State of California
AIR RESOURCES BOARD

Resolution 85-31
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a solicited research proposal, Number 1297-113, entitled "Evaluation of Potential Toxic Air Contaminants", has been submitted by Science Applications International Corporation;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1297-113, entitled "Evaluation of Potential Toxic Air Contaminants", submitted by Science Applications International Corporation for a total amount not to exceed $124,290.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1297-113, entitled "Evaluation of Potential Toxic Air Contaminants", submitted by Science Applications International Corporation for a total amount not to exceed $124,290.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $124,290.

I certify that the above is a true and correct copy of Resolution 85-31 as passed by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-36
May 23, 1985

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a solicited research proposal, Number 72-11, entitled "Short-Term Trends and Spatial Variability in Precipitation Chemistry in the South Coast Air Basin: Application of Novel Tracers for the Study of Atmospheric Chemical and Physical Transformation Processess", has been submitted by the California Institute of Technology;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

> Proposal Number 72-11 entitled "Short-Term Trends and Spatial Variability in Precipitation Chemistry in the South Coast Air Basin: Application of Novel Tracers for the Study of Atmospheric Chemical and Physical Transformation Processess", submitted by the California Institute of Technology for a total amount not to exceed $470,415.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Proposal Number 72-11 entitled "Short-Term Trends and Spatial Variability in Precipitation Chemistry in the South Coast Air Basin: Application of Novel Tracers for the Study of Atmospheric Chemical and Physical Transformation Processess", submitted by the California Institute of Technology for a total amount not to exceed $470,515.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $470,515.

I hereby certify that the above is a true and correct copy of Resolution 85-36, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-7-3(b)1
DATE: May 23, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 072-11 entitled "Short-Term Trends and Spatial Variability in Precipitation Chemistry in the South Coast Air Basin: Application of Novel Tracers for the Study of Atmospheric Chemical and Physical Transformation Process", Principal Investigators: Drs. Michael R. Hoffmann and Fredrick H. Shair

RECOMMENDATION: Adopt Resolution 85-36 approving Proposal No. 072-11 for funding in an amount not to exceed $470,415.

SUMMARY: The principal objectives of the proposed research will be to study the chemistry, physics, transport, and meteorology of selected wet deposition events characterized phenomenologically as winter stable and unstable storm events or summer stratus rain events.

The Kapiloff Acid Deposition Act requires the California Air Resources Board to identify and determine (1) the relative contribution of various sources of acid deposition precursor emissions, (2) the chemical, physical and meteorological mechanisms by which acid deposition is formed and transported within California, and (3) the extent of acid deposition in various geographic regions of the State. Furthermore, Senate Bill 55 requires the ARB to give priority in its research and monitoring programs to the South Coast Air Basin (SCAB).

Available monitoring data show that precipitation in the Los Angeles area is as acidic as precipitation in the northeastern United States. However, in contrast to the Northeast where storm systems transport acidic precursors and oxidation products long distances before depositing them in precipitation, unpolluted storm systems traversing the SCAB rapidly accumulate acidic pollutants and precursors to form highly acidic precipitation. Furthermore, while the NOx/SO_2 emissions ratio in the eastern United States is approximately the same as the nitric acid/sulfuric acid ratio in the precipitation, the corresponding emissions ratio in the SCAB is three time the ratio of nitric and sulfuric acids in the Basin's precipitation. An understanding of the underlying cause of these differences is required, if the Board and the South Coast Air Quality Management District are to accurately project the consequences of potential control strategies.

The two-year study proposed by Caltech includes the chemical characterization of wet deposition in samples to be collected with automated fraction collectors; the chemical characterization of pre- and post-event fine aerosol samples; and the use of both (inert) insoluble and soluble tracers to characterize large scale transport, mixing and scavenging of water soluble gases (for example, sulfur dioxide and nitric acid).

The spatial and temporal variation of major chemical components in the gas phase, aerosol phase, and in precipitation would be obtained at fourteen sites within the SCAB for three characteristically different meteorological events per wet season. Type I and II are winter events, with Type I being characterized by stable conditions and southeast surface winds ahead of the front. Type II events have unstable conditions and southwest surface winds ahead of the front. Type III is a summer event involving drizzle from thick stratus clouds. A total of six precipitation events (two of each type) would be studied over a two-year period.

The evaluation of novel tracer techniques for characterization of mixing, transport, deposition and scavenging would be a major objective of the proposed study. The tracers proposed to be employed initially on an experimental basis, during the first year, include hexafluoroacetone, trifluorosulfonic acid, perfluoropropenal and Flutec PP2 and PP3. The first three tracers are water soluble and are intended to mimic the scavenging of highly soluble gases by atmospheric water droplets. Flutec PP2 and PP3 and moderately volatile perfluorocarbon mixtures, which can be detected at substantially lower concentrations than the more commonly used SF_6, would be tested as alternatives to SF_6. Several test releases of small quantities of these tracers would be made in the first year during precipitating stratus conditions.

