State Route 125 Toll Road

A Report Describing Lessons Learned for
Future Regulatory Action

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by

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Need for Lessons Learned Report

Construction and maintenance of major linear transportation corridor projects such as roadways and railways has the potential to negatively impact waterways because of the introduction of new sources of pollutants. With upcoming roadway expansions and construction of new highways planned in several locations in the Southern California region, the manner in which the Regional Board oversees and regulates discharges from these projects and assesses impacts to water quality warrants review and refinement to better protect water quality and beneficial uses.

Unlike most construction projects where the Regional Water Quality Control Board, San Diego Region (Regional Board) has regulatory oversight, large transportation corridor projects are often problematic. Unlike other types of development, these types of projects often involve disturbing massive amounts of soil in multiple watersheds and the consequential potential for erosion and deposition of sediment into receiving waters. Transportation corridor projects also typically require many years of construction to complete, thereby increasing the chances of disturbed sediment reaching receiving waters over multiple rainy seasons. Large transportation projects cross multiple rivers and streams and includes significant modification of the natural hydrograph by the creation of impervious surfaces, placement of landscape irrigation and runoff, and are sources of road surface discharges of metals, hydrocarbons, and other pollutants. These pollutants are deposited to the receiving waters through stormwater and non-stormwater runoff, and aerial re-suspension and deposition. Because the potential to introduce pollutants into the watersheds is great, these types of projects also tend to be highly controversial. Administratively, the level of complexity in these projects further increases if a public-private partnership is involved.

The recent expansion of the State Route 125 Toll Road (SR-125 Toll Road) is one such complex transportation corridor project. The Regional Board's oversight of this project offers lessons to be learned in clearly understandable terms of minimizing ambiguity, clarifying expectations of the discharger(s), and ensuring that adequate legal and technical mechanisms are in place to implement effective management of the pollutants and discharges from these facilities.

Background on State Route-125 Toll Road

On April 23, 2001, the Regional Board adopted Resolution No. 2001-51, a resolution approving Clean Water Act Section 401 Water Quality Certification No. 99C-133 for the construction of SR-125 Toll Road. During the 5 year long road construction period, the Regional Board issued 4 Notices of Violations (NOVs) to the California Department of Transportation, District 11 (Caltrans) and Southbay Expressway (SBX; formerly California Transportation Ventures) for failing to meet certain conditions of the 401 Certification, and for failing to use

adequate construction best management practices (BMPs). Specifically, the numerous NOVs cite the failure to use erosion control measures and the subsequent discharge of sediment to receiving waters during storm events. Additionally, the Regional Board issued Caltrans and SBX (the dischargers) an NOV for failure to meet a condition to "promote and pursue" an aerial deposition study, as required by the 401 Certification. This condition was added to the Certification by the Regional Board during the public hearing to reassure concerned stakeholders that any aerial deposition of pollutants from the roadway landing on nearby Sweetwater Reservoir would be closely monitored. To date, the Regional Board and the dischargers remain in disagreement as to whether or not this condition has been met.

Finally, the 401 Certification requires that post-construction BMPs be fully vegetated and functional prior to road opening. When the SR-125 Toll Road was opened for public use on November 19, 2007, permanent, post construction BMPs proposed by the dischargers were neither in fact fully complete nor functional. Monitoring results from the first storm events of the 2007/2008 rain season following the opening of SR-125 Toll Road exhibited discharges of pollutants from the roadway in excess of those authorized by the 401 Certification as issued in 2001 and amended in 2007. These issues are more fully discussed below.

Jurisdictional Wetland Impacts and Mitigation Implementation

Large, multi-watershed, linear transportation corridor projects such as the SR-125 Toll Road involve more complex wetland delineations and impacts than conventional development usually regulated with 401 Certifications. Because they transverse multiple watersheds, impacts to wetlands are far more reaching than sizeable construction projects confined to one watershed. The increased uncertainty regarding negative impacts that is associated with such large planning efforts can result in outdated impact delineations and inadequate mitigation.

