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PART A – COVER PAGE

STATE WATER RESOURCES CONTROL BOARD
SFY 2002 Costa-Machado Water Act of 2000
Chapter 7, Article 5, Coastal Nonpoint Source Control Program

Application No. _130_

PROJECT TITLE: **THE BRAKE PAD PARTNERSHIP**

Project Region		Indicate RWQCB #:	
Multi-regional Project		Indicate RWQCB #s:	
Statewide Project	**X**	Indicate RWQCB #s:	CNPS **1, 2, 3, 4, 8, 9**

PROJECT DIRECTOR (one name only) (Ms., Mr., Dr.): MS. MARCIA BROCKBANK — JUNE 5, 2002
PRINT — DATE

LEAD APPLICANT OR ORGANIZATION: (one name only) ASSOCIATION OF BAY AREA GOVERNMENTS

TYPE OF AGENCY:

Municipality		Local Agency		*Nonprofit (non-landowner)	
Nonprofit (landowner)		Local Public Agency	**X**		

STREET ADDRESS: 101 EIGHTH STREET
CITY: OAKLAND — Zip Code: 94607-4756
P.O. BOX: P.O. BOX 2050 — Zip Code: 94604-2050
COUNTY: ALAMEDA
STATE: CALIFORNIA

PHONE NO.: 510-622-2325 FAX NO.: 510-622-2501

E-MAIL ADDRESS: mlb@rb2.swrcb.ca.gov FEDERAL TAX ID. NO.: 94-2832478

PROJECT TYPE: Runoff Pollution Prevention

LEGISLATIVE INFORMATION				
	Senate District	2-4,7-11, 13,15	Assembly District	6-8, 11-16, 18-24
	United States Congressional District	1-3,6-10,12-16		

RWQCB or SWRCB STAFF CONTACTED REGARDING THIS PROPOSAL:

RWQCB Contact:	**Richard Looker**	SWRCB Contact:	**Bill Campbell**
Phone No.:	510-622-2451	Phone No.:	916-471-5499
Dates contacted:	8/01, 11/01 … 5/02	Dates contacted:	5/3/02
RWQCB Contact:	**Carrie Austin**	RWQCB Contact:	**Tom Mumley**
Phone No.:	510-622-2451	Phone No.:	(510) 622-2395
Dates contacted:	8/01, 11/01 … 5/02	Dates contacted:	5/01, 8/01, 4/02

COOPERATING ENTITIES:

Entity Name:	**Bay Area Stormwater Management Agencies Association**		
Role/Contribution to Project:	Partner/Stakeholder–provide tech support & matching funds		
Contact Person:	Geoff Brosseau	Phone No.:	510-622-2326
E-mail address:	gabrosseau@attbi.com		

Entity Name:	**U.S. Environmental Protection Agency**		
Role/Contribution to Project:	Partner/Stakeholder—provide technical support		
Contact Person:	Jim Pendergast	Phone No.:	202-566-0398
E-mail address:	pendergast.jim@epa.gov		

Entity Name:	**Brake Manufacturers Council Product Envt'l. Cmte.**		
Role/Contribution to Project:	Partner/Stakeholder–provide tech support & matching funds		
Contact Person:	Pat Thesier	Phone No.:	734-414-5549
E-mail address:	pthesier@aol.com		

Entity Name:	**CLEAN South Bay & Sierra Club**		
Role/Contribution to Project:	Partner/Stakeholder—provide technical support		
Contact Person:	Michael Endicott	Phone No.:	916-627-8690
E-mail address:	sierrachub@aol.com		

Entity Name:	**San Francisco Bay RWQCB**		
Role/Contribution to Project:	Partner/Stakeholder—provide technical support		
Contact Person:	Richard Looker	Phone No.:	510-622-2451
E-mail address:	rel@rb2.swrcb.ca.gov		

WATERBODY/WATERSHED (Include Catalog Number from Section 18 of the ARD):	18050004 San Francisco Bay 18050002 San Pablo Bay 18050001 Suisun Bay
GPS COORDINATES FOR PROJECT LOCATION, IF AVAILABLE:	

FISCAL SUMMARY:

Prop 13 Funds Requested	$ 800,000
Other Project Funds	$ 820,000
Total Project Budget	$1,620,000

CERTIFICATION

Please read before signing.

I certify under penalty of perjury that the information I have entered on this application is true and complete to the best of my knowledge and that I am entitled to submit the application on behalf of the applicant (if the applicant is an entity/organization). I further understand that any false, incomplete, or incorrect statements may result in the disqualification of this application. By signing this application, I waive any and all rights to privacy and confidentiality of the proposal on behalf of the applicant, to the extent provided in this RFP.

Applicant Signature Date

Eugene Y. Leong, Executive Director, Association of Bay Area Governments
Printed Name of Applicant

Part B – Proposed Scope of Work

1. Background and Goals

California drivers use their brakes hundreds of millions of times a day, each time releasing small amounts of brake wear debris to the environment. In 1994, a highly disputed study roughly estimated that more than half the copper in urban runoff to the San Francisco Bay, for which copper is a pollutant of concern, comes from brake pads. Although the industry, environmental, stormwater management, and regulatory stakeholders have different perspectives on the potential significance of the study finding, today they are working together in the Brake Pad Partnership (BPP) to implement a program aimed at identifying and preventing impacts on surface water quality that potentially arise from the use of automotive brake pads.

The BPP's work is an integral part of the TMDL implementation plan for the Lower South San Francisco Bay, and the TMDL implementation plan soon to be extended to the entire San Francisco Bay. Although current plans are to delist the Lower San Francisco Bay as a copper-impaired water body, these plans are contingent on copper levels remaining constant or decreasing. Since 1998, however, the use of copper in brake pads has increased by 40%, as manufacturers have sought to meet new federal safety regulations and customer satisfaction requirements. This increase in usage raises concerns that urban runoff copper loadings to the Bay might also increase and result in significant water quality impairment. The increase in the copper content of brake pads underscores the urgency of addressing brake pads as a source of copper in urban runoff in the Bay Area and throughout the rest of the state.

If the BPP concludes that copper from brake pads is a significant source of water quality impairment, manufacturers have committed to voluntarily introducing new products within five years as a part of their participation in the BPP. It is critical that if the industry must replace copper with another material, that material not be harmful to the environment. Thus, whether or not copper from brake pads is found to be harmful to water quality, brake pad manufacturers intend to incorporate the Partnership's evaluation approach into their product development processes so that they can avoid the use of potentially harmful ingredients in the future. Although this project focuses on the San Francisco Bay as a case study, the outcomes of the project will be applicable to a wide variety of vehicle related pollution problems, and the results will produce long-term prevention of the release of harmful metals and other pollutants to the environment throughout the United States.

The proposed work outlined below consists of a series of interrelated tasks, which together will restore and protect water quality and the environment by reducing pollution in stormwater runoff; a portion of the effort entails ambient water quality monitoring. The work proposed will produce scientifically demonstrable water quality improvements and, given the excellent track record of the Brake Pad Partnership, it has a very high likelihood of success. The work proposed here is supported by all of the stakeholder groups involved in the BPP, including BASMAA, the U.S. Environmental Protection Agency, a coalition of Bay Area environmental groups, the San Francisco Bay Regional Water Quality Control Board, and the Brake Manufacturers Council.

2. Proposed Work to Be Performed

Task 4. Stakeholder Steering Committee and Communications

The Brake Pad Partnership (BPP) is collaborative endeavor of more than 300 individuals representing water quality regulatory agencies, automobile brake pad manufacturers, environmental groups, and stormwater management agencies. An existing Stakeholder Steering Committee comprised of representatives from each of these groups will provide policy and technical direction to the performance of Tasks 5, 6, 7, 8, 9, & 10. The BPP will also conduct outreach to inform the public of its progress.

4.1 Organize, convene, and facilitate monthly teleconference calls and quarterly meetings of the Steering Committee, frequently in conjunction with technical consultants, and members of the Scientific Advisory Team (see Task 5).

4.2 Organize, convene, and facilitate an Annual Stakeholder Conference for stakeholders and members of the public to come together for face-to-face discussions, and provide advice and guidance on project progress and direction.

4.3 Facilitate Steering Committee and stakeholders in detailed development of task plans and evaluation of task results.

4.4 Outreach to stakeholders and the public. Prepare and disseminate regular updates to stakeholders, approximately quarterly, reporting progress, outcomes, and next steps. Publicize the BPP's progress and accomplishments through target media, such as the San Francisco Estuary Project's *Estuary* newsletter.

4.5 Develop and maintain a website for information sharing among stakeholders, and to inform a wider audience of the Brake Pad Partnership's innovative approach for solving water quality problems. Reports from Tasks 5, 6, 7, 8, 9, & 10 will be made available to a broad public audience through this site.

Task 4 Deliverables: 4.1 Meeting minutes (including agenda, list of attendees, decisions made, and action items); **4.2** Annual Stakeholder Conference agenda, summary, and handouts; **4.3** Reports on detailed task plans and evaluation results; **4.4** Copies of regular stakeholder updates and public outreach materials; **4.5** Website.