If these releases prove to be successful, large scale releases over the SCAB would be made in the second year during each of the three types of precipitation events. One SF_6 release is proposed in the first year to evaluate this technique during a cyclonic storm.

Models of the chemistry and physics with mass tranpsort of SCAB rainfall would be developed for each basic type of precipitation event in the final task.

BUDGET SUMMARY

California Institute of Technology, Pasadena

"Short-Term Trends and Spatial Variablity in Precipitation Chemistry in the South Coast Air Basin: Application of Novel Tracers for the Study of Atmospheric Chemical and Physical Transformation Processes"

BUDGET ITEMS:

Salaries	$146,292	
Benefits	43,157	
Supplies (Tracer gases)[1]	37,020	
Other Supplies[2]	34,100	
Other Costs[3]	16,000	
Travel[4]	24,500	
Equipment[5]	29,400	
TOTAL, Direct Costs		$330,469
TOTAL, Indirect Costs		139,946
TOTAL PROJECT COST		$470,415

1. The expenditure of $37,020 would be required to purchase tracer gases (SF_6, Flutec PP2 and PP3, hexafluoroacetone, trifluorosulfonic acid, and perfluoropropenal). The ARB (and not the contractor) would purchase the gases directly to avoid overhead charges of $19,621. The actual amount of the contract with Caltech will be $433,395 ($470,415-$37,020).

2. Includes $25,000 for laboratory and shop supplies.

3. Meteorological consultant costs.

4. Includes $20,000 for field sampling (car rental and truck lease)

5. Includes material, motors, sensors, housing, and sample carousels for 14 automated aerosol collectors at $2,100/unit.

State of California
AIR RESOURCES BOARD

Resolution 85-37
May 23, 1985

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a solicited research proposal, Number 77-11, entitled "Cloud and Precipitation Scavenging Processes in the South Coast Air Basin", has been submitted by the University of Washington;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

> Proposal Number 77-11 entitled "Cloud and Precipitation Scavenging Processes in the South Coast Air Basin", submitted by the University of Washington for a total amount not to exceed $141,743.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Proposal Number 77-11 entitled "Cloud and Precipitation Scavenging Processes in the South Coast Air Basin", submitted by the University of Washington for a total amount not to exceed $141,743.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $141,743.

I hereby certify that the above is a true and correct copy of Resolution 85-37, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-7-3(b)2
DATE: May 23, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 077-11 entitled "Cloud and Precipitation Scavenging Processes in the South Coast Air Basin", Principal Investigators: Drs. Peter V. Hobbs and Dean A. Hegg.

RECOMMENDATION: Adopt Resolution 85-37 approving Proposal No. 077-11 for funding in an amount not to exceed $141,743.

SUMMARY: The major objective of this airborne field study is to determine the relative importance of various chemical and physical processes in clear, cloudy, and precipitating conditions in determining the ratio of sulfate and nitrate in wet deposition in the SCAB. Another objective is to determine the in-cloud scavenging coefficients of sulfate, nitrate, nitrogen oxides (NOx), nitric acid (HNO_3) and peroxyacetylnitrate (PAN) and any in-cloud production of sulfate and nitrate.

The Kapiloff Acid Deposition Act of 1982 requires the California Air Resources Board to identify and determine (1) the relative contribution of various sources of acid deposition precursor emissions, (2) the chemical, physical and meteorological mechanisms by which acid deposition is formed and transported within California, and (3) the extent of acid deposition in various geographic regions of the State. Furthermore, Senate Bill 55 requires the ARB to give priority in its research and monitoring programs to the South Coast Air Basin (SCAB).

A field study would be conducted in early spring 1986 in precipitating cumulus conditions. Gaseous and particulate species would be measured in the boundary layer entering the cloud base (region of updraft air can be identified using the measurement of vertical motion available aboard the aircraft), in cloud water, and in precipitation just below the cloud base. The nitrate/sulfate ratio in these measurements would be compared with the known NOx/SO_2 ratio in the emissions and in the boundary layer entering the cloud.

Measurements would also be made in non-precipitating clouds to compare homogeneous and heterogeneous processes in the formation of sulfate and nitrate, in widespread rain at several different levels below the cloud base in order to determine whether chemical modifications occur in the precipitation as it falls. This would also be done under clear conditions to determine whether differences in sulfur and nitrogen deposition can be attributed to vertical gradients of gases and particles.

Measurements of physical properties of cloud would include: liquid water content, size spectrum of cloud and precipitation particles and two-dimensional imagery of cloud particles. Aerosol measurements include size spectrum of aerosol including interstitial particles, the mass and number of aerosols, and light scattering coefficients. Size segregated particles would also be collected for chemical analyses. Chemical measurements would include: SO_2, nitrate, chloride, sodium, potassium and ammonium. Fast response detectors for NO_2, PAN and HNO_3 developed by Professor Donald Stedman of the University of Denver would be installed in the aircraft and operated by Professor Donald Stedman's research group.

