

State of California
AIR RESOURCES BOARD

Resolution 86-7
February 28, 1986

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 95-15, entitled "Effects of Acid Deposition on Materials," has been submitted by Environmental Monitoring & Services, Inc. to the ARB; and

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:

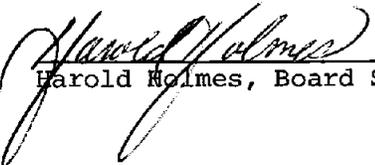
Proposal Number 95-15 entitled "Effects of Acid Deposition on Materials," submitted by Environmental Monitoring & Services, Inc. for a total amount not to exceed \$232,581.

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 95-15 entitled "Effects of Acid Deposition on Materials," submitted by Environmental Monitoring & Services, Inc. for a total amount not to exceed \$232,581.

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 \$232,581.

I hereby certify that the above is a true and correct copy of Resolution 86-7 as adopted by the Air Resources Board.


Harold Holmes, Board Secretary

ITEM NO.: 86-2-5(b)1
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

- ITEM: Research Proposal No. 95-15 entitled "Effects of Acid Deposition on Materials."
- RECOMMENDATION: Adopt Resolution 86-7 approving Proposal No. 95-15 for funding in an amount not to exceed \$232,581.
- SUMMARY: The purpose of this study is to distinguish the portion of materials damage which is caused by acid deposition from the damage that is induced by non-acidic pollutants or normal weathering in the absence of air pollutants. The Kapiloff Acid Deposition Act requires the Air Resources Board to assess the economic impact of acid deposition upon materials as part of a comprehensive research program to determine the nature, extent and potential effects of acid deposition in California.
- The research plan proposed by Environmental Monitoring & Services Inc., (EMSI) includes a combined field and laboratory study. EMSI would study five economically important materials. Ten one-month long laboratory chamber experiments would be conducted to investigate the effects of natural weathering and the relative effects of individual and combinations of aerometric parameters with continuous wet/dry cycles. In addition, a twelve-month field exposure program would be initiated at four California sites. EMSI would also monitor ambient nitric acid concentrations, temperature, and relative humidity. Other aerometric data will be obtained from the existing monitoring network.
- This comprehensive laboratory and field study is needed to provide the Board with valuable information on the corrosion rates caused by natural process and anthropogenic pollutants. Such information would be needed in determining the cost-benefit of emission controls with respect to the materials damage for a number of economically important materials in California.
- The research contractor would be the Environmental Monitoring & Services Inc., and the Principal Investigator would be Dr. R. Vijayakumar.

B U D G E T S U M M A R Y

Environmental Monitoring & Services, Inc.

"Effects of Acid
Deposition on Materials"

BUDGET ITEMS:

Salaries	\$ 84,090	
Benefits	30,456	
Supplies/Equipment*	11,040	
Travel	<u>4,994</u>	
TOTAL, Direct Costs		\$130,580
TOTAL, Indirect Costs		<u>102,001</u>
	<u>TOTAL PROJECT COSTS</u>	<u>\$232,581</u>

* Supplies and Equipment include data logger, electrochemical sensors, exposure material and associated supplies.

State of California
AIR RESOURCES BOARD

Resolution 86-8
February 28, 1986

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 99-15, entitled "Investigation of the Effects of Acidic Fog and Dew Upon Materials," has been submitted by the University of Southern California; and

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:

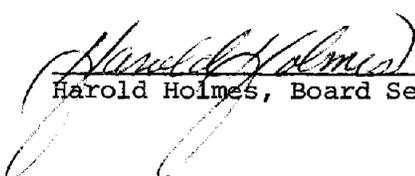
Proposal Number 99-15 entitled "Investigation of the Effects of Acidic Fog and Dew Upon Materials," submitted by the University of Southern California for a total amount not to exceed \$249,603.

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 99-15 entitled "Investigation of the Effects of Acidic Fog and Dew Upon Materials," submitted by the University of Southern California for a total amount not to exceed \$249,603.

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 \$249,603.

I hereby certify that the above
is a true and correct copy of
Resolution 86-8 as adopted by
the Air Resources Board.