Task 5. Scientific Advisory Team

The purpose of this task is to ensure that key decisions and assumptions that go into the proposed work are technically sound, and to assure that the technical concerns of the diverse stakeholder communities are met. The role of the Scientific Advisory Team (SAT) will be to provide credible technical advice to the Steering Committee and stakeholders; SAT members will serve as objective, expert reviewers at critical project milestones in the development and implementation of the technical Tasks 6, 7, 8, 9 and 10.

5.1 Identify Scientific Advisory Team members. Solicit recommendations from stakeholders, select, and invite key technical experts to serve on the SAT. The team will consist of regionally and nationally recognized experts in the key technical areas.

5.2 Establish an operations and communications plan, and meeting schedule. It is envisioned that subsets of the SAT will be convened for specific issues. A set of procedures for convening and using the SAT will be modeled on those for the Technical Review Committee used in the development of the TMDLs for copper and nickel in south San Francisco Bay.

5.3 Review documentation for and provide guidance and advice on key technical decisions involved in Tasks 6, 7, 8, 9 and 10.

5.4 Participate in the Annual Stakeholder Conference.

Task 5 Deliverables: 5.1 List of Scientific Advisory Team Members; **5.2** Copy of operations and communications plan, and meeting schedule; **5.3** Summaries of guidance and advice from SAT members.

Task 6. Chemical and Physical Characterization of Brake Wear Debris

The primary objective of this task is to characterize brake wear debris to provide input data for the three environmental transport and fate models (Task 7). Specifically, chemical characteristics (*e.g.*, leaching potential, weathering, adsorption/desorption rates) and physical characteristics (*e.g.*, particle size distribution, aerodynamic diameter, build-up/washoff characteristics) will be required by the models. A secondary objective may be to obtain a physicochemical "fingerprint" of representative brake wear debris so that a source-receptor analysis of the air deposition monitoring and ambient water quality monitoring (Task 8) can be performed. All brake wear debris characterization tests will be guided by the modeling and/or monitoring tasks, with technical oversight and direction being provided by the BPP Steering Committee (Task 4) and the Scientific Advisory Team (Task 5).

6.1 Determine brake wear characteristics required for air deposition model based on Task 7.2.

6.2 Determine brake wear characteristics required for watershed model based on Task 7.3.

6.3 Determine brake wear characteristics required for Bay water quality models based on Task 7.5.

6.4 Prepare and disseminate report summarizing results and including all data.

Task 6 Deliverables: 6.1, 6.2, 6.3 & 6.4 Progress reports; **6.5** Draft and final summary reports.

Task 7. Environmental Transport and Fate Modeling

The objective of the environmental transport and fate modeling is to predict how copper released from brake pads enters the Bay and affects both the short-term and long-term concentrations of copper in the Bay. The proposed approach is to identify existing models for air, watershed, and water quality, modify them if necessary to characterize the specific fate and transport of copper in brake pad wear debris, and combine them to allow evaluation of the fate and transport of brake pad debris from point of creation (automobiles) to point of eventual deposition (San Francisco Bay). Although this project focuses on the San Francisco Bay as a case study, its outcomes will be applicable to a wide variety of vehicle related pollution problems. Technical oversight and direction will be provided by the BPP Stakeholder Steering Committee (Task 4) with guidance from the Scientific Advisory Team (Task 5).

7.1 Estimate source loading to the watershed. Source loading estimates are key inputs to the fate and transport models. Annual loading estimates will be calculated based on data collected and compiled by the project team for the Castro Valley watershed on vehicle fleet mix, vehicle miles traveled and frequency of brake pad replacement by vehicle class, and ratio of aftermarket to original equipment brake pad replacements.

7.2 Select and run air deposition models. An air deposition model is needed to calculate the transport of brake pad wear debris from the point of origin to the points where the debris falls onto the watershed. Based on the existing particle size characterizations of wear debris, the deposition zone can range from a few hundred meters to hundreds of kilometers from the point of origin. Although no appropriate model specific to the San Francisco Bay area has been developed, existing models have been used to calculate transport in this length scale and can be applied to the San Francisco Bay watershed.

7.2.1 Identify dominant air transport mechanisms and determine most appropriate existing modeling approach for near-zone deposition onto the San Francisco Bay watershed. Conduct model sensitivity analysis to determine parameters requiring additional measurement (Task 6) and identify air transport mechanisms that are not important.

7.2.2 Calibrate model to local conditions using air deposition monitoring information (Task 8.1).

7.2.3 Use the air deposition model to calculate inputs for the watershed model (Task 7.2)

7.3 Conduct watershed modeling. Castro Valley Storm Water Management Model (CV-SWMM) has been developed by the Alameda Countywide Clean Water Program (ACCWP) and its contractor Systech Engineering, Inc. for the Castro Valley Creek Watershed in Alameda County, a San Francisco Bay watershed. Previous studies show this watershed model can simulate the hydrology of Castro Valley Creek Watershed very well, and reasonably simulate the fate of metals (Khan et al., 1999; Chen et al., 2002).[1] The Castro Valley watershed is a relatively representative San Francisco Bay area urban watershed. In addition, it has well monitored water quality and hydrology, is physically characterized, and is the only San Francisco Bay watershed having an existing watershed model with appropriate capabilities for analyzing the fate and transport of copper in brake wear debris. This task will be conducted by the entities that own the model—ACCWP and Systech Engineering, Inc.

7.3.1 Modify model, calibrate and validate model, and conduct modeling. Review reports relevant to physical/chemical properties of brake wear debris containing copper, including recent studies of copper washoff from roadways.[2] Based on this information and information from Task 6, modify the computer simulation model and prepare the input files for the model. Calibrate and verify the modified model to appropriate copper data collected in the Castro Valley Creek. Estimate the daily, monthly, and annual total copper loading at the outlet of Castro Valley Creek for a one-year period, with and without the brake pad contribution.

7.3.2 Meet with project team, Brake Pad Partnership Steering Committee, and Scientific Advisory Team members as needed.

7.3.3 Report results. Prepare draft and final reports.

7.4 Extrapolate watershed modeling to the San Francisco Bay watershed. The results of the watershed simulations using the CV-SWMM model will be extrapolated to the entire San Francisco watershed to provide the required inputs to the bay model (see Task 7.5). EPA's Better Assessment Science Integrating Point and Nonpoint Sources (BASINS) software will be used. BASINS is a suite of interrelated databases and assessment tools that support environmental analysis. It has been used successfully to simulate watershed loadings for stormwater permitting, TMDLs, land use planning, and watershed management planning. It is in the public domain, and already includes watershed characterization data for the entire San Francisco Bay watershed. This task will be conducted by EPA's Office of Science and Technology as in-kind technical support.

7.4.1 Develop a BASINS application for San Francisco Bay watershed. The existing data for the watershed that is currently in BASINS will be updated using the most current USGS information.

7.4.2 Conduct watershed simulations using BASINS to develop ratios between the runoff in each San Francisco Bay sub-watershed to that in the Castro Valley Creek watershed. The simulations will use the same set of conditions as used in Task 7.3.1, and will be run for the same time period.

7.4.3 Coordinate with ACCWP, Systech Engineering, Inc. URS, the Brake Pad Partnership Steering Committee, and the Scientific Advisory Team member as needed.

7.4.4 Report ratios in a spreadsheet. Prepare draft and final reports.

7.5 Conduct bay modeling. A hydrodynamic, sediment transport and water quality model has already been calibrated for San Francisco Bay and has been used previously to explain spatial and seasonal fluctuations in dissolved copper concentrations. This adapted MIKE 21 model will be used to predict seasonal and short-term changes in benthic and dissolved copper concentrations due to atmospheric and watershed loading of copper from brake pads. The URS-adapted version of MIKE 21 is the most complete and thorough existing model for copper fate and transport in San Francisco Bay, and has already been calibrated to the available copper data for the South Bay. Use of this model offers substantial cost savings, as no additional data collection—except for data specific to copper in brake pad wear debris—will be required. Since practical limitations prevent use of the MIKE 21 model over long time periods (*i.e.*, decades), a compartmental model will be integrated with MIKE 21 to predict long-term changes. This task will be conducted by URS, which owns the calibrated MIKE 21 model.

7.5.1 Develop model input information based on watershed model results. URS will work with the project team to help develop appropriate input information for the models, such as a method to extrapolate copper loads from the study watershed (Castro Valley) to estimate loads from other storm water runoff input sources to San Francisco Bay.

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[1] Khan, Obaid U., Ching-Lin Chen, and Carl W. Chen, Castro Valley Water Quality Modeling: Development and Application of Alameda-SWMM, January 1999; and Chen, C.L., J. Scanlin, and A. Feng, "Simulating the Fate of Diazinon in Castro Valley Watershed by SWMM," to be published in the Proceedings of 9th International Conference on Urban Drainage, *ASCE*, Sept. 8-13, 2002.

[2] For example, Sansalone, John J., Steven G. Buchberger, and Souhail R. Al-Abed, "Fractionation of Heavy Metals in Pavement Runoff," Science of the Total Environment, V. 189/190, p. 371-378, 1996; Sansalone, John J., and Steven Buchberger, "Partitioning and First Flush of Metals in Urban Roadway Storm Water," Journal of Environmental Engineering, p. 134, February 1997.