The study proposed by the University of Washington of cloud and precipitation scavenging processes would complement the study proposed by the California Institute of Technology (Item 1) of the spatial and temporal variation of precipitation chemistry and atmospheric mixing and transport during well defined meteorological conditions.

The total cost of the research program proposed is $313,071. This cost would be shared between the Air Resources Board ($141,743 or 45%), the National Science Foundation ($159,706 or 51%) and the University of Washington ($11,622 or 4%). The NSF grant was approved on April 1, 1985.

BUDGET SUMMARY

University of Washington, Seattle

"Cloud and Precipitation Scavenging Processes

in the South Coast Air Basin"

BUDGET ITEMS:

Salaries	$24,099	
Benefits	4,821	
Supplies[1]	35,699	
Other Costs[2]	29,499	
Travel[3]	17,951	
Equipment	0	
TOTAL, Direct Costs		$112,069
TOTAL, Indirect Costs		29,674
TOTAL PROJECT COST		$141,743[4]

1. Includes $32,199 for aircraft maintenance and airport fees.

2. Includes $21,999 for subcontract with University of Denver (Stedman) for high resolution, high sensitivity measurements of nitrogen species.

3. Includes travel costs of $13,125 for the three-week field project.

4. The total cost of the research program proposed is $313,071. This cost would be shared between the ARB ($141,743 or 45%), the National Science Foundation ($159,706 or 51%) and the University of Washington ($11,622 or 4%).

State of California
AIR RESOURCES BOARD

Resolution 85-38
May 23, 1985

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a solicited research proposal, Number 78-11, entitled "Acquisition of Acid Vapor and Aerosol Concentration Data for use in Dry Deposition Studies in the South Coast Air Basin", has been submitted by the California Institute of Technology;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

> Proposal Number 78-11 entitled "Acquisition of Acid Vapor and Aerosol Concentration Data for Use in Dry Deposition Studies in the South Coast Air Basin", submitted by the California Institute of Technology for a total amount not to exceed $293,107.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Proposal Number 78-11 entitled "Acquisition of Acid Vapor and Aerosol Concentration Data for Use in Dry Deposition Studies in the South Coast Air Basin", submitted by the California Institute of Technology for a total amount not to exceed $293,107.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $293,107.

I hereby certify that the above is a true and correct copy of Resolution 85-38, as adopted by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

ITEM NO.: 85-7-3(b)3
DATE: May 23, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 78-11 entitled "Acquisition of Acid Vapor and Aerosol Concentration Data for use in Dry Deposition Studies in the South Coast Air Basin", Principal Investigator: Dr. Glen R. Cass.

RECOMMENDATION: Adopt Resolution 85-38 approving Proposal No. 78-11 for funding in an amount not to exceed $293,107.

SUMMARY: The major objective of this field study is to measure the spatial and temporal concentration distribution of gas phase acids, weak organic acids, and related particulate phase species in the South Coast Air Basin.

The Kapiloff Acid Deposition Act of 1982 (California Health and Safety Code, Section 39010.5, 39010.6, 39900 et seq.) requires the California Air Resources Board to design and operate a comprehensive research program to determine the nature, extent and potential effects of acid deposition in California. Furthermore, Senate Bill 55 requires the Air Resources Board to give priority in its research and monitoring programs to the South Coast Air Basin. A monitoring program to measure wet deposition throughout California has been established. However, some scientists estimate that dry deposition in California may be 5-15 times more important than wet deposition. In the South Coast Air Basin, with its dry climate and numerous sources of acid precursors, dry acid deposition is expected to be much more important than wet deposition. Despite these concerns, data documenting the nature and extent of dry acid deposition are scarce.

The California Institute of Technology would set up a network of air monitoring stations at nine sites in the South Coast Air Basin. Seven sites would be co-located with the South Coast Air Quality Management District's PM_{10} monitoring network. This SCAQMD network is being funded by the EPA for $138,342. The other two sites would be added to the AQMD network. At each site, samples would be collected every 6 days. The concentrations of several acids and organic acid gases would be measured, as well as the concentrations of particles in three size ranges. The particles would be analyzed for total mass and all cations, anions and organic ions of interest. Carbon and trace elements would be analyzed for two particle size ranges.

