State of California
AIR RESOURCES BOARD

Resolution 83-19
July 29, 1983

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;

WHEREAS, an unsolicited research Proposal Number 1219-100 entitled "Particulate and Gas Phase Mutagens in Ambient and Simulated Atmospheres" has been submitted by Statewide Air Pollution Research Center, University of California, Riverside to the Air Resources Board; and

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

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

> Proposal Number 1219-100 entitled "Particulate and Gas Phase Mutagens in Ambient and Simulated Atmospheres" submitted by the Statewide Air Pollution Research Center, University of California, Riverside for a total amount not to exceed $160,000;

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 1219-100 entitled "Particulate and Gas Phase Mutagens in Ambient and Simulated Atmospheres" submitted by the Statewide Air Pollution Research Center, University of California, Riverside for a total amount not to exceed $160,000; and

BE IT FURTHER RESOLVED, that the Executive Officer is authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $160,000.

I hereby certify that the above is a true and correct copy of Resolution 83-19 as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO.: 83-11-2a
DATE: July 29, 1983

ITEM: Research Proposal No. 1219-100 entitled "Particulate and Gas Phase Mutagens in Ambient and Simulated Atmospheres".

RECOMMENDATION: Adopt Resolution 83-19 approving Research Proposal No. 1219-100 for funding in an amount not to exceed $160,000.

SUMMARY: Respirable particles in California's polluted air basins contain combustion-generated carcinogens such as benzo(a)pyrene (BaP). Furthermore, application of the Ames Salmonella typhimurium assay to extracts of ambient particulate organic matter (POM) has shown they contain strong, direct mutagens as well as promutagens such as BaP. Similar considerations apply to POM directly emitted from motor vehicles, especially those with diesel engines. There is also evidence for the existence of gaseous mutagens in urban atmospheres. Questions critical to risk-assessment evaluations of alternate control strategies for mutagenic species in the atmosphere include: what are the chemical structures of these mutagenic compounds, how are they formed and what are their concentrations in ambient POM? To begin to answer these questions a three-part program has been proposed.

1. Mutagenic and Chemical Composition of Particles in Ambient Air

Ambient particulate matter will be collected over a four-day period in September 1983 during a period of high photochemical activity. Samples will be collected at El Monte and at Riverside and on a schedule which permits study of diurnal changes. The particulate matter will be analyzed for mutagenicity, lead, bromine, total carbon, elemental carbon, sulfate, nitrate and various elements. Concurrent with these analyses, CO, NO, O_3, PAN, wind direction, wind velocity, temperature, dew point, light intensity, THC, NMHC and CH_4 will be measured continuously. The results from analyses of the particulate samples and the continuous monitoring will be analyzed for possible correlations of direct mutagenicity with co-pollutants.

2. Development, Optimization and Testing of Ames Assay for the Testing of Gas-Phase Mutagens and its Applications to Polluted Atmospheres

   Once the Ames test is optimized from gas-phase mutagens, testing will be done using concentrated surrogate smog mixtures generated in the SAPRC chambers. Initially dark and irradiated hydrocarbon/NOx mixtures will be used. Subsequently individual gaseous pollutants suspected of being mutagenic, such as HONO, PAN, NO_2 and O_3, will be tested using the same exposure system as in the smog chamber experiments described above.

3. Investigation of the Mutagenicities of Model Peroxycompounds Utilizing the New Ames Strain TA 102

   The investigation will evaluate the suitability of the new Ames tester strain TA 102 for the mutagenic detection of peroxycompounds such as endoperoxides, hydroperoxides, and peracids; these might serve as model compounds for oxymutagens formed by atmospheric reactions of singlet oxygen and hydrogen peroxide with PAHs, olefins, and aromatic acids, respectively.

This project will substantially improve the capabilities of the ARB, local air pollution control districts and others to assess possible risks to public health due to toxic air contaminants and thereby help to distinguish insignificant or acceptable risks from unacceptable risks. In addition, where unacceptable risks may occur, the information obtained will help to establish a scientifically sound and defensible basis for public policy action to mitigate excessive risks.

State of California
AIR RESOURCES BOARD

Resolution 83-20
July 29, 1983

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;

WHEREAS, an unsolicited research Proposal Number 1217-100 (R) entitled "Optimization and Performance Evaluation of Catalytic Trap Oxidizer for Exhaust Particulate Reduction on Diesel Buses" has been submitted by Johnson Matthey Inc. to the Air Resources Board; and

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

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

Proposal Number 1217-100 (R) entitled "Optimization and Performance Evaluation of Catalytic Trap Oxidizer for Exhaust Particulate Reduction on Diesel Buses" submitted by Johnson Matthey Inc. for a total amount not to exceed $90,071;

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 1217-100 (R) entitled "Optimization and Performance Evaluation of Catalytic Trap Oxidizer for Exhaust Particulate Reduction on Diesel Buses" submitted by Johnson Matthey Inc. for a total amount not to exceed $90,071; and

BE IT FURTHER RESOLVED, that the Executive Officer is authorized to initiate administrative procedures and execute all necessary documents and contracts for the research effort proposed herein in an amount not to exceed $90,071.

I hereby certify that the above is a true and correct copy of Resolution 83-20 as adopted by the Air Resources Board.

Harold Holmes, Board Secretary

State of California
AIR RESOURCES BOARD

ITEM NO.: 83-11-2b
DATE: July 29, 1983

ITEM: Research Proposal No. 1217-100 (R) entitled "Optimization and Performance Evaluation of Catalytic Trap Oxidizer for Exhaust Particulate Reduction on Diesel Buses".

RECOMMENDATION: Adopt Resolution 83-20 approving Research Proposal No. 1217-100 (R) for funding in an amount not to exceed $90,071.

SUMMARY:

Particulate emissions from diesel engines are a significant air pollution concern because of the potential carcinogenic hazards posed by these emissions, their potential to reduce visibility, and their soiling effects on materials. While devices to reduce particulate emissions from light-duty diesel engines have been extensively studied and are expected to be in commercial service by 1986, this technology has not been fully demonstrated for heavy-duty diesel engines.

In order to evaluate the current technology, the ARB staff has suggested a demonstration of particulate controls on a transit coach. The engines used on buses are predominantly two-cycle, direct injection types; they are generally larger and have lower exhaust temperatures than diesel engines in automobiles. They also produce significantly larger quantities of polynuclear aromatic hydrocarbons in their exhaust.

The Manufacturers of Emission Controls Association (MECA) was contacted by the ARB regarding participation in the transit coach demonstration of a particulate trap and regeneration system, and they in turn solicited interest from the manufacturers who produce these devices and systems. Three respondents expressed interest, but only one, Johnson Matthey, is able to provide both a trap and regeneration system. Engine dynamometer testing at Southwest Research Institute has shown that a regeneration system is essential for trap operation with the diesel engine used in most transit coaches. Both Corning and NGK-Locke can provide only a trap system. At this time, regeneration technology is not available from the latter manufacturers.

This proposed study seeks to obtain baseline emissions data on a representative diesel-powered bus, to scale up and optimize the performance of a Johnson Matthey Catalytic Trap Oxidizer for this engine, and to evaluate performance of the engine and Catalytic Trap Oxidizer in normal bus service for a period of about six months. The results from this study will greatly assist the ARB staff in evaluating the technical feasibility and cost effectiveness of fitting Catalytic Trap Oxidizers to new and existing bus engines as a means of improving air quality.