7.5.2 Conduct modeling to evaluate short-term impacts of copper from brake wear debris. URS will estimate short-term changes in brake pad-related copper concentrations in South San Francisco Bay from the difference between two series of MIKE 21 model simulations. Each simulation is planned to cover a one-year period. The two planned simulation series include output from the atmospheric deposition and watershed runoff models as source loads, with and without the brake pad contribution. The differences in modeled South San Francisco Bay dissolved and benthic copper concentrations between the runs will estimate the brake pad contribution.

7.5.3 Select model and conduct modeling to evaluate long-term impacts of copper from brake wear debris. URS will evaluate long-term changes in benthic and dissolved copper concentrations due to brake pad copper using a compartment-based model. The USEPA WASP model or a similar compartment-based model will be used with a large time step that allows long-term simulations to be performed. Annual rates of changes in copper mass computed from MIKE 21 will be used as input to WASP to forecast cumulative changes over several decades.

7.5.4 Meet with project team, Brake Pad Partnership Steering Committee, and Scientific Advisory Team members as needed.

7.5.5 Report results. Prepare draft and final reports.

7.6 Conduct final assessment and prepare draft and final reports.

Task 7 Deliverables: 7.1, 7.2 7.3, 7.4 & 7.5 Progress reports; **7.6** Draft and final reports.

Task 8. Environmental Monitoring

Collect environmental monitoring data to supplement currently available data for use in calibrating and validating the environmental fate and transport models. Two types of data are proposed for collection—air deposition and water quality data.

8.1 **Conduct air deposition monitoring.** Available air deposition measurements are extremely limited—the only previous San Francisco Bay area copper air deposition monitoring was conducted by the San Francisco Estuary Institute (SFEI) at 3 sites intentionally located away from urban sources such as roads.[3] Since conducting a full-watershed air-deposition measurement study would be prohibitively expensive, limited air deposition measurements in the study watershed in locations affected by emissions of wear debris from brake pads are proposed to be conducted by SFEI[4] to provide additional data for calibration of the air deposition model.

8.1.1 Prepare Sampling and Analysis Plan and Quality Assurance Project Plan (Task 3).

8.1.2 Collect data. SFEI will conduct dry and wet deposition monitoring for copper in the Castro Valley watershed, using methods used in previous San Francisco Bay area copper air deposition monitoring. SFEI will use two sets of wet and dry samplers to collect up to 50 wet and dry samples over one year. Locations and sampling frequency and duration will be determined in conjunction with the project team to maximize usefulness for calibrating and validating models.

8.1.3 Meet with project team, Brake Pad Partnership Steering Committee, and Scientific Advisory Team members as needed.

8.1.4 Report results. Supply data to the atmospheric and watershed modelers as they become available. Analyze data, in coordination with air deposition modelers, to determine what spatial and temporal differences exist in atmospheric copper fluxes to the Castro Creek watershed. Prepare draft and final reports summarizing results and including all data.

8.2 **Conduct water quality monitoring.** The Alameda Countywide Clean Water Program (ACCWP) has monitored runoff in the Castro Valley Watershed for copper and related pollutants since 1989. Grant funding will be used by ACCWP to expand the ongoing copper monitoring effort to provide additional data for use in calibrating and validating the watershed model.

8.2.1 Prepare Sampling and Analysis Plan and Quality Assurance Project Plan (Task 3).

8.2.2 Collect data. Conduct additional stream monitoring in Castro Valley Creek, using the same methods used by ACCWP for previous and concurrent monitoring. ACCWP will sample Castro Valley Creek for total copper, hardness and total suspended solids (TSS) during a minimum of 5 storm events during the 12 to 18 months following contract execution. Sampling may be either equal-time-interval or flow-weighted increments, as directed by needs of watershed model development. Obtain associated continuous flow (1 station) and precipitation (1 to 2 stations) data for the watershed.

8.2.3 Report results. Prepare brief draft and final reports that include all data.

Task 8 Deliverables: 8.1.1 Air deposition monitoring QAPP (Task 3); **8.1.2, 8.1.3, & 8.1.4** Draft and final air deposition monitoring reports; **8.2.1** Water quality monitoring QAPP (Task 3); **8.2.2 & 8.2.3** Draft and final water quality monitoring reports.

[3] Tsai, P., et al. (2001). Atmospheric Deposition of Trace Metals in the San Francisco Bay Area. Water Environment Federation Technical Exhibition and Conference 2001, Water Environment Federation.

[4] SFEI can also use the results to supplement the San Francisco Bay Regional Monitoring Program, which it conducts.

Task 9. Treatment and Control Measure Evaluation and Enhancement

The investigations planned by the Brake Pad Partnership will provide significant new understanding of the dispersion of water pollutants from vehicles into the environment and their subsequent transport to surface waters. This new information will have immediate implications for the selection and design of storm water runoff treatment systems that are being installed throughout California. While the focus of the brake pad partnership is on pollution prevention, this element will provide the basis for understanding the feasibility and cost-effectiveness of alternative controls or interim control measures.

9.1 Use information generated by this project to evaluate treatment and control measures that remove pollutants from urban runoff and identify enhancements to improve removal of pollutants from vehicles. Rely on the new information about the physical character, fate, and transport of pollutants from vehicles, and the extensive published literature (including the research conducted by Caltrans) on this topic as the basis of evaluation. Identify modifications in standard designs or control measure locations that could enhance removal of pollutants from vehicles. Compare pollutant reduction strategies based on treatment and controls measures to a source reduction strategy based on product reformulation and redesign.

9.2 Report results. Prepare draft and final reports.

Task 9 Deliverables: 9.1 & 9.2 Draft and final reports.

3. Target Completion Dates (See also Project Timeline in Part H, page H-10.)

Task No. Deliverables	Target Completion Dates*
Task 1: Project Administration	
1.2 Quarterly Progress Reports	10/03, 1/04, 4/04, 7/04, 10/04, 1/05, … 10/05, 1/06
1.5 Contract Summary Form	9/30/03
1.6 List of subcontracted tasks, GFE documents, quarterly Utilization Reports	quarterly
1.7 Subcontractor Documentation	12/03, 1/04, 8/05
1.8 Expenditure/Invoice Projections	monthly
1.9 Project Survey Form	2/28/06
Task 2: CEQA/NEPA Documents and Permits, if applicable	Not applicable
Task 3: Quality Assurance Project Plan	9/03
Task 4: Stakeholder Steering Committee and Communications	
4.1 Meeting minutes	10/03, 4/04, 10/04, 4/05, 10/05, 2/06
4.2 Annual Stakeholder Conference agenda, summary, and handouts	10/03, 10/04, 10/05
4.3 Reports on detailed task plans and evaluation results	10/03, 4/04, 10/04, 4/05, 10/05
4.4 Copies of regular stakeholder updates & public outreach materials	10/03, 10/04, 10/05
4.5 Website	1/04 through 6/06
Task 5: Scientific Advisory Team	
5.1 List of Scientific Advisory Team Members	10/03
5.2 Copy of operations & communications plan, and meeting schedule	10/03
5.3 Summaries of guidance and advice from SAT members	10/03, 4/04, 10/04, 4/05, 10/05, 2/06
Task 6: Chemical and Physical Characterization	
6.1, 6.2, 6.3 & 6.4 Progress reports	4/04, 7/04, 10/04
6.5 Draft and final reports	12/04, 3/05
Task 7: Environmental Transport and Fate Modeling	
7.1, 7.2, 7.3, 7.4 & 7.5 Progress reports	4/04, 10/04, 4/05
7.6 Draft and final reports	8/05, 11/05
Task 8: Environmental Monitoring	
8.1.1 Air deposition monitoring QAPP (same as Task 3)	10/03
8.1.2, 8.1.3, & 8.1.4 Draft and final air deposition monitoring reports	10/04, 12/04
8.2.1 Water quality monitoring QAPP (same as Task 3)	10/03
8.2.2 & 8.2.3 Draft and final water quality monitoring reports	10/04, 12/04
Task 9: Treatment & Control Measure Eval. & Enhancement	
9.1 & 9.2 Draft and final reports	10/05, 12/05
Task 10: Draft and Final Reports	12/05, 2/28/06

* Target Start Date: July 1, 2003

PART C1 - BUDGET SUMMARY SHEET – TASK BUDGET BREAKDOWN

	Proposition 13 Share	Match Amount	Total Budget
1. Task 1 – Project Administration	$ 100,000	$ 20,000	$ 120,000
2. Task 2 – CEQA/NEPA Documents and Permits	N/A	N/A	
3. Task 3 – Quality Assurance Project Plan	$ 8,000		$ 8,000
4. Task 4 – Stakeholder Steering Committee and Communications	$ 146,000	$ 714,000	$ 860,000
5. Task 5 – Scientific Advisory Team	$ 30,000	$ 30,000	$ 60,000
6. Task 6 – Chemical and Physical Characterization of Wear Debris	$ 140,000	$ 30,000	$ 170,000
7. Task 7 – Environmental Transport and Fate Modeling	$ 275,000	$ 20,000	$ 295,000
8. Task 8 – Environmental Monitoring	$ 72,000		$ 72,000
9. Task 9 – Treatment and Control Measure Evaluation and Enhancement	$ 25,000		$ 25,000
10. Task 10 – Draft and Final Reports	$ 4,000	$ 6,000	$ 10,000
*TOTAL BUDGET	$ 800,000	$820,000	$1,620,000