Two sampling trains would be employed. Method I would be used to sample fine particles (less than 2 microns) and nitric acid by the denuder difference method. An AIHL-designed cyclone would be used to eliminate particles larger than 2 microns. After the cyclone, the air stream would be split into six parts. The denuder difference method uses three of the streams. The other three would be used to collect particles on three different filters. Each filter has been chosen to provide the optimal substrate for a particular type of analysis. A Teflon filter would be analyzed by ion chromatography for ions mentioned above. A quartz filter would collect particles for analysis of elemental and organic carbon. A second Teflon filter would be analyzed for mass and for trace elements. Method II would be used primarily to collect samples of gases. Particles would be collected on Teflon prefilters on each of three sampling trains, but no size selection would be employed. One sampling train would use a nylon filter downstream of the Teflon filter to sample nitric acid. A second train would sample ammonia on oxalic acid-impregnated filters. The prefilter would be weighed for TSP. A third train would be used for ion analysis of TSP and would capture acidic gases on lithium hydroxide-impregnated filters.

Since the sampling sites would be co-located with the PM_{10} network of the SCAQMD, these data would also be available to augment the dry deposition monitoring. At seven sites, the PM_{10} samples would be analyzed using EPA funding for elemental and organic carbon, mass, trace elements, and ionic species for particles less than 10 microns. The ARB would fund these analyses for the other two sites.

BUDGET SUMMARY

California Institute of Technology

"Acquisition of Acid Vapor and Aerosol Concentration Data for use in Dry Deposition Studies in the South Coast Air Basin"

BUDGET ITEMS:

Salaries	$83,091	
Benefits	24,511	
Supplies[1]	48,248	
Other Costs[2]	43,310	
Travel[3]	6,550	
TOTAL, Direct Costs		$ 205,710
TOTAL, Indirect Costs		87,397
TOTAL PROJECT COST[4]		$293,107

1. Includes $12,842 for purchasing filters, $7,900 for laboratory supplies, $16,466 for parts to build four samplers at two sites, $6,430 for computing costs and $4,000 for office expense.

2. Includes $40,810 subcontract with Oregon Graduate Center to perform analysis for elemental and total carbon, and trace elements.

3. Includes $4,550 for automobile mileage for travel to nine sites.

4. The total research program cost of $431,449 includes $293,107 (68%) for this project and $138,342 (32%) for EPA funded SCAQMD PM_{10} network.

State of California
AIR RESOURCES BOARD

Resolution 85-39
May 23, 1985

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a solicited research proposal, Number 82-11, entitled "Quality Assurance and Measurement Uncertainty Quantification in the South Coast Air Basin Dry Acid Deposition Studies", has been submitted by the Desert Research Institute;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

Proposal Number 82-11 entitled "Quality Assurance and Measurement Uncertainty Quantification in the South Coast Air Basin Dry Acid Deposition Studies", submitted by the Desert Research Institute for a total amount not to exceed $52,500.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

Proposal Number 82-11 entitled "Quality Assurance and Measurement Uncertainty Quantification in the South Coast Air Basin Dry Acid Deposition Studies", submitted by the Desert Research Institute for a total amount not to exceed $52,500.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $52,500.

I hereby certify that the above is a true and correct copy of Resolution 85-39, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-7-3(b)4
DATE: May 23, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 82-11 entitled "Quality Assurance and Measurement Uncertainty Quantification in the South Coast Air Basin Dry Acid Deposition Studies", Principal Investigator: Dr. John G. Watson.

RECOMMENDATION: Adopt Resolution 85-39 approving Proposal No. 82-11 for funding in an amount not to exceed $52,500.

SUMMARY: The Major objective of this field study is to measure dry deposition fluxes of gases, aerosols, and acids at one site in the South Coast Air Basin.

The Kapiloff Acid Deposition Act of 1982 (California Health and Safety Code, Section 39010.5, 39010.6, 39900 et seq.) requires the California Air Resources Board to design and operate a comprehensive research program to determine the nature, extent and potential effects of acid deposition in California. Furthermore, Senate Bill 55 requires the Air Resources Board to give priority in its research and monitoring programs to the South Coast Air Basin. A monitoring program to measure wet deposition throughout California has been established. However, some scientists estimate that dry deposition in California may be 5-15 times more important than wet deposition. In the South Coast Air Basin, with its dry climate and numerous sources of acid precursors, dry acid deposition is expected to be much more important than wet deposition. Despite these concerns, data documenting the nature and extent of dry acid deposition are scarce.

The Desert Research Institute would measure the flux of nitric acid and other acidic species using a micrometeorological technique. The proposal is to perform a three-week intensive study of acid deposition fluxes at a single site using the gradient method. Dr. J. A. Businger, a noted expert on surface layer properties and pioneer of original research on flux-gradient relationships, would serve as a consultant to the project. Deposition velocities would be measured for SO_2, NO, NO_2, nitric acid, and sulfate aerosol for both daytime and nighttime conditions. Heat and momentum fluxes would also be

measured. Three weeks of data would be collected to provide adequate time to obtain valid and useful data.

As approved by the Scientific Advisory Committee, Task C, the direct measurement of deposition velocities, was approved as described above.