Harold Holmes, Board Secretary

ITEM NO.: 86-2-5(b)2
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 99-15 entitled "Investigation of the Effects of Acidic Fog and Dew Upon Materials."

RECOMMENDATION: Adopt Resolution 86-8 approving Proposal No. 99-15 for funding in an amount not to exceed \$249,603.

SUMMARY: The purpose of this project is to investigate the contribution to materials damage due to acidic fog and dew. The Kapiloff Acid Deposition Act requires the Air Resources Board to assess the economic impact of acid deposition upon materials as part of a comprehensive research program to determine the nature, extent and potential effects of acid deposition in California.

The research plan by University of Southern California (USC) includes a combined field and laboratory study. USC would study four economically important materials. Fourteen one-month long experiments would be conducted in which the effects of chemical composition and individual components of acidic fog water on corrosion damage would be investigated. The materials would be exposed at four fog-prone sites for up to twelve months in a manner which will allow separation of the contribution to corrosion damage due to fog from the total corrosion loss.

This study is needed by the Board in assessing the economic impact of acid deposition upon materials.

The research contractor would be the University of Southern California, and the principal investigator would be Dr. Florian Mansfeld.

B U D G E T S U M M A R Y

University of Southern California

"Investigation of the Effects of Acidic Fog
and Dew Upon Materials"

BUDGET ITEMS:

Salaries	\$72,163
Benefits	24,081
Supplies/Equipment*	51,207
Travel	<u>3,578</u>

TOTAL Direct Costs	\$151,029
TOTAL Indirect Costs	<u>98,574</u>

TOTAL PROJECT COSTS \$249,603

* Supplies and equipment include four fog monitors (\$22,000), data loggers (\$20,000), exposure racks, exposure materials, and associated supplies.

State of California
AIR RESOURCES BOARD

Resolution 86-9
February 28, 1986

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, an unsolicited research proposal, Number 101-15, entitled "An Integrated Watershed Study: An Investigation of the Biota in the Emerald Lake System (Sequoia National Park) and Stream Channel Experiments," has been submitted by the University of California, Santa Barbara;

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:

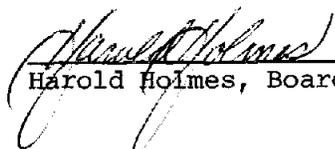
Proposal Number 101-15 entitled "An Integrated Watershed Study: An Investigation of the Biota in the Emerald Lake System (Sequoia National Park) and Stream Channel Experiments," submitted by the University of California, Santa Barbara, for a total amount not to exceed \$147,140.

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 101-15 entitled "An Integrated Watershed Study: An Investigation of the Biota in the Emerald Lake System (Sequoia National Park) and Stream Channel Experiments," submitted by the University of California, Santa Barbara, for a total amount not to exceed \$147,140.

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 \$147,140.

I hereby certify that the above
is a true and correct copy of
Resolution 86-9 as adopted by
the Air Resources Board.


Harold Holmes, Board Secretary

ITEM NO.: 86-2-5(b)3
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

- ITEM: Research Proposal No. 101-15 entitled "An Integrated Watershed Study: An Investigation of the Biota in the Emerald Lake System (Sequoia National Park) and Stream Channel Experiments."
- RECOMMENDATION: Adopt Resolution 86-9 approving Proposal No. 101-15 for funding in an amount not to exceed \$147,140.
- SUMMARY: The purpose of this research is to continue intensive baseline measurements and chemical and biological species at Emerald Lake Basin in Sequoia National Park in order to assess the potential effects of acid deposition upon sensitive ecosystems in California.
- The Kapiloff Acid Deposition Act requires that the Air Resources Board investigate the potential for damage to natural ecosystems from acid deposition. Accordingly, the Board has, in cooperation with the National Park Service, established a representative sensitive ecosystem, Emerald Lake Basin, located in Sequoia National Park. Baseline studies of ecosystem parameters, sensitive animal and plant populations and ecosystem cycles and processes are currently underway at the Integrated Watershed Study location.
- The first objective of this proposal is to continue biological monitoring in Emerald Lake and its associated streams to allow for an understanding of the natural variation in sensitive indicator populations. Potential changes in these populations can be assessed only after adequate baseline levels have been established.
- The second objective of this project is to evaluate the effects of acidic precipitation episodes upon the chemistry and biology of sensitive Sierra streams by means of a series of in-field experiments. These stream channel experiments will be conducted during summer 1986 and biological samples will be analyzed over the following months.
- This research project is needed in order to understand the current status of biological species sensitive to acidic deposition and to determine possible changes in natural populations in the Sierra due to anthropogenic inputs. This project is a part of the Board's five-year plan for acid deposition research pursuant to the Kapiloff Act.
- The research would be carried out by the University of California at Santa Barbara, and the principal investigator would be Dr. John Melack.