PART C2 - BUDGET SUMMARY SHEET – LINE ITEM Budget

	Proposition 13 Share	Match Amount	Total Budget
1. Personnel Services	$ 76,500	$ 12,000	$ 88,500
2. Operating Expenses	$ 1,000		$ 1,000
3. Property Acquisitions			
a. Equipment	-0-		
b. Furniture	-0-		
c. Portable assets	-0-		
d. Electronic data software/hardware	-0-		
e. Processing equipment	-0-		
f. Miscellaneous	$ 1,000		$ 1,000
4. Professional and Consultant Services			
a. Alameda County Clean Water	$ 30,000		$ 30,000
b. San Francisco Estuary Institute	$ 50,000		$ 50,000
c. Science Advisory Committee	$ 30,000	$ 30,000	$ 60,000
d. Systech Engineering, Inc.	$ 75,000		$ 75,000
e. Steering Committee			
i. Sustainable Conservation	$ 150,000	$ 270,000	$ 420,000
ii. Other Stakeholders		$ 470,000	$ 470,000
f. URS Corporation	$ 125,000		$ 125,000
g. Characterization Element	$ 140,000	$ 30,000	$ 170,000
h. Atmospheric Deposition Modeling	$ 75,000		$ 75,000
i. Treatment Control Measures Study	$ 25,000		$ 25,000
j. Graphic Design/Printing Services	$ 4,500		$ 4,500
Subtotal	$ 704,500	$ 800,000	$ 1,504,500
6. Construction Expenses	-0-	-0-	-0-
7. General Overhead	$ 17,000	$ 8,000	$ 25,000
8. Total Budget	$ 800,000	$ 820,000	$ 1,620,000

9. Percent of Match Share in dollars: Approximately 50 percent.
Amount Match Share Dollars required: None

10. Describe the source and nature of the matching funds:
    a. ***Bay Area Stormwater Management Agencies Association***: $120,000 as in-kind technical support.
    b. ***U.S. Environmental Protection Agency***: $100,000 as in-kind technical support.
    c. ***Brake Manufacturers Council Product Environmental Committee***: $310,000 as in-kind technical support and matching funds.
    d. ***Sustainable Conservation***: $255,000 in technical and administrative support raised from private and corporate foundations.
    e. ***Sacramento Stormwater Permittees***: $15,000 as technical support.
    f. ***CLEAN South Bay & Sierra Club***: in-kind technical support.
    g. ***San Francisco Bay RWQCB***: in-kind technical support.
    h. ***Association of Bay Area Governments***: $20,000 as services and administrative support.

Part D – Questionnaire

1. Identify water quality impairments or major sources of NPS pollution, as applicable, that will be addressed by the project.

____Agriculture ____Forestry **__XX__**Urban (Construction, Roads, Septic Systems)
_XX_ Stormwater/Urban Runoff
____Marinas and Boating Activities ____Hydromodification
____Resource Extraction Other:_____

2. Describe how the proposed restoration activities, to be supported with Proposition 13 funds, are part of an existing watershed management plan, restoration action strategy, or equivalent document?

The Brake Pad Partnership's (BPP) proposed work is an integral part of several water quality and resource management strategies centering on the San Francisco Bay and the protection of California coastal waters. Specifically:

- The San Francisco Bay Regional Water Quality Control Board (RWQCB) is establishing site-specific water quality objectives for copper in Lower South San Francisco Bay (south of the Dumbarton Bridge) and will soon be developing ***site-specific objectives for copper in all of San Francisco Bay***. An implementation strategy to support and maintain the objectives must accompany such a regulatory action. The BPP project is part of the watershed management component of the implementation strategy. The implementation strategy contains specific actions to control known sources of copper, prevent copper pollution through treatment once it is released into the environment, and monitor ambient water quality to assess the effectiveness of the strategy. The BPP project will address all three aspects of the implementation strategy.

  The original document that defines the implementation strategy that will be taken in support of the site-specific water quality objectives for copper in Lower South San Francisco Bay is the **Santa Clara Basin Watershed Management Initiative's *Copper Action Plan*** (TetraTech, Inc. and EOA 2000). The BPP is included in this plan as a baseline action for the copper control strategy. A copy of the plan's cover page is included in Part H, on page H-2.

  The **San Francisco Bay Regional Water Quality Control Board's *Staff Report on Proposed Site-Specific Water Quality Objectives and Water Quality Attainment Strategy for Copper and Nickel for San Francisco Bay South of the Dumbarton Bridge*** (April 2002) is the functional equivalent of an environmental impact report (EIR), describing the regulatory actions of establishing site-specific water quality objectives and the implementation plan to support the objectives. The BPP is also included in this plan as a baseline action for implementation in support of the objectives. A copy of the SF Bay RWQCB's staff report is included in Part H, on page H-2.

- The BPP also fulfils elements of the ***Comprehensive Conservation and Management Plan for San Francisco Estuary*** (San Francisco Estuary Project 1992). It supports goals in the Pollution Prevention Program, specifically, "Action PO-2.4: Improve the management and control of urban runoff from public and private sources," and "Action PO-2.5: Develop control measures to reduce pollutant loadings from energy and transportation systems." A copy of the CCMP is available on the web at http://www.abag.ca.gov/bayarea/sfep/reports/ccmp/index.html.

3. Describe the technically/scientifically sound and effective procedure(s) and techniques that will be used in preventing degradation of coastal water quality and/or restoring coastal water quality.

The BPP's approach embraces the three key strategies for preventing degradation of and restoring coastal water quality contained in the implementation strategy for site-specific water quality objectives described above in response to Question 2: control known sources of copper, prevent copper pollution through treatment once it is released into the environment, and monitor ambient water quality to evaluate the effectiveness of the strategy. A fourth key strategy involves collaboration among a diverse group of stakeholders.

The BPP is founded on principles of ***source control and pollution prevention***. Specifically, some brake wear debris is released to the environment during the normal course of use of automobiles. In 1994, a highly disputed study roughly estimated that more than half the copper in urban runoff to the San Francisco Bay, for which copper is a pollutant of concern, comes from brake pads. Since then, the use of copper in brake pads has increased by 40%, as manufacturers have sought to meet new federal safety regulations and customer satisfaction requirements.[1] Although the industry, environmental, stormwater management, and regulatory stakeholders have different perspectives on the potential significance of the study finding and the potential water-quality implications of the increased copper usage, today they are ***collaborating*** in the BPP to implement a program aimed at identifying and preventing impacts on surface water quality that potentially arise from the use of automotive brake pads.

If the BPP concludes that copper from brake pads is a significant source of water quality impairment, manufacturers have committed to voluntarily introducing new products within five years as a part of their participation in the BPP. It is critical that if the industry must replace copper with another material, that material not be harmful to the environment. Thus, whether or not copper from brake pads is found to be harmful to water quality, brake pad manufacturers intend to incorporate the Partnership's evaluation approach into their product development processes so that they can avoid the use of potentially harmful ingredients in the future. This application of the project will result in long-term prevention of the release of harmful metals and other pollutants to the environment. The BPP stakeholders are pioneering an innovative approach to water quality pollution prevention, which provides a model for effectively addressing other important water quality issues.

Task 9 of the proposed work addresses ***treatment and control measures*** for preventing copper from entering aquatic systems, where it can be toxic to certain aquatic plants and animals. The work proposed by the BPP will provide significant new understanding of the dispersion of water pollutants from vehicles into the environment and their subsequent transport to surface waters. This new information will have immediate implications for the selection and design of storm water runoff treatment systems that are being installed throughout California. While the focus of the BPP is on pollution prevention through product reformulation if needed, this element will provide the basis for understanding the feasibility and cost-effectiveness of alternative controls or interim control measures.

In Task 8 the BPP proposes to conduct ***environmental monitoring***, specifically to look at the air deposition of copper as a way of developing the link between atmospheric transport and water quality, and at stormwater runoff quality to calibrate and validate the proposed watershed model. This information is critical for ground-truthing the proposed modeling work and for developing a scientifically sound basis for predicting how copper released from brake pads enters the Bay and affects the short- and long-term concentrations of copper in the Bay.

[1] Brake manufacturers report a 40% increase in copper use in new light-duty vehicles (where most brake copper is used) between 1998 and 2000. (Brake Pad Partnership Project 2001. "Copper Use Monitoring Program Results for Model Years 1998, 1999, and 2000.")

An example of a success of a similar source control and monitoring strategy can be found in the case of lead. In the 1970s, substantial efforts aimed at source control and monitoring focused on the removal of lead from gasoline, household paint, and other consumer products. Monitoring of ambient air quality before and after the elimination of lead from gasoline demonstrated the dramatic reduction in air concentrations. Testing blood for lead levels showed a similar dramatic reduction in the amount of lead found in humans. Public health studies confirmed the correlation between the decreased ambient concentration and decreased incidence of lead-related neurological disorders. Although lead is primarily a concern for human health, whereas copper is a pollutant of concern due to toxicity to aquatic ecosystems, the work proposed here is expected to make substantial contributions to the understanding of copper transport in the environment, and will be broadly applicable to other materials released from mobile sources.

4. Identify the NPS management measure(s) (see Section 6 of the ARD) that the proposed project will implement and describe how you will be able to track or account for the implementation and success of these measures.