During construction of the SR-125, the dischargers informed the Regional Board that temporal impacts delineated for a portion of the SR-125 Toll Road have been found in the final project to be permanent impacts due to slope encroachment on the wetland area. Because the project design deviated from what was originally proposed, the slope encroachment onto jurisdictional wetlands was not accounted for. Consequently, the loss of wetlands was not addressed in the overall mitigation plan, and the dischargers must now devise an alternative mitigation plan. Adequate mitigation of temporal and permanent impacts is necessary to comply with the state and federal No Net Loss policies for wetlands as well as to preserve the structure and functions of these areas and the water quality benefits and beneficial uses they support.

Construction Phase Violations and/or Inadequate BMPs.
During the course of constructing the SR-125 Toll Road, the Regional Board issued 3 NOVs) to the dischargers for failure to implement construction BMPs and/or failure to conduct water quality monitoring. Field inspections between March 2004 and September 2007 showed that failure to implement construction BMPs caused erosion and deposition of sediment into receiving waters. In some areas, BMPs were utilized but not properly maintained, therefore the effectiveness was compromised.

Such problems are not unique to the SR-125 project. During widening of the Interstate 5/Interstate 805 interchange initiated in 2002, the Regional Board issued 9 NOVs to Caltrans for failure to implement effective combinations of erosion and sedimentation controls. As a result of these ineffective or non-existent BMPs, massive volumes of sediment were discharged to Los Peñasquitos Creek, Carmel Valley Creek, and Soledad Canyon Creek. Significantly, these streams are tributary to Los Peñasquitos Lagoon, which is listed on the State's Clean Water Act Section 303(d) List of Water Quality Limited Segments as impaired for sediment. In response to these discharges, the Regional Board issued Caltrans a Cleanup and Abatement Order in May 2003, to implement BMPs at this construction site and submit progress reports.

Inadequate Planning and/or Implementation of Post-Construction BMPs.
The 401 Certification requires that post-construction BMPs be fully vegetated and functional prior to road opening, and that the BMPs achieve an 80 percent reduction in suspended solids and total metals. Monitoring results from the first storm events of the 2007/2008 rain season following the opening of SR-125 Toll Road revealed that the performance standards described in the 401 Certification were not met.

Although the engineering plans for the SR-125 Toll Road included numerous post-construction treatment BMPs, the problem therein was that the schedule for completion of these treatment BMPs was apparently not given a high priority by the dischargers until too late. This failure to plan appropriately occurred despite repeated admonitions from the Regional Board over the life of the project that the dischargers needed to initiate the construction of the post-construction BMPs in the years before the planned opening of the SR-125 Toll Road to vehicles. Indeed, to best protect water quality, these devices should be completed as soon after the placement of the permanent impervious surfaces in order to prevent or reduce downstream hydromodification and discharges from construction activity on these surfaces that could affect water quality. Instead, the dischargers did not prioritize this issue for action until just weeks before the scheduled road opening. In a hasty attempt to come into compliance with the intent of the Certification, the dischargers launched an interim stormwater management strategy using construction BMPs to mimic the design and function of permanent BMPs. The interim construction BMPs are being used until the vegetation in the post-construction BMPs has become 70 percent established. Information to date has

shown that this strategy is ineffective at meeting the discharge requirements of the 401 Certification. Clearly, the dischargers failed to meet the conditions of the 401 Certification by both opening the road before the post-construction BMPs were fully vegetated and functional, and by causing un-permitted discharges of sediment and other pollutants during storm events in December 2007 and January 2008.

Lack of Aerial Deposition Study.

The condition in the 401 Certification to "promote and pursue" an aerial deposition study was added to the Certification to reassure concerned stakeholders that any aerial deposition of pollutants from the roadway landing on nearby Sweetwater Reservoir would be closely monitored. Although the Regional Board clarified that a study with actual air and water quality measurements was required, the dischargers never embarked on such a study, relying on ambiguous language added by the Regional Board during the hearing as providing them discretion the Regional Board did not intend to provide. Clarification of the intent of the Regional Board for this requirement to include actual measurements provided in a letter from the Regional Board Executive Officer to Caltrans and California Transportation Ventures (now Southbay Expressway) in November 2001 was apparently disregarded.

The Regional Board recognizes that construction of new roadways or roadway expansions introduces pollutants to the watershed via aerial deposition from either vehicle exhaust or re-suspension of road bed materials, and that quantification of this phenomenon is useful for designing strategies to reduce such pollutants. This is especially important because current aerial particulate standards enforced by the California Air Resources Board are set for the protection of human respiratory health—and have little consideration for the protection of aquatic ecosystems.