B U D G E T S U M M A R Y

University of California, Santa Barbara

"An Integrated Watershed Study: An Investigation
of the Biota in the Emerald Lake System
(Sequoia National Park) and Stream Channel Experiments"

BUDGET ITEMS:

Salaries	\$79,200	
Benefits	11,099	
Equipment	6,400	
Supplies	7,750	
Other Costs	8,100	
Travel	<u>3,890</u>	
TOTAL, Direct Costs		\$116,439
TOTAL, Indirect Costs		<u>30,701</u>
	<u>TOTAL PROJECT COST</u>	<u>\$147,140</u>

State of California
AIR RESOURCES BOARD

Resolution 86-10
February 28, 1986

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 1346-121, entitled "Inventory of Chlorophenol Use in the Forest Products Industry and Investigation of Related Emissions of Chlorinated Dibenzodioxins and Dibenzofurans," has been submitted by Systems Applications, Inc.;

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:

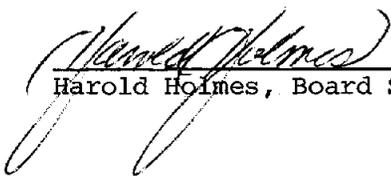
Proposal Number 1346-121, entitled "Inventory of Chlorophenol Use in the Forest Products Industry and Investigation of Related Emissions of Chlorinated Dibenzodioxins and Dibenzofurans," submitted by Systems Applications, Inc. for a total amount not to exceed \$74,474.

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 1346-121, entitled "Inventory of Chlorophenol Use in the Forest Products Industry and Investigation of Related Emissions of Chlorinated Dibenzodioxins and Dibenzofurans," submitted by Systems Applications, Inc. for a total amount not to exceed \$74,474.

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 \$74,474.

I hereby certify that the above
is a true and correct copy of
Resolution 86-10 as adopted by
the Air Resources Board.


Harold Holmes, Board Secretary

ITEM NO.: 86-2-5 (b) 4
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal Number 1346-121 entitled "Inventory of Chlorophenol Use in the Forest Products Industry and Investigation of Related Emissions of Chlorinated Dibenzodioxins and Dibenzofurans."

RECOMMENDATION: Adopt Resolution 86-10 approving Proposal Number 1346-121 for funding in an amount not to exceed \$74,474.

SUMMARY: The purpose of this project is to develop an emission inventory of the use, distribution and fate of chlorophenols and related compounds, as used in the forest products industry. These compounds are candidates for identification by the ARB as toxic air contaminants.

Section 39650 et seq. of the California Health and Safety Code (Assembly Bill 1807, Tanner, 1983) directs the Air Resources Board to identify toxic air contaminants and, where appropriate, develop emission control strategies. The ARB staff has compiled a list of potential toxic air contaminants to be reviewed according to the criteria specified in AB 1807, which include risk of harm to public health; amount or potential amount of emissions; manner of usage; persistence in the atmosphere; and ambient concentrations. Chlorophenols, polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) are included on the list.

Chlorophenols, primarily the penta- and tetrachloro-homologs, are used as fungicides in the preservation of wood and wood products for outdoor and/or underground use. The commercial preparations are often contaminated with residual amounts of PCDDs and PCDFs. In addition, the incineration of such treated wood products has been shown to produce PCDDs and PCDFs, either as volatile products of incomplete combustion or as residual solid in the wood ash itself.

The objectives of this project are to provide an accurate inventory of the use, distribution and fate of these compounds. This information will be used by the ARB and others to assess the risk to public health from chlorophenols and related compounds, as used in the forest products industry.