   - ***3.1.A. Urban Areas: Watershed Protection: Pollution Prevention and Source Reduction Practices.*** As described in response to Question 2 above, the BPP is an integral component of the implementation strategy for the *Santa Clara Basin Watershed Management Initiative's* *Copper Action Plan* for attaining site-specific water quality objectives in the South San Francisco Bay.

   - ***3.3. Urban Areas: Runoff from Existing Development.*** The proposed project will address treatment and control measures for preventing copper runoff from entering aquatic ecosystems. This new information will have immediate implications for the selection and design of storm water runoff treatment systems that are being installed throughout California.

   - ***3.5. Transportation Development: Roads, Highways, and Bridges.*** The proposed project will feature fate and transport modeling and confirmatory air deposition monitoring to track copper from the automobile source to receptor. This modeling and monitoring will provide insight on how the particles emitted from automobiles on roadways travel and deposit on the watershed. Such information will inform decisions on the design of roadways, how to collect and control contaminants associated with roadways and automobiles, and the intelligent design of treatment systems to control copper and other contaminants

   - ***3.6. Pollution Prevention/Education: General Sources.*** As described above in response to Question 3, pollution prevention and source control lie at the heart of the Brake Pad Partnership's approach. The BPP is developing an ingredient evaluation tool that manufacturers plan to incorporate into their existing product development processes so that they can identify and avoid the use of ingredients that have the potential to impair water quality. In addition, the project has a large stakeholder involvement, outreach and education component that will make the information developed in the process available to a broad public audience.

5. Identify whether your project has a relationship to an existing or proposed TMDL. (See Section 19 of the ARD.)

The Brake Pad Partnership is directly linked to the copper TMDL efforts in the San Francisco Bay. The Lower South San Francisco Bay and the San Francisco Bay north of Dumbarton Bridge are listed on the U.S. Environmental Protection Agency's §303(d) list as being impaired by ambient concentrations of copper.

The technical studies performed as part of the ***Lower South San Francisco Bay Copper TMDL process*** resulted in the finding that site-specific water quality objectives are appropriate for this waterbody. The

implementation strategy for meeting the site-specific objectives resulted from the TMDL process. It includes plans to remove the Lower South San Francisco Bay from the §303(d) list providing copper levels in the Bay do not increase, which is where the BPP fits in. Specifically, in 1994, a highly disputed study roughly estimated that more than half the copper in urban runoff to the San Francisco Bay comes from brake pads. Since then, as manufacturers have sought to meet new federal safety regulations and customer satisfaction requirements, they have increased the use of copper in brake pads by 40%. This increase in copper use in brake pads raises concerns that urban runoff copper loadings to the Bay might also increase and underscores the urgency of addressing brake pads as a source of copper in urban runoff.

The ongoing ***Copper TMDL process for San Francisco Bay north of the Dumbarton Bridge***, is following a strategy similar to that used in the development of the Copper TMDL for the Lower South San Francisco Bay. It is anticipated that the implementation results of the process will also rely on the BPP.

6. What specific sources of coastal water quality impairment will this project address? What are the expected benefits of this project for coastal water quality?

The Brake Pad Partnership is addressing the potential for water quality impairment to arise from the release of copper from brake pads in the course of normal automobile use. This work will also result in the long-term prevention of other potential water pollutants from being used in brakes (see related response to Question 3). In addition, the BPP's work will be directly applicable to other efforts to control pollutants from mobile sources, particularly water pollutants for which atmospheric transport is an important environmental pathway. The key benefit to coastal water quality is the potential for long-term reduction of concentrations of copper, other metals, and related pollutants. Table D-1 (next page) provides a listing of sources of stormwater runoff pollutants of concern.

7. Explain how your project is directly linked to coastal water quality protection and/or restoration for near-shore coastal waters, waters adjacent to public beaches, within estuaries or within the California Ocean Plan.

Most of California's population and automobile drivers are clustered in urban areas along the coast, adjacent to the bays and estuaries that provide rich aquatic habitat and are essential for primary production. Pollutants released from automobiles—including brake wear debris—have the potential to adversely affect organisms in these regions. The proposed project specifically addresses the potential impacts of copper from brake wear debris, but also will result in ***long-term prevention of the release of harmful metals and other pollutants from brake pads to coastal waters***. It is also anticipated that the results of the BPP's work will be broadly applicable to other automobile-related sources of pollution.

Copper is a pollutant of concern, in part because of its toxicity to certain sensitive species of algae (phytoplankton), which forms the base of the aquatic food web. Most if not all of the aquatic species living in California's near-shore coastal waters and estuaries prey on organisms that are direct or indirect consumers of phytoplankton. Thus, the goals of the proposed project are directly linked to protection of these waters by

Table D-1. San Francisco Bay Area Highway Stormwater Runoff Pollutants of Concern

Pollutant	Reason	Major Sources in Highway Runoff
Copper	San Francisco Bay impairment	Brakes, eroded soils
Lead	Elevated levels in highway runoff	Historic use in gasoline
Mercury	San Francisco Bay impairment, Bay fish consumption warning	Diesel vehicle tailpipe emissions, air deposition, erosion of debris from historic mines
Nickel	San Francisco Bay impairment	Eroded soils, gasoline vehicle tailpipe emissions (catalytic converters)
Zinc	Elevated levels in highway runoff	Tires
Sediments	Potential impairment of creeks, carries other pollutants to water bodies	Highway construction, erosion (especially of non-vegetated areas), vehicles (tires, brakes, tailpipe emissions)
Polyaromatic hydrocarbons (PAHs)	Linked to toxicity in Bay water samples	Gasoline and diesel vehicle tailpipe emissions
Dioxins/furans	San Francisco Bay impairment, Bay fish consumption warning	Diesel vehicle tailpipe emissions, air deposition
Petroleum products	Potential impairment of creeks, local effects	Drips and spills
Nutrients	Impairment of some rivers, creeks and bays in District 4	Roadside vegetation management
Pesticides	Urban creek and San Francisco Bay impairment	Roadside maintenance and vegetation control
Trash/debris	Aesthetic concern	Litter, construction debris

Sources: Santa Clara Valley Urban Runoff Program (Urban Runoff Program), *Metals Control Measures Plan and Evaluation of Nine Metals of Concern*, February 1997; Woodward-Clyde Consultants, *Contribution of Heavy Metals to Storm Water From Automotive Disc Brake Pad Wear*, prepared for the Santa Clara Valley Nonpoint Source Pollution Control Program, October 1994; California Department of Transportation (Caltrans), *Summary of Water Quality Data Associated with Run-Off from Caltrans Highways and Freeways*, 1997; Spellisey, Sandra, *Merging Currents: Transportation and Water Quality*, Planning and Conservation League, Sacramento California, January 2000; Woodward-Clyde Consultants, *Source Identification and Control Report*, prepared for the Santa Clara Valley Nonpoint Source Pollution Control Program, December 1992; San Francisco Bay Regional Water Quality Control Board, *Draft Mercury TMDL*, 2000; Jarman, Walter M., and Jay A. Davis, "Observations on Trace Organic Concentrations in RMP Water Samples", in the *1995 San Francisco Bay Regional Monitoring Program (RMP) Annual report*; Claremont Graduate University Research Institute and Rails-to-Trails Conservancy, *The Road to a Cleaner Environment: How to Use Highway Funds to Enhance Water Quality, Wetlands, and Habitat Connections*, November 23, 1998; Bateman, B., and B. Deboisblanc, Toxic Evaluation Section, Bay Area Air Quality Management District, Air Emissions of Dioxins in the Bay Area, March 27, 1996, updated via a letter, December, 1998.

maintaining quality habitat for these listed species in that control of copper sources will help ensure adequate food availability by eliminating a stress on primary productivity. Moreover, the goals of the proposed project would help support the general requirements for management of waste discharge to the ocean as stated in the *SWRCB's California Ocean Plan*:

> Waste management systems that discharge to the ocean must be designed and operated in a manner that will maintain the indigenous marine life and a healthy and diverse marine community.
>
> Waste discharged to the ocean must be essentially free of substances which will accumulate to toxic levels in marine waters, sediments or biota.

8. List the watershed group(s) of which the applicant is a member (if applicable).

San Francisco Estuary Project Implementation Committee
Association of Bay Area Governments' CALFED Task Force
Santa Clara Basin Watershed Management Initiative
San Francisco Bay Joint Venture

9. Describe the level of local support for your project, including local government, tribal government, organized groups, landowners, agencies, and others working in the watershed. Also identify your relationship to other watershed or ecosystem projects and programs in your area.

The **Association of Bay Area Governments'** (ABAG) membership is comprised of 100 cities and 9 counties in the Bay region and exists as a Joint Powers entity. It was established to promote cooperation on area-wide issues including multi-agency planning, environmental and scientific projects. ABAG is the **San Francisco Estuary Project's** (SFEP) partner and fiscal agent. SFEP's goals are to restore water quality and natural resources through effective management and public/private partnerships among diverse Estuary stakeholders and support community-based environmental stewardship. Representatives from over 30 local/state/federal agencies, business/industry, and environmental organizations make up the SFEP Implementation Committee. Strong relationships with all of these stakeholders have continued over the past 15 years insuring local, state and federal support of ABAG/SFEP projects.

