including the copermitees' contribution to the overall program monitoring activities.
- The multi-year monitoring plan development and implementation.
- Pollutant-specific investigations and special studies.

1.5 Program Areas Not Evaluated

The following areas were not evaluated in detail:

- Programmatic monitoring conducted by Program staff and individual permittees (e.g., inspections, public attitude and awareness surveys).
- Other NPDES permits issued to the copermitees (e.g., industrial or construction NPDES stormwater permits).

- Inspection reports, plan review reports, and other relevant files. The evaluation team did not conduct a detailed file review to verify that all elements of the program were being implemented as described. Instead, observations by the evaluation team and statements from the Co-permittees' representatives were used to assess overall compliance with permit requirements. A detailed file review of specific program areas could be included in a subsequent evaluation.

1.6 Program Areas Recommended for Future Evaluation

The evaluation team recommends follow up evaluation of the following elements:

- *Monitoring program management - subcontractor quality systems*
During the evaluation, it was revealed that SCVURPPP does not adequately review interim reports from subcontractors. Errors identified in preliminary assessment of the data presented for the receiving water monitoring indicate that the subcontractor's analytical chemistry quality systems are failing, and that the program reviews did not identify the deficiencies to activate the corrective action process. These issues and examples are further described in Section 4.0 of this report. These issues may, therefore, continue to exist until such program quality reviews and assessments are completed. Additional evaluation of subcontractor quality systems, performance metrics, evaluations, and assessments are recommended to include subcontractor quality system reviews, and timely review of subcontractor deliverables. The subcontractor quality systems should be subject to detailed reviews at some regular frequency, and audits should be conducted on processes and deliverables developed in conjunction with the monitoring program.
- *Evaluation of existing and future monitoring data*
This evaluation of SCVURPPP's monitoring program did not include a detailed analysis of monitoring data, rather only a cursory verification of monitoring results presented in the annual report. Additional evaluation is recommended in conjunction with the incorporation and synthesis of FY 03-04 monitoring results and refinement of the Multi-year Monitoring Plan. According to Program staff, this evaluation and analysis is currently underway concurrent with the revision of the multi-year plan. It is anticipated that observations will be made in further analysis that will confound consistent treatment of data, given the inconsistencies observed in this evaluation's preliminary review process. As an example, dissolved and total fraction analytical results for metals, organic carbon, and phosphorus, and total solids data for sediment analysis may indicate that additional investigation is warranted with regard to analyses already performed, and their potential impact on preliminary conclusions may need to be revisited. With regard to the moisture determinations for the sediments, for instance, it may be important that SCVURPPP define whether correct values were used in sample calculations for pollutant analyses. Initial conclusions in the FY 02-03 report indicate only that data "displayed similar patterns to those identified from previous monitoring," however there is only reference to one other monitoring year.

2.0 Monitoring Program Summary

A significant volume of data has been collected since the inception of the monitoring program from SCVURPPP activities, other stormwater agencies, and other sources. The SCVURPPP monitoring program was initially focused on collection of historical data and additional data to establish baseline characteristics. Early in the second permit term the Regional Board requested the Program to take a one-year hiatus from fixed-station monitoring and to use that time to develop a comprehensive watershed monitoring program. The Program has since undertaken a number of special studies related to stream assessment and specific source identification, and now pursues these objectives while collecting data to further define temporal variability on a rotating watershed basis and to contribute to the Board's Regional Monitoring and Assessment Strategy database.

The Program sees these data collections as ancillary to the permit, but these data collections constitute the basis of compliance with the antidegradation guidance established in the Clean Water Act. Many of the streams currently being sampled and scheduled for sampling are establishing the first meaningful data collections under uniform monitoring and measurement protocols. These data are invaluable to the assessment of beneficial use designation and definition of specific stressor investigations.