The Research Screening Committee has recommended that this contract be awarded to Systems Applications, Inc. The principal investigator will be Mr. Pradeep Saxena.

B U D G E T S U M M A R Y

Systems Applications, Inc.

"Inventory of Chlorophenol Use in the Forest Products
Industry and Investigation of Related Emissions
of Chlorinated Dibenzodioxins and Dibenzofurans"

BUDGET ITEMS:

Salaries	\$23,954	
Benefits	25,631	
Supplies	4,050	
Other Costs	2,600	
Travel	<u>185</u>	
TOTAL, Direct Costs		\$56,420
TOTAL, Indirect Costs		<u>18,054</u>
	<u>TOTAL PROJECT COST</u>	<u>\$74,474</u>

State of California
AIR RESOURCES BOARD

Resolution 86-11
February 28, 1986

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 1359-122, entitled "Assessment of Emissions of Volatile and Potentially Toxic Organic Compounds from Sewage Treatment Plants and Sewage Collection Systems," 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:

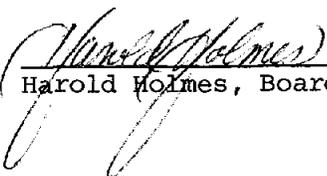
Proposal Number 1359-122, entitled "Assessment of Emissions of Volatile and Potentially Toxic Organic Compounds from Sewage Treatment Plants and Sewage Collection Systems," submitted by the University of California, Davis, for a total amount not to exceed \$31,656.

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 1359-122, entitled "Assessment of Emissions of Volatile and Potentially Toxic Organic compounds from Sewage Treatment Plants and Sewage Collection Systems," submitted by the University of California, Davis, for a total amount not to exceed \$31,656.

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 \$31,656.

I hereby certify that the above
is a true and correct copy of
Resolution 86-11 as adopted by
the Air Resources Board.



Harold Holmes, Board Secretary

ITEM NO.: 86-2-5(b)5
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1359-122 entitled "Assessment of Emissions of Volatile and Potentially Toxic Organic Compounds from Sewage Treatment Plants and Sewage Collection Systems."

RECOMMENDATION: Adopt Resolution 86-11 approving Proposal No. 1359-122 for funding in an amount not to exceed \$31,656.

SUMMARY: This proposed project is part of the Board's program to identify toxic air contaminants and to assess their associated health risks in accordance with the Health and Safety Code. Sewage treatment plants and collection systems are sources of potentially toxic volatile organic hydrocarbons. A recent study sponsored by the Environmental Protection Agency indicates that as many as 16 toxic compounds may be emitted from these sources. Eight of these compounds have been identified by the Air Resources Board as potential toxic air contaminants to be reviewed in accordance with AB 1807 (Section 39650 *et seq.* of the California Health and Safety Code; Assembly Bill 1807, Tanner, 1983). Based upon data compiled by the EPA for two facilities in the South Coast Air Basin and three in the Bay Area, the toxic emissions from California sewage treatment plants are estimated to be approximately 4000 metric tons per year.

The objectives of this research project are to quantify the emissions of hydrocarbons and volatile toxic organic compounds from publicly owned sewage treatment plants and collection systems in California. This inventory would include not only the gaseous effluents emitted through volatilization from sewage systems but also the emissions from sludges and other adsorbents collected from these treatment plants and disposed of through landfills, landfarming or other means.

The contractor would compile these data primarily through a literature search; by contacting knowledgeable personnel from the State Regional Water Quality Control Boards; and by

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surveying the major water treatment facilities for data on plant operations and systems. Based on all of this information, the contractor would estimate emissions of potential or identified toxic air contaminants from this emission source.

The results of this project will be used by the ARB staff and others to assist in risk assessment and, as required, for risk management for certain toxic air contaminants emitted from sewage treatment plants and collection systems.

This research will be carried out by the University of California at Davis. The principal investigator would be Dr. Daniel Chang; co-principal investigator would be Dr. Edward Schroeder from the Department of Civil Engineering.