The San Francisco Estuary Project initiated the BPP in 1996 to address the issue of copper from brake pads in urban runoff. The stakeholder network for this project includes more than 300 individuals representing the diverse stakeholder communities. Most of the Partnership's work is conducted through a Steering Committee consisting of representatives of the water quality regulatory agencies, stormwater management agencies, brake manufacturing industry, and environmental community. Groups that are directly involved in the BPP with representatives on the Steering Committee include the **Bay Area Stormwater Management Agencies Association** (BASMAA), **U.S. Environmental Protection Agency**, **Sierra Club**, and the **Brake Manufacturers Council's Product Environmental Committee** (which includes an estimated ninety percent of the brake pad manufacturers in the United States). Individual brake pad manufacturing companies supporting this application include: **Aakebono Corporation**; **ADVICS North America, Inc.**; **Brake Parts Inc**.; **Continental Teves**; **Federal-Mogul Corporation**; **Nisshinbo Automotive Corporation**; **TMD Friction, Inc**.; and **TRW Inc**.

The BPP enjoys the full support of the **Santa Clara Basin Watershed Management Initiative** (WMI), which developed the *Copper Action Plan* for the South San Francisco Bay (see response to Question 2). The WMI is a collaborative, stakeholder driven effort among representatives from some 16 regional and local public agencies; 10 civic, environmental, resource conservation and agricultural groups; 7 professional and trade organizations, and business and industrial sectors; and the general public. Specific WMI members who have actively participated in the BPP process include: the **San Francisco Bay Regional Water Quality Control Board**, the **City of Palo Alto**, the **Santa Clara Valley Urban Runoff Pollution Prevention Program**, **CLEAN South Bay**, and the **Silicon Valley Toxics Coalition**.

Other entities that are involved in the BPP stakeholder community and who strongly support this project include: the **Alameda County Wide Clean Water Program**, the **San Mateo Countywide Stormwater Pollution Prevention Program**, the **Fairfield-Suisun Sewer District and Urban Runoff Management Program**, the **Bay Area Open Space Council**, and **U.S. EPA Region IX**. In addition, Sustainable Conservation, which manages and facilitates the BPP has received funding for its efforts over the last three years variously from the **Santa Clara Valley Urban Runoff and Pollution Prevention Program**, the **Bay Area Stormwater Management Agencies Association**, the **San Francisco Estuary Project**, the **U.S. Environmental Protection Agency**, the **Fred Gellert Family Foundation**, the **ARCO Foundation**, the

Ford Motor Company Fund, and a **Switzer Foundation Environmental Leadership Grant provided through the San Francisco Foundation**.

10. Is this a next-phase of an ongoing project? **Yes_X_** (if "yes", describe) No__

As detailed in response to Question 13, the proposed project is the next phase of the Brake Pad Partnership's work plan. The BPP has already scoped out the work needed and is moving forward with developing a more detailed work plan to carry out the project. Funding is available to complete the work plan development, but is needed from Proposition 13 to conduct the project. The BPP considers this project the final phase of its work, which will result in one of three environmentally beneficial outcomes as illustrated in the diagram on page H-9. If the BPP determines that copper from brake pads is a significant cause of water quality impairment, brake pad manufacturers have already committed to introducing low copper products within five years. For additional details in regard to this question, please refer to the response to Questions 3, 9, & 13.

11. Describe how the project will result in ongoing or widespread implementation throughout the project area, region, or state.

The proposed project is already an integral component of the copper control strategy for Lower South San Francisco Bay, and it will be a part of the similar strategy being developed for the rest of San Francisco Bay, as described above in the responses to Questions 2 & 5. In addition, if the BPP concludes that copper from brake pads is a significant source of water quality impairment, manufacturers have committed to voluntarily introducing new products within five years as a part of their participation in the BPP. They also intend to incorporate the Partnership's evaluation approach into their product development processes so that they can avoid the use of potentially harmful ingredients in the future. Thus application of the project will result in long-term, ongoing prevention of the release of harmful metals and other pollutants to the environment. Since the manufacturers' products are sold nationally and internationally, the project will have a lasting impact not only on the San Francisco Bay, but in any coastal water or estuary under the influence of an urbanized watershed in California, the United States, and the rest of the world.

12. Describe related anticipated future work in the affected watershed.

The San Francisco Bay is a large and complex watershed, faced with a diversity of water quality and related problems. The San Francisco Estuary Project first developed the ***Comprehensive Conservation and Management Plan for San Francisco Estuary*** in 1992 identifying 145 specific implementation actions needed to restore and maintain the chemical, physical and biological integrity of the Bay and Delta. Significant progress has been made on this plan since then (see the ***Bay-Delta Environmental Report Card 1996-1999***), including the accomplishments of the Brake Pad Partnership. The San Francisco Estuary Project and all its partners plan to continue to pursue efforts toward the goal of protecting, restoring and enhancing the San Francisco Bay-Delta Estuary.

13. Summarize actions that have been accomplished to date to address the problem(s) (e.g., past monitoring, planning, implementation phases).

Significant reductions to copper loading to San Francisco Bay have been accomplished through the improved treatment technologies implemented at wastewater treatment facilities, industrial pre-treatment programs, and basin-wide pollution prevention efforts. For example, in the last 10 years alone, total copper loads from lower South San Francisco Bay POTWs have decreased by about 70%.[2] The Bay Area Pollution Prevention Group (organized by the Regional Water Quality Control Board) stimulated basin-wide pollution prevention.

[2] Tetra Tech, 1998. Copper and Nickel Source Characterization for the Lower South San Francisco Bay TMDL project. Report prepared for the City of San Jose.

From 1992 through 1998, this group focused its efforts on copper, which resulted in the region-wide implementation of a vehicle service facility pollution prevention program and a regional sales ban for copper-based root control products.

The Table D-2 below gives examples of the types of measures that have been or are being implemented to reduce the amount of copper entering POTWs and urban storm drains. These loading decreases have almost certainly played a part in helping to reduce measured ambient concentrations of dissolved copper in lower South San Francisco Bay and in the Bay ecosystem.

It now appears, based on both copper loading estimates and USGS environmental monitoring data from clams in the lower South Bay, that ***stormwater runoff is the major source of copper discharge to the Bay***.[3] In 1994, a highly disputed study roughly estimated that more than half the copper in urban runoff to the San Francisco Bay comes from brake pads.[4] On the basis of this information, in the mid-1990s, South

Table D-2. Examples of Past Wastewater and Stormwater Runoff Copper Reduction Actions in Lower South San Francisco Bay

Copper Source	Control Measure
Metal finishers, printed circuit board manufacturers, and all other industry and institutions	Strict permit requirements
Machine shops and metal fabricators	Permits; eliminated most discharges
Vehicle service facilities	Permit, inspect; Most discharges prohibited
Cooling towers	Permits (large); must discharge to sewer; education
Copper-containing cooling system additives	Banned
Copper pipe corrosion (systems in place)	Education for plumbers and residents
Copper pipe (new installation)	Providing technical support for state process to legalize use of plastic pipe
Copper and brass wastewater piping	Prohibited
Copper sulfate water supply treatment	Use terminated
Car washes	Permit, inspect; all treat & recycle wash water
Residential car washing	Education; distribute discount coupons for commercial car washes
Copper-based root killers	Banned
Use of copper or copper-containing devices to control algae in pools, spas, and fountains	Banned
Pool, spa, and fountain discharges	Required to go to sewer
Copper roofs and gutters	Considering restrictions on installation
Cars (general)	Education to reduce vehicle miles traveled

Source: City of Palo Alto

[3] Ibid, and Hornberger, M., S. Luoma, D. Cain, F. Parchaso, C. Brown, R. Bouse, C. Wellise, and J. Thompson, Bioaccumulation of Metals by the Bivalve Macoma balthica at a Site in South San Francisco Bay Between 1977 and 1997: Long-term trends and Associated Biological Effects with Changing Pollutant Loadings. USGS Open File Report 99-55.

[4] Woodward-Clyde Consultants, October 1994. Contribution of Heavy Metals to Storm Water from Automotive Disc Brake Pad Wear, Prepared for Santa Clara Valley Nonpoint Source Pollution Control Program, Principal Author: Louis J. Armstrong.

Bay dischargers worked with the San Francisco Estuary Project and a non-profit organization that specialized in collaborative solutions to environmental problems[5] to establish the Brake Pad Partnership—a multistakeholder collaborative effort to address the issue of brake pads as a source of copper to stormwater.

Since then, the BPP's work has continued primarily through a Steering Committee that is facilitated by Sustainable Conservation (a list of members is included in Part H, page H-1), and is moving forward with an emphasis on developing new information that all the parties find credible. **The Partnership recently completed the first phase of its technical work, which was the development of a protocol for generating and characterizing wear debris.** The protocol entails the use of a brake dynamometer—a laboratory machine that simulates on-road vehicle braking conditions. A variety of factors can affect the generation of wear debris, including the type and brand of brake pad used, the type of vehicle, variable brake temperatures under different driving conditions, and the frequency and intensity of braking. The highly controlled laboratory conditions and reproducibility of the procedure are important for the manufacturers who intend to use the protocol in testing new product formulations.