This research will provide valuable direct measurements of dry deposition flux of acidic pollutants in the South Coast Air Basin. These results will provide a direct link between measurement of acidic pollutant concentrations and deposition fluxes.

BUDGET SUMMARY

Desert Research Institute

"Quality Assurance and Measurement Uncertainty Quantification in South Coast Air Basin Dry Acid Deposition Studies"

BUDGET ITEMS:

Salaries	$13,145	
Benefits	3,615	
Supplies	1,450	
Consultant/ (J. A. Businger)	2,400	
Other Costs*	7,500	
Travel	3,140	
TOTAL, Direct Costs		$31,250
TOTAL, Indirect Costs		21,250
TOTAL PROJECT COST		$52,500

* Includes $5100 for equipment lease (one data logger, six gas analyzers, and gill anemometers and thermistor) and $2000 for chemical analysis.

State of California
AIR RESOURCES BOARD

Resolution 85-40
May 23, 1985

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a solicited research proposal, Number 79-11, entitled "Mathematical Modeling of the Formation and Dynamics of Acidic Aerosols", has been submitted by the California Institute of Technology;

WHEREAS, the Research staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

Proposal Number 79-11 entitled "Mathematical Modeling of the Formation and Dynamics of Acidic Aerosols", submitted by the California Institute of Technology for a total amount not to exceed $164,050.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

Proposal Number 79-11 entitled "Mathematical Modeling of the Formation and Dynamics of Acidic Aerosols", submitted by the California Institute of Technology for a total amount not to exceed $164,050.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $164,050.

I hereby certify that the above is a true and correct copy of Resolution 85-40, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-7-3(b)5
DATE: May 23, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 079-11 entitled "Mathematical Modeling of the Formation and Dynamics of Acidic Aerosols", Principal Investigator: Dr. John H. Seinfeld.

RECOMMENDATION: Adopt Resolution 85-40 approving Proposal No. 079-11 for funding in an amount not to exceed $164,050.

SUMMARY: Atmospheric aerosols are a critical component in determining the chemistry and acidity of wet and dry deposition (including acid fog events) because the formation of acidic species (sulfates and nitrates) depends on aerosol chemistry and thermodynamics. For example, acid fog measurements have shown a strong correlation between the acidity of aerosols that serve as fog condensation nuclei and the acidity of the fog water itself. The major objective of this two-year study, proposed by Dr. John Seinfeld of Caltech, is the development of a state-of-the-science description of particulate acidic aerosol chemistry and thermodynamics. An aerosol model, capable of predicting the size distribution and chemical composition of atmospheric aerosols from gas-phase concentrations and readily available atmospheric properties (temperature, relative humidity, ammonia concentration, etc.), would be developed. It will then be thoroughly tested, using a Lagrangian trajectory simulation, on several well-defined situations to gain an understanding of its sensitivity to key meteorological and chemical variables.

The contractor would accomplish the objectives of this study by carrying out five tasks. In Task 1, generalized rate equations would be developed to represent the generation of condensible organic species from atmospheric organics. Task 2 would assess the importance of homogeneous nucleation as a source of new aerosol particles. Tasks 3 and 4 are considered major efforts and would extend thermodynamic treatment of aerosols in models developed earlier by the proponent's group to include significant organic and inorganic species. The treatment of thermodynamics of solutions of sulfate, nitrate and ammonium ions would be extended to include

other inorganic salts and/or organic constituents. The thermodynamics would then be coupled with size evolution (growth) to compute (from gas-phase concentrations) the size-resolved, acidic aerosol composition of a complete spectrum of components as a function of time and location in the atmosphere. The final Task 5 would involve testing and sensitivity analysis of the aerosol module using a Lagrangian trajectory model.

The proposed work meets the broader objectives of the Kapiloff Program. A size-resolved aerosol module incorporating the thermodynamics and chemistry of sulfate/nitrate/ammonium/organics would provide useful information in a number of areas of direct interest in acid deposition research including: 1) dry and wet deposition, 2) fine and inhalable aerosol concentration levels, 3) atmospheric visibility impairment and 4) evaluation of effective control strategies for acidic precursors.

BUDGET SUMMARY

California Institute of Technology

"Mathematical Modeling of the Formation and Dynamics of Acidic Aerosols"

BUDGET ITEMS:

Salaries	$57,700	
Benefits	17,022	
Supplies	4,000	
Other Costs*	28,500	
Travel	0	
Equipment	0	
TOTAL, Direct Costs		$107,222
TOTAL, Indirect Costs		56,828
TOTAL PROJECT COST		$164,050

* Includes $20,000 for computer costs, $6,000 for consultant, and $2,500 for publication costs.