The permit monitoring program goals include characterization of drainage areas and stormwater discharges, assessment of existing and potential adverse impacts on beneficial uses, identification of potential pollutant sources, and collection of data that will assist in the evaluation of the effectiveness of the overall stormwater pollution prevention program. The monitoring program appears to be focused toward satisfaction of the permit requirements. The Program must continue the rotating stream sampling in order to aid in the understanding of the variability in the receiving waters of the region. The program's strategy toward assessment of physical habitat and biological responses supports beneficial use assessments, and aids in identifying the needs for future investigation. As these indicators may encompass a broader series of stressors than strictly the conventional monitoring program supports, the combined approach appropriately focuses on both the data requirements for the current permit and the anticipated future requirements for comprehensive demonstration of effectiveness of stormwater management practices. Continued close collaboration with the Regional Board and SWAMP staff will aid in stressor assessments and continue to develop and refine potential source identifications.

The SCVURPPP web site is <http://scvurppp.org/> with most of the monitoring reports located under the tab for "C.7 and C.9 submittals."

3.0 Observations

The following items were observed as noteworthy strengths of the monitoring program.

- *Significant resources are devoted to the program*
The Program staff offers significant depth of understanding relative to the local political climate and subsequent stakeholder process. The Program is staffed with highly qualified

and passionate scientists and engineers interested in advancing the fundamental science and engineering that define the characteristics of the watersheds and basins discharging to the San Francisco Bay. As one of the first MS4 permits in the nation, the Program has been a leader in the development and evolution of similar programs and permits across the country. The Program has been successful in securing grants to fund some of its research within the watershed, and has contributed significant financial and human resources to a variety of other regional agencies and environmental stakeholder groups, as well as self-funding some of its research toward improvement of national stormwater management practices and policies.

- *Coordination with the Regional Board's Surface Water Ambient Monitoring Program (SWAMP) coordinator*

During the course of the review process, specific dialogue was initiated between key Program staff and Regional Board SWAMP technical staff, advancing complimentary initiatives tentatively identified through each. This dialogue was leading toward more efficient coordination of monitoring efforts to be undertaken by the Program and staff. For example, discussions between SCVURPPP and SWAMP staff during the evaluation revealed that watersheds scheduled for monitoring by one group were actively being monitored in the current year by the other, and vice versa. It was apparent to the reviewer that this dialogue was mutually beneficial and should be perpetuated through inclusion of key Regional Board staff in electronic distribution lists for key Program communications. The most challenging aspect of this coordination will be incorporating the Regional Board's monitoring data into future data analysis for the Program's stream and subwatershed assessments.

- *The Program is targeting specific pollutants of concern through special studies and monitoring*

Examples of pollutant specific studies include the Two Year Case Study Investigating Elevated PCBs in Storm Drain Sediments, the Joint Mercury/PCBs/Organochlorine Pesticide Study, the First Flush Study, and the Trash Assessments. In the most recently concluded year, the Assessment of Stream Ecosystem Functions for Coyote Creek (The Coyote Creek Watershed Integrated Pilot Assessment) was completed as a pilot for continued monitoring efforts in the Basin. The Coyote Creek study concludes that assessment of ecosystem function is an effective tool for assessing beneficial use support as well as the impacts of storm water runoff, and the associated stresses. We recommend the assessment of ecosystem function approach as supplemental to, rather than in lieu of, the existing plan of rotating physicochemical monitoring throughout the streams in the basin.

The Coyote Creek study used limiting factors analysis of stream function as a screening technique to define those areas most impacted by stormwater runoff and other stresses, and to focus future monitoring efforts toward those areas, while providing a baseline for BMP effectiveness assessment and development of potential management alternatives. We commend the Coyote Creek Pilot Assessment report for fully synthesizing data to draw conclusions; recommending actions including future monitoring; and establishing linkages to other programs that could support future actions.

4.0 Findings

The following monitoring program areas were identified as needing improvement.