In one study, researchers characterized the dry deposition patterns of chromium, copper, lead, nickel, and zinc upwind and at increasing distances downwind of the I-405 Freeway in coastal Los Angeles (Sabin et al., 2006). Dry deposition fluxes and atmospheric concentrations of these metals were highest at the site closest to the freeway, and reduced to approximately urban background concentrations between 10 and 150 meters (0.006 to 0.9 miles) downwind of the freeway. These data indicate that over time aerial deposition of metals in the vicinity of major roadways can be a significant anthropogenic source of such pollutants to the affected watershed.

A recent study in the City of San Diego examined dry weather aerial deposition of metals within the Chollas Creek watershed (Weston Solutions, 2007) and found similar results. The purpose of the study was to assess the contribution of aerial particulate deposition to storm water pollution in the City of San Diego. Study authors concluded that roadways had overall greater metal particulate emissions than industrial emissions, and re-entrainment of dust from freeways and surface

streets is most likely the largest contributor of aerial particulates throughout the City of San Diego.

Although there are relatively few studies that have looked at aerial deposition of vehicle-related contaminants on surface waters, these findings document that the air-water interface is an important mechanism for pollutant fate and transport. Aerially born pollutants pose a threat to downstream waterways because pollutants that have deposited within the watershed will likely dissolve during precipitation events and contaminate surface waters via stormwater runoff. Considering that there are currently 43 pollutant-waterbody combinations in the San Diego region included on the State's List of Water Quality Limited Segments for impairment from vehicle-related contaminants, it is critical to identify definitive sources of these contaminants and develop strategies to reduce them. Quantifying the amount of metals and other contaminants depositing aerially in the watershed is a necessary step towards developing pollutant reduction strategies.

Lessons Learned: Recommendations for Regulation of Future Large Transportation Corridor Projects

As a result of problems associated with the SR-125 Toll Road, the following recommendations are made for Regional Board oversight of future construction/expansion of large transportation corridor projects.

Issue 1: Large Transportation Corridor Projects Involving Several Partners Are Complex And Present Numerous Technical And Administrative Challenges.

A 401 Certification is required for a project that will result in permanent or temporary impacts to a water of the State/U.S. by dredging or filling of that water. A project proponent is encouraged to avoid impacts to wetlands. Where impacts to wetlands cannot be avoided, they must be minimized and the applicant must perform mitigation for all temporary or permanent impacts created by the project. The 401 Certification is a necessary precursor for the project to obtain a Clean Water Act section 404 permit from the U.S. Army Corps of Engineers, which is required before the project can commence. The 401 Certification is the regulatory tool used by the Regional Board because it is a necessary step for the project proponent in obtaining subsequent approvals. Typical 401 Water Quality Certifications are issued to a single project proponent for projects with relatively short construction and mitigation timeframes that are usually completed in less than one year.

Regulatory tools like the 401 Water Quality Certification are not the best approach to regulating the full range of activities on these types of long-term infrastructure projects. Applicants submit a one-time fee of $500 for processing (in addition to added fees based on the size of the temporary and permanent

impacts). This one-time fee is sorely inadequate in funding the necessary regulatory oversight needed for multi-year projects.

Projects that involve multiple partners with varying authorities and responsibilities are difficult to regulate using 401 Certifications. The 401 Certification application process is relatively simple and straightforward and does not necessarily prompt the applicant for all the information that may be needed for a complete analysis of the direct and indirect impacts to jurisdictional waters. In addition, responsibilities that are shared under the 401 Certification can be neglected by one of the parties, as seems to have been the case with the SR-125 Toll Road, with uncertain ramifications for the other partner. Finally, the 401 Certification is typically approved by the Executive Officer without a public hearing, although any member of the public can and sometimes do request a more formal process to address issues with a pending 401 Certification.

Recommendation: Issue Waste Discharge Requirements For Large Transportation Corridor Projects.

For transportation corridor projects with construction schedules spanning lengthy timeframes, the Regional Board should consider using individual Waste Discharge Requirements (WDRs). In an open and public process, the dischargers, concerned stakeholders, and the Regional Board will be able to more fully evaluate the totality of the project through examination of a Report of Waste Discharge, which can provide much more information about the project than is usually submitted with a 401 Certification application. In drafting and approving WDRs, the Regional Board can more clearly establish specific expectations for each partner in the project, establish clear prohibitions, set specific requirements to control discharges from the project and perform appropriate monitoring and self inspection and reporting duties for the facility and receiving waters, and finally that presents complete and adequate findings that provide support and justification for each of the above requirements.