State of California
AIR RESOURCES BOARD

Resolution 85-41
May 23, 1985

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring on acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a solicited research proposal, Number 80-11, entitled "Intermethod Comparison of Procedures for Nitric Acid and Ammonia", has been submitted by the California Public Health Foundation;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

Proposal Number 80-11 entitled "Intermethod Comparison of Procedures for Nitric Acid and Ammonia", submitted by the California Public Health Foundation for a total amount not to exceed $42,604.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

Proposal Number 80-11 entitled "Intermethod Comparison of Procedures for Nitric Acid and Ammonia", submitted by the California Public Health Foundation, California for a total amount not to exceed $42,604.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $42,604.

I hereby certify that the above is a true and correct copy of Resolution 85-41, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-7-3(b)6
DATE: May 23, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 080-11 entitled "Intermethod Comparison of Procedures for Nitric Acid and Ammonia", Principal Investigator: Dr. Bruce R. Appel.

RECOMMENDATION: Adopt Resolution 85-41 approving Proposal No. 080-11 for funding in an amount not to exceed $42,604.

SUMMARY: The primary objective of this project is to participate in an ARB-sponsored methods comparison study for airborne gas and particle phase nitrogenous species in the South Coast Air Basin. Twelve groups, sponsored by private and government agencies, have been contacted concerning participation in this seven to ten day study which will be conducted in late summer 1985. The purpose of the methods comparison study is to determine measurement methods for species such as nitric acid, ammonia and particulate nitrate, which can be used in a multi-station monitoring mode in the two-year Southern California air quality field study, whose validity, accuracy and precision are known.

The contractor will measure, concurrently with other investigators, nitric acid and ammonia, in order to assess measurement accuracy. The semi-continuous tungstic acid technique (TAT) and the denuder difference method will be used for nitric acid, and dual filter techniques and denuder tubes will be employed for collection of ammonia. The contractor will also measure NOx using chemiluminescence, and fine particle nitrate using nylon filters. These different analytical methods for airborne nitrogenous species will be compared with other direct optical techniques in the methods comparison study.

BUDGET SUMMARY

California Public Health Foundation

"Intermethod Comparison of Procedures

for Nitric Acid and Ammonia"

BUDGET ITEMS:

Salaries	$21,390	
Benefits	5,348	
Supplies*	6,835	
Other Costs	0	
Travel	2,320	
TOTAL, Direct Costs		$35,893
TOTAL, Indirect Costs		6,711
TOTAL PROJECT COST		$42,604**

* The expenditure of $6,835 for supplies includes $5,000 required to purchase liquid nitrogen, calibration gas cylinders and other supplies to be used by the investigators in the methods comparison study. The ARB (and not the contractor) would purchase these materials to avoid overhead charges.

** The actual amount of the contract with the California Public Health Foundation will be $37,604 ($42,604-$5,000).

State of California
AIR RESOURCES BOARD

Resolution 85-42
May 23, 1985

WHEREAS, the Air Resources Board has been directed to design and implement a comprehensive program of research and monitoring of acid deposition in California pursuant to Health and Safety Code Sections 39900 through 39915; and

WHEREAS, a solicited research proposal, Number 85-11, entitled "Intercomparison Study of Nitric Acid and Nitrogen Dioxide using Tunable Diode Laser Absorption Spectrometry", has been submitted by Unisearch Associates, Inc.;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Scientific Advisory Committee on Acid Deposition has reviewed and recommends for funding:

> Proposal Number 85-11 entitled "Intercomparison Study of Nitric Acid and Nitrogen Dioxide using Tunable Diode Laser Absorption Spectrometry", submitted by Unisearch Associates, Inc. for a total amount not to exceed $43,392.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39906, hereby accepts the recommendation of the Scientific Advisory Committee on Acid Deposition and approves the following:

> Proposal Number 85-11 entitled "Intercomparison Study of Nitric Acid and Nitrogen Dioxide using Tunable Diode Laser Absorption Spectrometry", submitted by Unisearch Associates, Inc. for a total amount not to exceed $43,392.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $43,392.

I hereby certify that the above is true and correct copy of Resolution 85-42, as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

ITEM NO.: 85-7-3(b)7
DATE: May 23, 1985

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 085-11 entitled "Intercomparison Study of Nitric Acid and Nitrogen Dioxide using Tunable Diode Laser Absorption Spectrometry", Principal Investigator: Dr. Harold I. Schiff.

RECOMMENDATION: Adopt Resolution 85-42 approving Proposal No. 085-11 for funding in an amount not to exceed $43,392.

SUMMARY: The primary objective of this project is to participate in an ARB-sponsored methods comparison study for airborne gas and particle phase nitrogenous species in the South Coast Air Basin. Twelve groups, sponsored by private and government agencies, have been contacted concerning participation in this seven to ten day study which will be conducted in late summer 1985. The purpose of the methods comparison study is to determine measurement methods for species such as nitric acid, ammonia and particulate nitrate, which can be used in a multi-station monitoring mode in the two-year Southern California air quality field study, whose validity, accuracy and precision are known.