- *Multi-habitat Rapid Bioassessment Protocols (RBPs)*
 SCVURPPP and its subcontractors should seek technical guidance from the Regional Board's SWAMP staff and the Department of Fish and Game to gain access to and an understanding of alternate RBPs for low gradient streams. While the streams that were unable to be sampled according to the FY 02-03 monitoring assessment were planned for modification (thereby negating the benefits of any bioassessments), it is anticipated that a number of streams may be identified as intermittent in future field efforts. The State's routine RBP employed in the FY 02-03 field work is suitable only for flowing, wadeable streams with multiple riffle habitats. The protocol brief for the state program indicates that guidance on alternate protocols for pools are available from the Department of Fish and Game. SCVURPPP should consider a multi-habitat approach to afford a selection of representative habitats and assessment protocols.
- *Reassessment of the index period for bioassessment*
 The program should consider selection of an index period for the bioassessments during the "rainy" season to minimize the number of sites requiring multi-habitat assessment, and optimize collections in accordance with the more routinely employed protocols. In the absence of alternate sample collection and stream assessment protocols, lack of flow during the rainy season will prove a more useful data point than the same observation during decreasing hydrograph or the dry season.
- *Coordination with SWAMP staff*
 Tetra Tech recommends that the Co-permittees gain the approval and support of the Regional Board for executing permit-required studies and monitoring dedicated to assessing the SWAMP protocols. While the permit clearly states that alternative monitoring methods *may be proposed with justification*, the proposal process should include greater input from the Board and its substantial resources to garner approval prior to enacting studies and research under the premise of permit compliance monitoring. The Program staff are to be commended for their initiatives toward the advancement of the science associated with stormwater management and monitoring, however a less confrontational approach is recommended over the "assessment of the assessment" approach to effect change in the statewide program. Where regional conditions may have significant ramifications in the implementation of the statewide protocols resulting in deficiencies in usefulness of the data collected, the program should consult with the Board on practical alternatives identifying those conditions and potential technical resolutions to address them. To date these consultations have been conclusions reached through parallel studies and assessments, rather than collaborative negotiation of alternate protocols or techniques.
- *Importance of conventional monitoring*
 Discussions with Program staff indicate that the current direction of the multi-year plan includes a strong move toward bioassessment and physical habitat assessments. While the use of bioassessment as a response to physical and chemical stressors has several important advantages, bioassessments do not overshadow the importance of conventional

physicochemical monitoring. Bioassessments should include sample collection and analyses for a parallel suite of stressor indicators. Metals analyses in particular have extended holding times of six months, which could be useful following interpretation of final assessments of benthic macroinvertebrate (BMI) assemblages. As the BMI assessment may indicate recent or current stress of the watersheds, corresponding elemental analysis may prove useful for point-in-time assessment of the apparent response. Should accelerated BMI assessment be a possibility, additional chemical parameters with holding times of up to 28 days may provide valuable information to aid in the interpretation of the bioassessment results. As cost-effectiveness is an increasing concern, concurrent sample collections for archival for later chemical analysis is a practical approach to gain potentially useful insights.

- *Stressor assessment vs. response assessment*
Monitoring of physical and chemical stressors can be confounding until sufficient data have been collected and synthesized to gain a full understanding of the characteristics and variability in the streams. Response assessments (bioassessments) do not determine the potential cause of stresses to the biological indicators, but may facilitate more focused stressor (physicochemical) monitoring and assessments. It is clear from the Multi-year and FY 03-04 Monitoring Plans that SCVURPPP desires to move away from stressor assessment to response assessment as a means to target its future special studies and monitoring efforts. On its own merit, the program is not unsound for this reason, but unforeseen delay in data interpretation or follow-on stressor analyses may limit the usefulness of bioassessments. Program staff also indicated concern that physicochemical monitoring has limited use because the watershed is subject to flash flooding and seismic events. These eventualities may complicate scheduling and safe execution of a meaningful monitoring program, but they are the prevailing conditions for the region and cannot be considered significant in development of a monitoring program. These events may also complicate a monitoring program focused on conventional physicochemical stressor measurements, but physicochemical measurements are more amenable to remote collections, are less likely to bear long-term effects, and may be useful in consideration of overall temporal variability in the watershed that is apparently not well understood. It is important that conventional monitoring be continued in subwatersheds on the rotating basis to gain better understanding of the variability and character of the streams within the basin.
- *Hydrograph Modification Management Plan*
As the Hydrograph Modification Management Plan, or Hydromodification Plan (HMP), is being drafted, it is anticipated that the monitoring associated with demonstrating its effectiveness will encompass habitat assessments in the overall stream geomorphic assessments. Evaluation of the monitoring associated with the HMP is recommended to ensure that data collections are sufficient to support the routine monitoring requirements of the permit concurrent with the demonstration of effectiveness for the HMP. Depending on how widely the HMP is ultimately applied, the HMP could offer an opportunity for the Program to expand its habitat assessments and ecosystem functions analysis in support of this significant management initiative.