As part of the BPP, U.S. friction materials manufacturers have developed a procedure for **reporting on the amount of copper used in brake pads on new vehicles each year**. This information is being used by the BPP to monitor trends in copper usage. In addition, friction materials manufacturers have committed to voluntarily introducing reduced copper products if the BPP determines that copper from brake pads is a significant cause of water quality impairment. The copper use monitoring data will be used to track reductions in copper use in the event that manufacturers need to act on this commitment.

The BPP is now entering the second phase of its technical work, and has developed an action plan for evaluating the fate and transport of wear debris material in the environment, and the bioavailability of the wear debris in aquatic ecosystems. Plans for this phase of work are further described in Question 14.

14. Is the project ready to proceed?

Absolutely! ***The Brake Pad Partnership has developed a process and timeline for completing this work***. The partnership process, interrelationships of the tasks, and timeline for completion are included in Part H, pages H-7, H-8, and H-10. The BPP has already begun developing a more detailed plan for conducting the work proposed here, which will be the major focus at the upcoming Annual Stakeholder Conference on September 9, 2002. The BPP will continue the detailed development of the work plan necessary for drafting requests for proposals for work elements that require competitive bids, and for entering into sole-source contracts, so that we will be able to move quickly on the proposed work as soon as the contract with the SWRCB is in place.

The work proposed here forms the core of the Partnership's next phase of work and builds on past accomplishments. In 2001, the BPP presented the draft wear debris generation protocol report, which will be published in an industry publication where it will be widely accessible to brake engineers this year, and a report on the ongoing Copper Use Monitoring Program. Currently, the BPP is conducting wear debris characterization studies, which will provide the foundation for the additional characterization work included in Task 6. We have also initiated work on a preliminary literature review that will provide the basis for the detailed work plan development for Tasks 6, 7, 8, and 9.

[5]Common Ground for the Environment, a partnership of the Stanford University School of Law and Sustainable Conservation. Sustainable Conservation now coordinates and facilitates the Brake Pad Partnership.

15. Describe the financial/institutional capability or commitments that the applicant has to ensure that the project will be completed?

The San Francisco Estuary Project (SFEP) is housed within the San Francisco Bay Regional Water Quality Control Board, which is designated as the lead agency for implementing the CCMP. The Association of Bay Area Governments (ABAG) acts as SFEP's fiscal agent. SFEP, working with agencies, interest groups and consultants has carried out many projects over the past years to restore and preserve the Estuary. Some of these include the following projects: Alameda Creek Watershed Resource Management, Wildcat Creek and San Pablo Creek Habitat Grazing Management in Contra Costa County, Demonstration Project to Restore Habitat on Delta In-Channel Islands Using Biotechnical Methods. Additionally ABAG is the fiscal agent for the Bay Trail Project, a multi-million dollar project to build a public access trail around San Francisco Bay. SFEP/ABAG has taken the lead responsibility for organizational and administrative tasks for many projects, including competitive bid solicitation, contract management and regular financial reporting.

As reported in Part C, ***the proposal includes matching funds of approximately 50%***. The bulk of the reported matching funds come from organizations that have a long-term commitment to the BPP process. Thus, while none of the reported matching funds are formally committed by these organizations at this time (few, if any, of them are in a position to formally commit funding for as far in advance as July 2003 to June 2006), all of them have committed to continuing with this process.

16. Have any previous Proposition 13 implementation grants or grants from other agencies and other funding sources (such as CALFED, CWA Section 319[h] or 205[j], Proposition 204) been awarded for work in this watershed.

Many 319(h), 205(j), Prop 204 and Prop 13 grants have been awarded in the San Francisco Bay Area, however, the BPP has not received any previous funding for their projects from these sources.

17. Describe how the project will demonstrate a capability of sustaining water quality benefits for a period of 20 years as required by Proposition 13 (79148.8(c)).

If copper from vehicle brake pads is indeed a significant contributor to copper levels in receiving water bodies like San Francisco Bay, the combination of increased copper levels in brakes (see responses to Questions 3 & 5) and increased population and vehicle miles traveled in California's urban watersheds could significantly increase urban runoff copper loadings. The proposed project will squarely address this potentially significant concern for California urban surface waters:

- ***If the BPP concludes that copper from brake pads is a significant source of water quality impairment, manufacturers have committed to voluntarily introducing new products within five years as a part of their participation in the BPP.*** If this change is needed, shifting brake pad formulations away from copper will create a permanent reduction in copper releases, improving the potential for urban surface waters throughout California to meet copper water quality objectives, potentially without additional copper control measures.

- ***If the BPP's research shows that vehicle brake pads are not a significant source of copper releases to California surface waters, state and local government water quality programs can direct resources away from brakes to other water pollution sources***, while using the information obtained from proposed studies to improve designs of treatment and control systems for removing vehicle-associated pollutants.

Whether or not copper from brake pads is found to be harmful to water quality, ***brake pad manufacturers intend to incorporate the Partnership's evaluation approach, which will be developed under this grant, into their product development processes so that they can avoid the use of potentially harmful ingredients in the future.*** This application of the project will result in a permanent shift in brake pad formulations away from ingredients that cause water pollution, and will prevent potential future formulation shifts that could release harmful metals and other water pollutants to the environment. The diagram in Part H, on pageH-9, shows clearly how the results of this project will produce outcomes with long-term benefits to water quality.

18. If there is a National Pollution Discharge Elimination System (NPDES) permit required for this project area (check with your RWQCB), describe the relationship of the project to the permit.

NPDES permits are required for more than 50 entities discharging to the San Francisco Bay and its tributaries, including municipal wastewater treatment, industrial facilities and municipal stormwater programs. In the Lower South San Francisco Bay, there are two NPDES permits—one pertains to discharges from the three POTWs, the other is a stormwater runoff discharge permit held by the Santa Clara Valley Urban Runoff Pollution Prevention Program. The implementation plan to support the site-specific water quality objectives—including source control, pollution prevention, and monitoring activities—has been written into both of these permits. The implementation plan includes dischargers' "support" for the Brake Pad Partnership, which both have been doing fully through their active participation in the project in conjunction with the Bay Area Stormwater Management Agencies Association, and through the funding support they have provided for the Annual Stakeholder Conference, Sustainable Conservation, and brake wear debris characterization tests.

When the implementation plan is developed for all of San Francisco Bay, similar language will be included in all NPDES permits for stormwater discharges to the San Francisco Bay.

19. Will land, rights of way, or easements be purchased with Proposition 13 funds? Who will hold the title?

No.

20. Is the project located in an area covered by recovery plans, for coho salmon, steelhead trout, or where other threatened or endangered species exist? If "yes," explain how the project is consistent with the plans and seeks to implement specific recommendations.

The preliminary Endangered Species Act consultation performed in 2001 with the National Marine Fisheries Service (NMFS) and United States Fish and Wildlife Service (USFWS) provided three lists of endangered or threatened aquatic species living some or part of their life in San Francisco Bay that may be impacted by the presence of copper—the NMFS Endangered Species Act (NMFS-ESA) list, the NMFS Essential Fish Habitat (NMFS-EFH) list, and the USFWS-ESA list. The Central California Coast steelhead is a threatened species on the NMFS-ESA list. The NMFS–EFH species list includes: Chinook salmon, Northern anchovy, Pacific sardine, English sole, Sand sole, Starry flounder, Lingcod, Brown rockfish, Leopard shark, Spiny dogfish, Skates, Calico rockfish, Rex sole, Cabezon, and Soupfin Shark. The FWS-ESA species list includes:

- Tidewater goby (*Eucyclogobius newberryi*), endangered
- Winter-run chinook salmon/critical habitat (*Oncorhynchus tshawytscha*), endangered
- Coho salmon–central CA coast (*Oncorhynchus kisutch*), threatened
- Central California Coast steelhead/critical habitat (*Oncorhynchus mykiss*), threatened
- Central Valley steelhead critical habitat (*Oncorhynchus mykiss*), threatened
- Central Valley spring-run chinook/critical habitat (*oncorhynchus tshawytscha*), threatened.

- Sacramento splittail (*Pogonichthys macrolepidotus*), threatened
- South Central California Steelhead/critical habitat (*oncorhynchus mykiss*), threatened

San Francisco Bay is an estuary used by a large number and variety of fish species during some or all of their lives. ***Current levels of copper in the bay are unlikely to be directly toxic to these fish, but copper is toxic to phytoplankton at the base of the food web on which these fish species depend. There is a concern that copper contamination in the bay could be suppressing primary productivity (algal growth) affecting the entire Bay ecosystem.*** Copper levels in the bay are close to those known to be toxic to certain sensitive species of algae (copper sulphate is often used for algae control in aquatic systems). Most if not all of the species listed above prey on organisms that are direct or indirect consumers of algae. Thus, if copper levels do suppress algae populations, prey availability for fish will also be reduced. Thus, the goals of the proposed project are consistent with maintaining quality habitat for these listed species in that control of copper sources will help ensure adequate food availability by eliminating a stress on primary productivity.