The contractor will make measurements of nitric acid and other gas phase nitrogenous species with a tunable diode laser absorption spectrometer system mounted in a mobile laboratory. The method is based on a very high resolution absorption spectrometry and will be used as a standard method against other, less direct, analytical measurement techniques.

BUDGET SUMMARY

Unisearch Associates, Inc.

"Intercomparison Study of HNO_3 and NO_2 using Tunable Diode Laser Absorption Spectrometry"

BUDGET ITEMS:

Salaries	$12,176	
Benefits and Overhead	9,741	
Supplies	0	
Other Costs	500	
Travel*	12,030	
Equipment	5,000	
TOTAL, Direct Costs		$39,447
TOTAL, Indirect Costs		3,945
TOTAL PROJECT COST		$43,392

* Includes $7950 for round trip transportation of mobile laboratory from Canada

State of California
AIR RESOURCES BOARD

Resolution 85-43
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a solicited research proposal, Number 1330-116, entitled "Development of an Analyzer for Exhaust From Methanol/Hydrocarbon-Fueled Motor Vehicles", has been submitted by Global Geochemistry Corporation;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1330-116, entitled "Development of an Analyzer for Exhaust From Methanol/Hydrocarbon-Fueled Motor Vehicles", submitted by Global Geochemistry Corporation for a total amount not to exceed $69,557.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1330-116, entitled "Development of an Analyzer for Exhaust From Methanol/Hydrocarbon-Fueled Motor Vehicles", submitted by Global Geochemistry Corporation for a total amount not to exceed $69,557.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $69,557.

I certify that the above is a true and correct copy of Resolution 85-43 as passed by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-44
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a solicited research proposal, Number 1321-116, entitled "Development of Inspection and Maintenance Procedures for Diesel-Powered Heavy-Duty Vehicles", has been submitted by Radian Corporation;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1321-116, entitled "Development of Inspection and Maintenance Procedures for Diesel-Powered Heavy-Duty Vehicles", submitted by Radian Corporation for a total amount not to exceed $99,798.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1321-116, entitled "Development of Inspection and Maintenance Procedures for Diesel-Powered Heavy-Duty Vehicles", submitted by Radian Corporation for a total amount not to exceed $99,798.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $99,798.

I certify that the above is a true and correct copy of Resolution 85-44 as passed by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-45
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a solicited research proposal, Number 1326-115, entitled "Survey of Heavy-Duty Diesel Engine Rebuilding, Reconditioning, and Remanufacturing Practices", has been submitted by Sierra Research;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1326-115, entitled "Survey of Heavy-Duty Diesel Engine Rebuilding, Reconditioning, and Remanufacturing Practices", submitted by Sierra Research for a total amount not to exceed $49,790.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1326-115, entitled "Survey of Heavy-Duty Diesel Engine Rebuilding, Reconditioning, and Remanufacturing Practices", submitted by Sierra Research for a total amount not to exceed $49,790.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $49,790.

I certify that the above is a true and correct copy of Resolution 85-45 as passed by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-46
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a solicited research proposal, Number 1329-116, entitled "Assessment of Fugitive Emissions of Photochemically Reactive Organic Compounds from Petroleum Refinery Operation", has been submitted by Radian Corporation;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1329-116, entitled "Assessment of Fugitive Emissions of Photochemically Reactive Organic Compounds From Petroleum Refinery Operations", submitted by Radian Corporation for a total amount not to exceed $149,969.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1329-116, entitled "Assessment of Fugitive Emissions of Photochemically Reactive Organic Compounds From Petroleum Refinery Operations", submitted by Radian Corporation for a total amount not to exceed $149,969.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $149,969.

I certify that the above is a true and correct copy of Resolution 85-46 as passed by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-47
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a solicited research proposal, Number 1332-116, entitled "Study of Vinyl Chloride Formation", has been submitted by Battelle Pacific Northwest Laboratories;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1332-116, entitled "Study of Vinyl Chloride Formation", submitted by Battelle Pacific Northwest Laboratories for a total amount not to exceed $179,999.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1332-116, entitled "Study of Vinyl Chloride Formation", submitted by Battelle Pacific Northwest Laboratories for a total amount not to exceed $179,999.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $179,999.

I certify that the above is a true and correct copy of Resolution 85-47 as passed by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-48
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a solicited research proposal, Number 1313-116, entitled "Development of Methods for Estimating PM_{10} Concentrations from Emissions in California", has been submitted by the Desert Research Institute, University of Nevada System;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1313-116, entitled "Development of Methods for Estimating PM_{10} Concentrations from Emissions in California", submitted by the Desert Research Institute, University of Nevada System for a total amount not to exceed $78,873.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1313-116, entitled "Development of Methods for Estimating PM_{10} Concentrations from Emissions in California", submitted by the Desert Research Institute, University of Nevada System for a total amount not to exceed $78,873.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $78,873.