- *Monitoring plans either do not yield sufficient usable information, or data evaluation is not thorough enough to make conclusions about water quality (FY02-03 plan)*
The first paragraph of the Annual Report FY02-03 appendix containing the FY02-03 monitoring report indicates that the data collected for the Lower Penetencia and Coyote Creek watersheds were “screening level/baseline data,” suggesting that insufficient data were collected for definitive assessment. The revised monitoring plan should include a more comprehensive assessment of existing historical and primary data collection activities undertaken by the Program. It is acceptable to offer the conclusion that current data are not sufficient to draw definitive conclusions, provided the monitoring plan includes adequate provision to address this deficiency.

One report, the Coyote Creek Watershed Integrated Pilot Assessment, did draw clear conclusions and offer potential management alternatives, but these conclusions were not incorporated into the Annual Report. The Annual Report should (1) restate or summarize all conclusions and findings from all monitoring and assessment activities during the year, and (2) state how these conclusions will be acted upon. See further comments on reporting below.

- *Improve reporting formats*
Further evaluation is recommended with respect to the communications between the Program and the Board relative to reporting formats. Given the breadth of the Co-permittee and stakeholder groups, it is apparent that the reporting process and its subsequent review have become inefficient as the monitoring program develops. Annual reports become overwhelmed in appendices and supporting data, without providing a watershed-based synthesis of the data. The program maintains an effective web site as a repository for key reports, deliverables, and technical memoranda. Reproduction of existing reports in the annual report is neither an efficient application of Program resources nor of the Board’s resources in assessment of permit compliance.

The annual report could be simplified greatly through greater reliance on the web resources established and maintained by the program staff. Specifically, with regard to the Provision C.9. submittals, the annual report contains appendicized reports which are published throughout the monitoring year. The annual report could be greatly simplified through presentation of only those activities conducted in the current reporting year (potential trends identified; conclusions, where adequate data are available; or the gaps identified for further information requirements; and the direction for future investigation, where applicable). Because the various investigative reports are available to the general public on the web, reference to the appropriate supporting information should be adequate to allow a reconstruction or assessment of the study progress.

Where the annual receiving water monitoring data are released concurrently with the annual report, it may be unavoidable to include the full appendix for chemical data with the annual report, however review of interim deliverables is critical to ensure their accuracy in the annual report submission.

- *Subcontractor quality systems*

It is apparent that quality systems need improvement relative to the collection, review, and use of physicochemical data in both the subcontractor and Program management organizations. Timely assessment of data has not been performed prior to release of the data from the subcontract laboratory or from the Program staff. This situation precludes an effective corrective action system, and, given the schedule for the current monitoring year, requires immediate evaluation by the Program staff. The corrective action system is not apparent, as the data analyses currently being undertaken with the review and assessment of the multi-year plan will reveal inaccuracies and inconsistencies in data collected as part of the FY 02-03 Monitoring Plan, at the same time that the second of three rounds of sampling for the current fiscal year are scheduled for mobilization. Quality systems appear to have failed, and their reassessment is strongly recommended.