Part E – Map

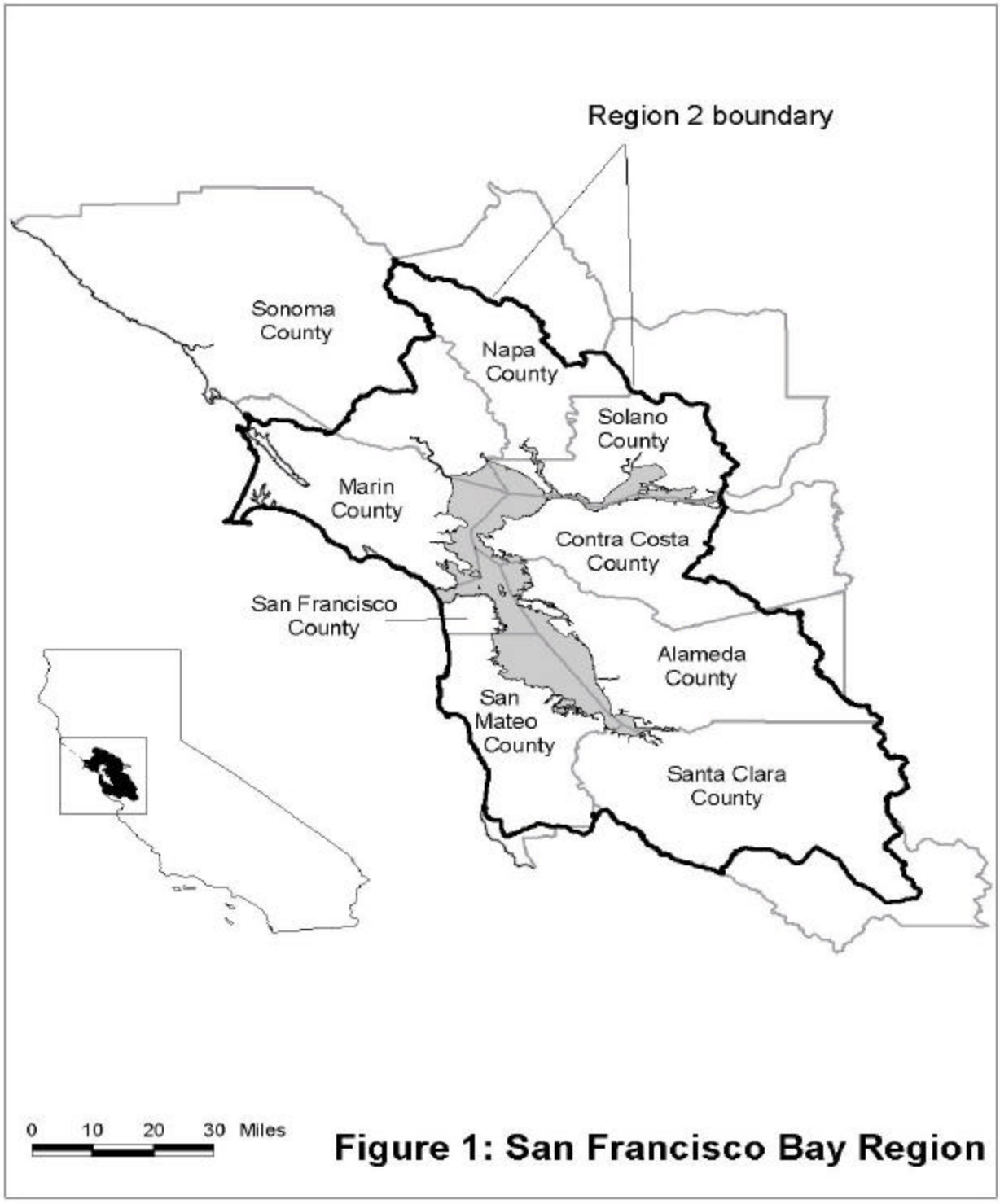

Figure 1: San Francisco Bay Region

Part E – Map

Figure 2 – State of California and Regional Water Boards

PART F – Environmental Information Form

NEPA/CEQA

1. Will this project require compliance with CEQA, NEPA, or both? Yes_____No__**X**__

2. If you checked "no" to question 1, please explain why compliance is not required for the actions in this proposal.

None of the proposed activities constitutes a "project" as defined by CEQA and NEPA, therefore the proposed work is exempt from environmental review requirements. The proposed work does not include any on-the-ground construction projects or any other physical changes in the environment.

3. If the project will require CEQA and/or NEPA compliance, identify the lead agency(ies).

CEQA Lead Agency _____

NEPA Lead Agency _____

4. Please check which type of document will be prepared.

CEQA		**NEPA**	
Categorical Exemption	_____	Categorical Exclusion	_____
Initial Study	_____	Environmental Assessment/FONSI	_____
Environmental Impact Report	_____	Environment Impact Statement	_____

If you anticipate relying on either or both the Categorical Exemption or Categorical Exclusion for this project, please specifically identify the exemption and/or exclusion that covers this project. (Example: Fish and Wildlife Service Manual at 516 DM 6 Appendix 1.4 Categorical Exclusions Section B Resources Management: (1) Research, inventory, and information collection activities directly related to the conservation of fish and wildlife resources.)

5. If the CEQA/NEPA process is not complete, please describe the estimated timelines and cost for the process and the expected date of completion.

6. If the CEQA/NEPA document has been completed:

What is the name of the document?_____

Please attach a copy of the CEQA/NEPA document cover page to the application.

7. Environmental Permitting and Approvals

Please indicate what permits or other approvals may be required for the activities contained in your proposal and which have already been obtained. Please check all that apply.

LOCAL PERMITS AND APPROVALS	Needed?	Obtained?
Conditional use permit		
Variance		
Subdivision Map Act		
Grading permit		
General plan or Local Coastal Program amendment		
Specific plan approval		
Rezone		
Williamson Act Contract cancellation		
Local Coastal Development Permit		
Other		
STATE PERMITS AND APPROVALS	Needed?	Obtained?
Scientific collecting permit		
CESA compliance: 2081		
CESA compliance: NCCP		
1601/03		
CWA 401 certification		
Coastal development permit		
Reclamation Board approval		
Notification of DPC or BCDC		

Other		
FEDERAL PERMITS AND APPROVALS	Needed?	Obtained?
ESA compliance Section 7 consultation		
ESA compliance Section 10 permit		
Rivers and Harbors Act		
CWA 404		
Other		
PERMISSION TO ACCESS PROPERTY		
Permission to access city, county or other local agency land. If "yes," indicate the name of the agency:_____		
Permission to access State land. If "yes," indicate the name of the agency: _____		
Permission to access federal land. If "yes," indicate the name of the agency: _____		
Permission to access private land. If "yes," indicate the name of the agency: _____		

PART G - LAND USE QUESTIONNAIRE

1. Do the actions in the proposal involve construction or physical changes in the land use?
   Yes____ No__**X**_

If you answered "yes" to # 1, describe what actions will occur on the land involved in the proposal.

If you answered "no" to # 1, explain what type of actions are involved in the proposal (i.e., research only, planning only).

The proposed work is a pollution prevention project that entails identifying the water quality impacts associated with the use of automobile brake pads. The proposed work involves investigative, analytical, and modeling efforts. Based on the results of this work, the brake pad manufacturing industry will reduce and eventually eliminate the use of materials that degrade water quality (while still producing products that are critical for automotive safety).

2. How many acres of land will be subject to a land use change under the proposal?
   __0____

3. What is the current land use of the area subject to a land use change under the proposal? What is the current zoning and general plan designation(s) for the property? Does the current land use involve agricultural production?

a) Current land use **Not applicable**_____
b) Current zoning _____
c) Current general plan designation _____
d) Does current use involve agricultural production? Yes_____ No_____

4. Is the land subject to a land use change in the proposal currently under a Williamson Act contract? **Not applicable**
   Yes_____ No_____

5. What is the proposed land use of the area subject to a land use change under the proposal? **Not applicable**

6. Will the applicant acquire any land under the proposal, either in fee (purchase) or through a conservation easement?
   Yes_____ No**__X__**

a) If you answered "yes" to 6, describe the number of acres that will be acquired and whether the acquisition will be of fee title or a conservation easement:
b) Total number of acres to be acquired under proposal _____
c) Number of acres to be acquired in fee _____
d) Number of acres to be subject to conservation easement _____

7. For all lands subject to a land use change under the proposal, describe what entity or organization will manage the property and provide operations and maintenance services. **Not applicable**

8. Will the applicant require access across public or private property that the applicant does not own to accomplish the activities in the proposal? Yes_____ No_____ Maybe__**X**__

The proposed project includes an air deposition monitoring task (Task 8.1) that will be contracted to the San Francisco Estuary Institute, which performs extensive monitoring activities in the San Francisco Bay region. The sampling locations for the air deposition monitoring have yet to be determined. One criterion for determining the best locations will be the accessibility of the sites. Thus it is not anticipated that access will be a barrier to carrying out this monitoring activity.

The sampling locations for the water quality monitoring proposed in Task 8.2 have already been determined and access arranged. This task will be subcontracted to the Alameda County Wide Clean Water Program, and builds on its existing monitoring efforts.

9. For land acquisitions (fee title or easements), will existing water rights be acquired? Yes_____ No_____ **Not applicable**

10. Does the applicant propose any modifications to the water right or change in the delivery of the water?
    Yes_____ No__**X**___

    If "yes" to 10, please describe the modifications or changes.