I certify that the above is a true and correct copy of Resolution 85-48 as passed by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-49
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, an unsolicited research proposal, Number 1301-113, entitled "Interaction of O_3 with Salinity on Vegetation", has been submitted by the University of California, Riverside;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1301-113, entitled "Interaction of O_3 With Salinity on Vegetation", submitted by the University of California, Riverside for a total amount not to exceed $59,911.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1301-113, entitled "Interaction of O_3 With Salinity on Vegetation", submitted by the University of California, Riverside for a total amount not to exceed $59,911.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $59,911.

I certify that the above is a true and correct copy of Resolution 85-49 as passed by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-50
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a unsolicited research proposal, Number 1308-115, entitled "Maintain and Operate California Air Resources Board Field Fumigation Facility for Experimental Use", has been submitted by the University of California, Riverside;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1308-115, entitled "Maintain and Operate California Air Resources Board Field Fumigation Facility for Experimental Use", submitted by the University of California, Riverside for a total amount not to exceed $41,030.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1308-115, entitled "Maintain and Operate California Air Resources Board Field Fumigation Facility for Experimental Use", submitted by the University of California, Riverside for a total amount not to exceed $41,030.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $41,030.

I certify that the above is a true and correct copy of Resolution 85-50 as passed by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-51
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, an unsolicited research proposal, Number 1336-116 , entitled "Southern California Regional Air Pollution Study", has been submitted by the Air and Industrial Hygiene Laboratory, California Department of Health Services;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1336-116, entitled "Southern California Regional Air Pollution Study", submitted by the Air and Industrial Hygiene Laboratory, California Department of Health Services for a total amount not to exceed $149,993.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1336-116, entitled "Southern California Regional Air Pollution Study", submitted by the Air and Industrial Hygiene Laboratory, California Department of Health Services for a total amount not to exceed $149,993.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $149,993.

I certify that the above is a true and correct copy of Resolution 85-51 as passed by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-52
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, an unsolicited research proposal, Number 1337-116, entitled "Research and Development of Methods for the Engineering Evaluation and Control of Toxic Airborne Effluents", has been submitted by the University of California, Davis;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1337-116, entitled "Research and Development of Methods for the Engineering Evaluation and Control of Toxic Airborne Effluents", submitted by the University of California, Davis for a total amount not to exceed $82,951.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1337-116, entitled "Research and Development of Methods for the Engineering Evaluation and Control of Toxic Airborne Effluents", submitted by the University of California, Davis for a total amount not to exceed $82,951.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $82,951.

I certify that the above is a true and correct copy of Resolution 85-52 as passed by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-53
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, an unsolicited research proposal, Number 1338-116, entitled "Effects of Ambient Air Pollution on the Lung and Immune System", has been submitted by the Professional Staff Association, Los Angeles County/University of Southern California Medical Center;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1338-116, entitled "Effects of Ambient Air Pollution on the Lung and Immune System", submitted by the Professional Staff Association, Los Angeles County/University of Southern California Medical Center for a total amount not to exceed $117,935.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1338-116, entitled "Effects of Ambient Air Pollution on the Lung and Immune System", submitted by the Professional Staff Association, Los Angeles County/University of Southern California Medical Center for a total amount not to exceed $117,935.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $117,935.

I certify that the above is a true and correct copy of Resolution 85-53 as passed by the Air Resources Board.

Harold Holmes

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

Resolution 85-54
May 23, 1985

WHEREAS, the Air Resources Board has been directed to carry out an effective research program in conjunction with its efforts to combat air pollution, pursuant to Health and Safety Code Sections 39700 through 39705; and

WHEREAS, a proposed program plan, Number 1309-116, entitled "Crop Loss From Air Pollutants Assessment Program", has been submitted by the University of California, Riverside;

WHEREAS, the Research Division staff has reviewed and recommended this proposal for approval; and

WHEREAS, the Research Screening Committee has reviewed and recommends for funding:

> Proposal Number 1309-116, entitled "Crop Loss From Air Pollutants Assessment Program", submitted by the University of California, Riverside for a total amount not to exceed $97,972.

NOW, THEREFORE, BE IT RESOLVED, that the Air Resources Board, pursuant to the authority granted by Health and Safety Code Section 39703, hereby accepts the recommendation of the Research Screening Committee and approves the following:

> Proposal Number 1309-116, entitled "Crop Loss From Air Pollutants Assessment Program", submitted by the University of California, Riverside for a total amount not to exceed $97,972.

BE IT FURTHER RESOLVED, that the Executive Officer is hereby authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $97,972.

I certify that the above is a true and correct copy of Resolution 85-54 as passed by the Air Resources Board.

Harold Holmes, Board Secretary