Although Caltrans is regulated statewide through a general NPDES stormwater permit for its properties, facilities, and activities, projects that involve a private-public partnership present significant challenges because the private entity is not regulated directly under this general statewide permit; as indicated above, this has proven to be a problematic issue. The Regional Board is not, however, precluded from using WDRs to regulate these projects with more specific language that is pertinent to the site (SWRCB, 1999). In addition to addressing the needs of the project in terms of obtaining the 401 Certification, WDRs can also provide additional measures specific to the project (i.e. post construction management measure requirements, performance standards, monitoring requirements, etc.) that are only generally addressed in the statewide general permit.

The 401 Certification, although a very useful and expedient tool for smaller, less complex projects, has not been as useful in this regard as other regulatory tools

like NPDES permits or Waste Discharge Requirements that clearly assign roles and responsibilities and that provide a funding source through payment of annual fees for the long term and close Regional Board oversight these projects require.

Issue 2: Wetland Delineation and Mitigation.
Wetland mitigation is dependent on the delineations performed prior to the start of the project that do not necessarily reflect the reality of the finished transportation project. Permanent or temporary impacts to various wetland types, acreage, or functionality in the finished project may change from that originally proposed for the project. For example, due to slope encroachment into a wetlands area during construction, impacts that were identified as temporary impacts in the 401 Certification application submitted for the SR-125 Toll Road may have resulted in permanent impacts in the finished project. Moreover, several recent studies in southern California have shown that although mitigation may be complete in terms of acreage created, the mitigation acreage created may not have adequate functionality, resulting in an actual net loss of wetlands and a failure to conform to the No Net Loss policies.

Recommendation: Include Wetlands Habitat Monitoring, Management, And Mitigation Plans in WDRs Or 401s That Include Before, During, And After Wetlands Impacts Delineation, Mitigation, and Management.
To adequately identify and protect wetland and wetland functions impacted directly or indirectly by the project, the Report of Waste Discharge or 401 Application should provide a detailed analysis of the projects' impacts before, during, and after construction. Some of the documentation that should be provided in the description of the project before, during and after construction includes photo-documentation, GIS maps, and functionality measures. The WDRs or 401 Certifications should include specific mechanisms to enable the Regional Board to require additional mitigation in the event that unforeseen wetlands impacts occur or in which the type or timing of impacts change during the project.

Moreover, in cases where there is demonstrably inadequate functionality in completed mitigation wetlands, specific mechanisms to evaluate success of the mitigation should be included and language included in the WDR or 401 Certification to provide for additional mitigation or improvements in the mitigation measures implemented in order to achieve full mitigation success. For perennial and certain non-perennial streams, one of the tools used to evaluate mitigation success should be the peer reviewed and published Index of Biotic Integrity (IBI - Ode et al 2005). Where appropriate, the before/after and upstream/downstream IBI scores should be used to set performance standards for mitigation functionality in river and stream systems. For wetland areas in general, the California Rapid Assessment Methodology should be used. A similar performance standard for monitoring and evaluating wetland mitigation functionality using the CRAM scores should be established in the WDRs or 401 Certification.

Issue 3: Construction Phase Violations.
As stated earlier, both the SR-125 Toll Road and the widening of the Interstate 5/Interstate 805 projects experienced discharge violations because of negligence in maintaining BMPs or failure to use BMPs altogether.

Recommendations: Improve Construction Phase Measures Through Specific WDRs For Erosion And Sedimentation Control, And Conduct Regular Inspections.
Because transportation corridor projects have the potential to dislodge huge volumes of sediments, site specific requirements regarding the use of effective combinations of construction BMPs for erosion control should be incorporated into the WDRs. Additionally, the WDRs should require the dischargers to conduct inspections of BMPs at specified frequencies to ensure maximum effectiveness. The WDRs should also include a requirement to report failure of the BMPs or other violations on a monthly basis for the lifetime of the construction phase. Water quality monitoring to assess BMP effectiveness should also be incorporated, as discussed under Issue #3 below.