B U D G E T S U M M A R Y

University of California, Davis

"Assessment of Emissions of Volatile and Potentially
Toxic Organic Compounds From Sewage Treatment Plants
and Sewage Collection Systems"

BUDGET ITEMS:

Salaries	\$22,387
Benefits	3,613
Supplies	200
Other Costs	1,025
Travel	<u>1,553</u>

TOTAL, Direct Costs	\$28,778
TOTAL, Indirect Costs	<u>2,878</u>

<u>TOTAL PROJECT COST</u>	<u>\$31,656</u>
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State of California
AIR RESOURCES BOARD

Resolution 86-12
February 28, 1986

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 1361-122, entitled "Study to Determine the Fate of Benzene Precursors in Gasoline," has been submitted by the National Institute for Petroleum and Energy 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:

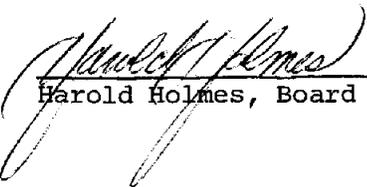
Proposal Number 1361-122, entitled "Study to Determine the Fate of Benzene Precursors in Gasoline," submitted by the National Institute for Petroleum and Energy Research, for a total amount not to exceed \$249,892.

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 1361-122, entitled "Study to Determine the Fate of Benzene Precursors in Gasoline," submitted by the National Institute for Petroleum and Energy Research, for a total amount not to exceed \$249,892.

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 \$249,892.

I hereby certify that the above
is a true and correct copy of
Resolution 86-12 as adopted by
the Air Resources Board.


Harold Holmes, Board Secretary

ITEM NO.: 86-2-5(b)6
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal NO. 1361-122 entitled "Study to Determine the Fate of Benzene Precursors in Gasoline."

RECOMMENDATION: Adopt Resolution 86-12 approving Proposal No. 1361-122 for funding in an amount not to exceed \$249,892.

SUMMARY: Benzene has been identified by the Air Resources Board as a toxic air contaminant to be regulated in accordance with AB 1807 (Section 39650, et seq. of the California Health and Safety Code; Assembly Bill 1807, Tanner, 1983). Automotive emissions (exhaust and evaporative) and emissions from gasoline marketing operations constitute the largest known sources of benzene present in the atmosphere. Based on an inventory compiled by ARB staff, annual benzene emissions statewide are about 16,100 tons, 83 percent of which originate from vehicular exhaust.

Previous studies sponsored by ARB indicate that benzene concentrations are greater in the hydrocarbon fraction of the exhaust emissions than in the gasoline fuel used in vehicles with or without catalytic converters. Data from these tests and other information compiled by ARB staff suggest that a correlation may exist between the aromatic content of gasoline and the benzene content in the exhaust from both catalyst and non-catalyst equipped light-duty vehicles.

The objectives of this research project are to identify the specific aromatic compounds (e.g., toluene, isomers of xylene, ethylbenzene, etc.) that are converted, in the engine or in the catalyst, to form benzene and to quantify the effects of the concentrations of these compounds in gasoline upon the benzene concentration in the exhaust emissions.

The contractor will achieve these objectives by combusting synthetic fuels spiked with varying concentrations of specified aromatic compounds and determining the concentrations of benzene in the exhaust of pre- and post-catalytic converter samples. Federal Test Procedure emission tests would be conducted using each of the synthetic fuels in five 1985-86 model test vehicles equipped with a variety of fuel induction and exhaust control systems.

State of California
AIR RESOURCES BOARD

Resolution 86-13
February 28, 1986

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 1370-123, entitled "Inhalation Toxicology of Combined Acid and Soot Particles," has been submitted by the University of California, Irvine;

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:

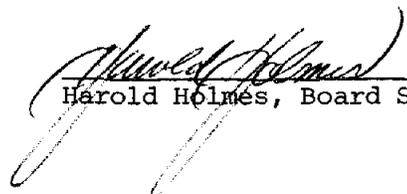
Proposal Number 1370-123, entitled "Inhalation Toxicology of Combined Acid and Soot particles," submitted by the University of California, Irvine, for a total amount not to exceed \$302,651.

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 1370-123, entitled "Inhalation Toxicology of Combined Acid and Soot Particles," submitted by the University of California, Irvine, for a total amount not to exceed \$302,651.