Specific examples of inconsistencies with regard to the analytical chemistries presented in the FY02-03 Receiving Waters Monitoring Report include a number of typographical errors, and conflicting corollary data. The report also indicates that the data were subject to verification and validation reviews prior to release to SCVURPPP. This subcontractor internal review system should have identified the inconsistencies in the deliverables, as it is integral to the National Functional Guidelines to verify corollary data. Further, SCVURPPP's reviews were not apparent, as no mention is made of the anomalous results or inconsistencies in the SCVURPPP FY 02-03 Watershed Monitoring and Assessment Summary Report. No actionable conclusions are drawn based on the collection of screening data in the report, but the fact that there is no evidence of a detailed data assessment as part of its preparation indicates a failure in the review processes and the quality system. SCVURPPP is ultimately responsible for the quality of the data produced and submitted in its annual reports, and should provide closer oversight of subcontractors and the data they produce.

- *Citation of reference methods.* Table 14 of Attachment B, Appendix C of the Annual Report cites EPA method 8370C as a Selective Ion Monitoring Method for PAH analysis. This appears to be a reference to 8270C (the most current promulgated SW846 method for semivolatiles), however, the following table entry indicates method 8270 as the analytical method for analysis of Semivolatiles (SVOCs). Updates to Method 8270 (1986) have been promulgated three times in revisions A (1992), B (1994), and C (1996), and there is currently a revision D in draft Update IV-A in 1998. While these references are easily accessible in the laboratory community, the full method reference is critical for future data users in their continuing analysis.
- *Corollary data.* A number of dissolved organic carbon (DOC) results were observed in excess of total organic carbon (TOC) results for corresponding samples (dry season UP1 and UP3; declining hydrograph [spring] B1 and LS2; and wet season LC1, UP3, and LS1), none exceeded method variability. Results for orthophosphate exceeded the corresponding sample results for total phosphorus in UP3 for the declining hydrograph (spring) by nearly a factor of two. Results for dissolved metals exceeded the corresponding total metals results for a number of elemental analyses in the

declining hydrograph and the wet season sampling. A number of these exceeded method variability, one by more than a factor of five. Of particular note is that this observation could not be made in the dry season sampling for any elements, but 15 dissolved measurements in the spring and 8 in the wet season were observed to have this inconsistency. These observations were made with regard to dissolved versus total measurements of cadmium, chromium, nickel, silver, and zinc. For the sediment sample analyses, the total solids and percent moisture results do not add up to 100%, as would be expected given that they were analyzed by the same method, and were likely measured and calculated concurrently. Three of four sediments do not approach 100%.

Most of these observations exceed method variability where discrete measurements are employed, however, normal validation protocols include analysis of corollary data, and would include a comment regarding these observations and which exceeded the respective estimates of method variability. There are other instances not cited here that were within method variability and, as such, are not mentioned as examples of system failure, but should be discussed in laboratory reports.

These observations may indicate that there were laboratory issues associated with the discrete measurements or the measurement systems, or that the samples were mislabeled in the laboratory in various stages of sample handling and processing. Labeling issues are particularly difficult to address, as it is difficult to fully isolate the issues to just these observations at this late stage.

- *Subcontractor performance metrics and evaluation.* It is recommended that SCVURPPP reassess its system of qualification and evaluation for subcontractor analytical services. While the published laboratory reports include a statement that data are subject to verification and validation, neither is apparent in detailed review. The verification and validation reviews should be adequate to identify and resolve these types of inconsistencies. As the self-evaluation system being employed by the laboratory is inadequate, it is critical that the Program revise its subcontractor performance evaluation and metrics. It is further recommended that SCVURPPP reassess what services it contracts from each of its vendors, as environmental laboratories do not commonly offer interpretive analysis as part of their core business services. This functional contribution may be inappropriately assigned outside of the laboratory's core competencies. Chemistry laboratories, while having the breadth of exposure to large volumes of environmental data, are generally not charged with its interpretation. The same is not true for biological services, as interpretation of results is integral to conducting routine biological assessments. There were no significant issues noted with the bioassessment data included with the program deliverables.