Furthermore, the Regional Board should plan to conduct regular oversight inspections of the large transportation corridor projects in coordination with Caltrans staff.

Issue 4: Need For Additional Effectiveness Monitoring And Assessment, Water Quality Monitoring.
Site visits to both the Interstate 805/Interstate 5 widening project and the SR-125 Toll Road revealed that several construction BMPs were in place, yet they were not completely effective because they were not properly maintained.

Recommendation: Include Numeric Effluent Limits for Facility Runoff, and Include Specific Monitoring And Reporting Requirements for both Receiving Waters and Facility Runoff And Inclusion of Prospective Penalties.
One option that the Regional Board could utilize in the WDRs is the inclusion of numeric effluent limits for the discharge of roadway waste. Similar to WDRs for point source facilities, this could be one type of performance measure that is easily monitored. WDRs should state what constituents are to be measured, under what conditions sampling is required, including locations and precipitation probabilities, and the frequency in which the self-monitoring reports must be submitted. Additionally, WDRs should include specific monitoring and reporting requirements for receiving waters to assess the effectiveness of BMP strategies in protecting water quality.

Finally, prospective penalties could be identified in the WDRs and administered through enforcement actions for significant violations of the WDRs. Prospective penalties would provide a proactive motivation to meet and maintain the

compliance standards and avoid costly penalties rather than addressing the problems after the discharges have occurred.

Issue 5: Inadequate Post Construction Best Management Practices.
Because roadways alter hydrology through the addition of extensive impervious surfaces and discharge pollutants associated with vehicles such as metals and hydrocarbons during rain events, it is essential that post-construction BMPs be in place and functional before the roadway is open to vehicular traffic. Without functional BMPs, pollutants from the roadway can enter receiving waters with little or no treatment.

Although the Regional Board provided guidance regarding the need to implement post-construction BMPs early on the SR-125 Toll Road, more site visits during roadway construction focusing on this specific issue might have been helpful.

Recommendation: Include Specific Performance Measures And Prospective Penalties For Implementation Of Post Construction Management Measures For Transportation Corridor Projects.
In order to avoid this scenario of ineffective post-construction BMPs in future road expansion projects, WDRs should include specific language describing performance measures and timelines. This will ensure early prioritization of effective measures to protect the quality of the downstream surface waters. WDRs should include:

A. **Requirement for detailed plans describing post-construction BMPs and management measures**. One of the most challenging aspects of regulating large transportation projects is getting the discharger to incorporate protection of water quality into the design aspects early into the project. Although the Regional Board typically provides comments on the Environmental Impact Report (EIR) during the California Environmental Quality Act (CEQA) process, details of the project design are not usually negotiated until the project proponent seeks a 401 Certification. One positive aspect about the design of the SR-125 Toll Road is that several post-construction BMPs were included to treat runoff from most of the roadway surfaces. However, the inclusion of these treatment facilities as part of the design plan for this transportation corridor project was the exception, rather than the rule. For future projects, in addition to encouraging the project proponent to consider water quality impacts during the CEQA comment period, WDRs should require specificity in terms of design plans for post-construction stormwater treatment. As much attention should be spent on incorporating stormwater treatment BMPs into the project design as other components of the project. The Regional Board should consider denying issuance of WDRs and/or the 401 Certification pending adequate engineering/construction management plans showing proper treatment of

stormwater runoff in both the construction and post-construction phases of the project.

B. **Better defined timelines for the implementation of post-construction BMPs**. Condition D.6 of the 401 Certification for the SR-125 Toll Road contains the following language: "Caltrans and CTV (SBX) shall plant permanent landscape material and begin irrigation within one year of ground disturbances." Although the Regional Board issued the dischargers an NOV in February 2005 for failure to meet this condition, the dischargers later responded that meeting this condition would not be possible because in some areas, construction activities would span multiple years, and planting of vegetation requires finished grade. Although the intent of the Certification language was to initiate slope stabilization by planting vegetation and provide natural filtration of pollutants, the language in the Certification was never reconciled with the discharger's construction schedule. One alternative would be to include staggered performance measures, measured from either the completion of slope grading, or the proposed date of road opening. For example, since vegetated BMPs for post-construction treatment of pollutants were included as part of the road design, planting of the vegetation and associated irrigation should begin immediately upon completion of specific grading activities. Therefore the requirement should explicitly state, for example, that "Within 2 weeks of completion of final grading, planting of vegetation and associated irrigation within post-construction BMPs must be initiated. Twelve months after completion of final grading, post-construction BMPs must be fully vegetated and functional."