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 \$302,651.

I hereby certify that the above
is a true and correct copy of
Resolution 86-13 as adopted by
the Air Resources Board.


Harold Holmes, Board Secretary

ITEM NO.: 86-2-5(b)7
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

- ITEM: Research Proposal No. 1370-123 entitled "Inhalation Toxicology of Combined Acid and Soot Particles."
- RECOMMENDATION: Adopt Resolution 86-13 approving Proposal No. 1370-123 for funding in an amount not to exceed \$302,651.
- SUMMARY: This proposal is for the second and third years of a planned 3-year project to evaluate the acute toxicity of inhaled acids, alone and in combination with soot particles. This study will provide important toxicologic information on previously unstudied pollutant mixtures similar to those which might be observed in California.
- The study will use sensitive assessments of lung injury: structural damage, physiological impairment (clearance), and immunological alterations. The protocols are designed to observe early and residual effects and a nose-only exposure system has the advantage of preventing neutralization of airborne acids by animal-generated ammonia. During the first year of this study the contractor modified existing exposure facilities to accept a propane soot generator and dilute exhaust from a diesel engine, as requested by the ARB. Test atmospheres were generated and characterized, and initial acid-soot exposures were performed.
- The proposed research would be carried out by the University of California, Irvine. The principal investigator would be Dr. Robert Phalen.

B U D G E T S U M M A R Y

University of California, Irvine

"Inhalation Toxicology of Combined
Acid and Soot Particles"

BUDGET ITEMS:

Salaries	\$85,215
Benefits	23,948
Supplies	36,595
Equipment**	34,300
Other Costs*	38,500
Travel	<u>3,400</u>

TOTAL, Direct Costs	\$221,958
TOTAL, Indirect Costs	<u>80,693</u>

TOTAL PROJECT COST \$302,651

* Fees for USC Morphometric Study	\$29,300
Physical Plant, Film Badges, Waste Disposal	5,000
Consultant Costs	4,200
** Incubator	2,000
Stages 9 & 10 Cascade Impactor	1,000
Lundgren low-pressure Impactor	2,700
Nose-only Exposure Systems(2)	14,800
Formaldemeter	800
CO, CO ₂ Analyzer	5,000
Gas Chromatograph	6,000
Repairs and upgrades to existing equipment	2,000

State of California
AIR RESOURCES BOARD

Resolution 86-14
February 28, 1986

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 1369-123, entitled "Genotoxicity of Diesel Exhaust Particles and Vapors Collected from Engines with and without Particulate Trap Oxidizers," has been submitted by the University of California, Irvine;

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 1369-123, entitled "Genotoxicity of Diesel Exhaust Particles and Vapors Collected from Engines with and without Particulate Trap Oxidizers," submitted by the University of California, Irvine for a total amount not to exceed \$188,207.

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 1369-123, entitled "Genotoxicity of Diesel Exhaust Particles and Vapors Collected from Engines with and without Particulate Trap Oxidizers," submitted by the University of California, Irvine for a total amount not to exceed \$188,207.

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 \$188,207.

I hereby certify that the above
is a true and correct copy of
Resolution 86-14 as adopted by
the Air Resources Board.


Harold Holmes, Board Secretary

ITEM NO.: 86-2-5(b)8
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal No. 1369-123 entitled "Genotoxicity of Diesel Exhaust Particles and Vapors Collected from Engines with and without Particulate Trap Oxidizers."

RECOMMENDATION: Adopt Resolution 86-14 approving Proposal No. 1369-123 for funding in an amount not to exceed \$188,207.

SUMMARY: As part of the program to reduce emissions from diesel vehicles, the Air Resources Board is sponsoring testing of catalytic particle traps on heavy-duty diesel engines and has adopted a regulation that may necessitate the use of particle traps on some light-duty diesel vehicles. The efficiency of these traps in removing harmful mutagens and carcinogens, which are known to occur in diesel exhaust, is not known.