C. **Prospective penalties**. WDRs should include prospective penalties associated with them if they are not met. For example, if the performance standard is not adequately demonstrated, then civil liabilities could be automatically administered. Using the example above, the following language could be inserted: "If vegetation of post-construction BMPs is not initiated within 2 weeks of completion of final grading, then dischargers shall be administered a civil liability in the amount of $10,000 per day until the condition is met."

In addition to these measures, the Regional Board should conduct site inspections throughout the life of the project for the purposes of assessing compliance with the construction and post-construction BMP requirement. This will help ensure that attention is focused on this requirement well before the road opens for public use.

Issue 6: Need For Additional Information Regarding Impacts Of Re-Suspended Road Bed Materials And Aerial Deposition In Nearby Receiving Waters.

As previously mentioned, the ambiguous language in the 401 Certification for the SR-125 Toll Road to "promote and pursue" an aerial deposition study resulted in a disagreement between the Regional Board and the dischargers in terms of what was expected. Future such requirements should avoid ambiguous language.

Recommendation: Include Appropriate, Clear, Site Specific Aerial Deposition Monitoring Requirements In WDRs For Transportation Corridor Projects, And Coordinate With The Air Resources Board.

To obtain the necessary information regarding pollutant sources, the monitoring and reporting program in the WDRs should explicitly require monitoring of aerial deposition of vehicular-related pollutants within the WDRs. Monitoring locations would be placed in strategic locations downwind of roadway alignments. If appropriate, monitoring requirements could be restricted to timeframes focused on before-and-after roadway openings to see if there is a quantifiable difference in the rate of deposition between the two conditions.

Additionally, the Regional and/or State Water Resources Control Board should coordinate with the Air Resources Board to address the current particulate standards that are ineffective at protecting aquatic ecosystems.

Summary

The failure of both the construction and post-construction BMPs along the SR-125 Toll Road to protect water quality is cause for reassessment of the manner in which the Regional Board regulates major transportation corridor projects. The Regional Board's intent is to utilize the lessons learned from this construction project and implement the recommendations contained in this report on upcoming road expansion projects such as the widening of Interstates 5 and 15. Additionally, if the proposed State Route-241 Toll Road is ever constructed, the recommendations in this report will be implemented to protect the sensitive aquatic systems and wildlife habitat surrounding the footprint of this proposed project.

Regional Board participation in the CEQA process and issuance of site specific WDRs in addition to 401 Certifications for these projects will enable the Regional Board to establish and enforce effective requirements. Specifically, WDRs should include site specific requirements for erosion and sediment control, monitoring and reporting requirements, performance measures for both construction and post construction BMPs including numeric effluent limits, prospective penalties for failure to meet these performance measures, and a component for aerial deposition monitoring.

This specificity in requirements, in addition to a more thorough, regular inspection presence, will in turn aid the Regional Board in overseeing compliance with efforts to protect water quality. The goal is to avoid in future projects the shortcomings exhibited by the SR-125 Toll Road project. Specific WDRs should result in prioritization for protecting water quality, both during and after construction, upon commencement of the construction project.

Literature Cited

Ode, P, A. Rehn, and J. May, 2005. *A Quantitative Tool for Assessing the Integrity of Southern Coastal California Streams.* Environmental Management. Vol. 35, No. 1, pp. 1-13.

Sabin, Lisa D., Jeong Hee Lim, Maria Teresa Venezia, Arthur M. Winer, Kenneth C. Schiff, and Keith D. Stolzenbach, 2006. *Dry deposition and resuspension of particle-associated metals near a freeway in Los Angeles*. Atmospheric Environment 40 (2006) 7528-7538.

State Water Resources Control Board (SWRCB), 1999. Order No. 99-06-DWQ. National Pollutant Discharge Elimination System (NPDES) Permit Statewide Storm Water Permit And Waste Discharge Requirements (WDRs) for the State of California, Department of Transportation (Caltrans).

Weston Solutions, Inc., 2007. *City of San Diego Dry Weather Aerial Deposition Study*.