The objective of this study is to assess the mutagenicity of exhaust particles and vapors emitted from heavy-duty diesel bus engines and from light-duty diesel passenger car engines operating under various conditions with and without particle traps. Collection of particles and vapors from the exhaust of one engine will be performed at intervals during the time the bus is operated on city streets to study whether the performance of the trap decays with use. Staff of the Board's Haagen-Smit Laboratory will obtain the samples when the bus is returned to the laboratory for durability testing of the emission control system. Results of the in vitro tests will be used to assess the effectiveness of the particle traps in removing mutagenic materials from the exhaust streams.

The proposed research would be carried out by the University of California, Irvine. The principal investigator would be Dr. Ronald Rasmussen.

B U D G E T S U M M A R Y

University of California, Irvine

"Genotoxicity of Diesel Exhaust Particles and Vapors Collected
from Engines with and without Particulate Trap Oxidizers"

BUDGET ITEMS:

Salaries	\$85,558	
Benefits	24,065	
Supplies	19,630	
Other Costs	2,360	
Travel	<u>-0-</u>	
TOTAL, Direct Costs		\$131,613
TOTAL, Indirect Costs		<u>56,594</u>
	<u>TOTAL PROJECT COST</u>	<u>\$188,207</u>

State of California
AIR RESOURCES BOARD

Resolution 86-15
February 28, 1986

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 1353-121, entitled "Development of Test Procedures to Determine Emissions from Open Burning of Agricultural and Forestry Wastes," 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:

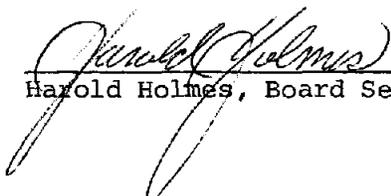
Proposal Number 1353-121, entitled "Development of Test Procedures to Determine Emissions from Open Burning of Agricultural and Forestry Wastes," submitted by the University of California, Davis, for a total amount not to exceed \$124,249.

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 1353-121, entitled "Development of Test Procedures to Determine Emissions from Open Burning of Agricultural and Forestry Wastes," submitted by the University of California, Davis, for a total amount not to exceed \$124,249.

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 \$124,249.

I hereby certify that the above
is a true and correct copy of
Resolution 86-15 as adopted by
the Air Resources Board.



Harold Holmes, Board Secretary

ITEM NO.: 86-2-5(b)9
DATE: February 28, 1986

State of California
AIR RESOURCES BOARD

ITEM: Research Proposal Number 1353-121 entitled "Development of Test Procedures to Determine Emissions from Open Burning of Agricultural and Forestry Wastes."

RECOMMENDATION: Adopt Resolution 86-15 approving Proposal Number 1353-121 for funding in an amount not to exceed \$124,249.

SUMMARY: AB 1223 requires that emission offset credits be granted in the permitting of new waste burning facilities using materials that would otherwise be burned in the field. The purpose of this study is provide a test facility for the accurate measurement of emission factors needed to assess the magnitude of emission credits.

The specific objectives of this project are to develop the experimental equipment, facilities and test procedures for determining emissions of criteria pollutants and toxic materials from burning of agricultural and forestry wastes, which can be applied to the development of emission offsets in accordance with AB 1223. A test apparatus is to be constructed to simulate open burning conditions as closely as possible while maintaining controlled conditions of material burn rate, air velocity, material moisture content, initial material distribution, boundary conditions, aerodynamic similarity and other factors which may influence the combustion of residues in the field.

The test equipment will be built, operated and maintained on a site at the University of California, Davis. Overall conduct of the project will be managed through the Agricultural Engineering Department by Dr. Bryan M. Jenkins. Drs. Daniel P. Y. Chang and Otto G. Raabe will provide assistance and guidance for the measurement and analysis of emissions.

B U D G E T S U M M A R Y

University of California, Davis

"Development of Test Procedures to Determine Emissions from
Open Burning of Agricultural and Forestry Wastes"

BUDGET ITEMS:

Salaries	\$54,296	
Benefits	13,193	
Equipment*	30,366	
Supplies	14,700	
Other Costs	1,200	
Travel	<u>1,960</u>	
TOTAL, Direct Costs		\$115,715
TOTAL, Indirect Costs		<u>8,534</u>
	<u>TOTAL PROJECT COST</u>	<u>\$124,249</u>

*Blower; fans; flowmeter; NO_x, SO₂ and benzene analyzers