

PROJECT ADMINISTRATION DATA SHEET

ORIGINAL  REVISION NO. \_\_\_\_\_

Project No. A-4209 GTRC/~~OPX~~ DATE 6 / 25 / 85

Project Director: Paul Middendorf ~~XXXXX~~/Lab EDL/EHS

Sponsor: General Services Administration, Region 4

Type Agreement: Letter Dated June 12, 1985

Award Period: From 6/21/85 To 7/5/85 (Performance) 7/5/85 (Reports)

Sponsor Amount: This Change Total to Date

Estimated: \$ 1,000 \$ 1,000

Funded: \$ 1,000 \$ 1,000

Cost Sharing Amount: \$ None Cost Sharing No: N/A

Title: Indoor Air Quality Survey for GSA in Birmingham, AL

ADMINISTRATIVE DATA OCA Contact Brian J. Lindberg X4820

1) Sponsor Technical Contact: John W. Davis 2) Sponsor Admin/Contractual Matters: Same as 1)

Field Office Manager

Federal Building, Room 428

1800 Fifth Avenue North

Birmingham, Alabama 35203-2182

(205) 254-1755

Defense Priority Rating: N/A Military Security Classification: N/A

(or) Company/Industrial Proprietary: N/A

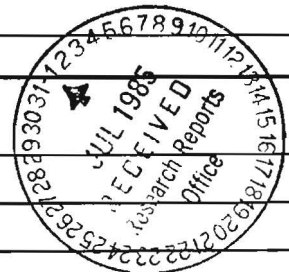
RESTRICTIONS

See Attached N/A Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval - Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of \$500 or 125% of approved proposal budget category.

Equipment: Title vests with none proposed or anticipated.

COMMENTS:



COPIES TO: SPONSOR'S I. D. NO. 01.147.002.85.001

Project Director Procurement/EES Supply Services GTRC  
Research Administrative Network Research Security Services Library  
Research Property Management Reports Coordinator (OCA) Project File  
Accounting Research Communications (2) Other Jones

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 8/13/85

Project No. A-4209 ~~XXXX~~ Lab EDL

Includes Subproject No.(s) \_\_\_\_\_

Project Director(s) Paul Middendorf GTRC ~~XXXX~~

Sponsor General Services Administration, Region 4

Title Indoor Air Quality Survey for GSA in Birmingham, AL

Effective Completion Date: 7/5/85 (Performance) 7/5/85 (Reports)

Grant/Contract Closeout Actions Remaining:

- None
- Final Invoice or Final Fiscal Report
- Closing Documents
- Final Report of Inventions
- Govt. Property Inventory & Related Certificate
- Classified Material Certificate
- Other \_\_\_\_\_

Continues Project No. \_\_\_\_\_ Continued by Project No. \_\_\_\_\_

COPIES TO:

- Project Director
- Research Administrative Network
- Research Property Management
- Accounting
- Procurement/GTRI Supply Services
- Research Security Services
- Reports Coordinator (OCA)
- Legal Services

- Library
- GTRC
- Research Communications (2)
- Project File
- Other Heyser
- Jones



4209  
Project A-4029

July 18, 1985

Mr.

Dear

At your request, an indoor air quality survey was performed in the offices of Congressman [redacted] on June 29, 1985. The basis for the request was employee complaints of eye, throat, and sinus irritation which cleared up when they left the offices. These complaints began around March of 1985. One employee was afflicted to such an extent that she left work and went to the hospital for treatment of the symptoms.

While on-site, several potential sources of chemical contaminants and the physical environment including ventilation were evaluated. Most air samples were taken in the Congressman's office since workers indicated that the problem seemed worse in this area, while it decreased in intensity as distance from the room increased. The results of the survey are described below.

#### Chemical Contaminants

The first potential source of chemical irritants to be considered was the presence of air contaminants from vehicle exhaust. The fresh air intake for the ventilation system which services the Congressman's offices is located at street level so that compounds found in vehicle exhaust are more likely to be found in this area than in areas serviced by ceiling units. The irritant chemicals which can be found in vehicle exhaust include the oxides of nitrogen (nitrogen dioxide and nitric oxide). Long-term detector tubes were used to detect the presence and concentration of these compounds.

It was not expected that vehicle exhaust would be a major contributor to the problem since the employees indicated that the symptoms were relieved when they went outside. Concentrations would be at least as high at the street as inside the building. Using the oxides of nitrogen as an indicator, there did not appear to be significant concentrations of vehicle exhaust in the office area. The sample results indicate the combined concentrations of the oxides of nitrogen in the 1 to 4 parts per million range. Short-term indicator tubes did not detect the presence of either nitrogen dioxide or nitric oxide.

Mr.  
July 18, 1985  
Page Two

Ozone, another irritant compound that could have been brought into the building through the ventilation system, was monitored with short-term detector tubes and was below the detectable limit (0.01 ppm).

Formaldehyde is an irritant found in many building products such as carpets, paneling, and adhesives. Concentrations of formaldehyde in buildings usually peak shortly after installation of formaldehyde-containing materials, and then gradually decrease to a low level. The actual concentration at a given time will depend on the off-gasing rate, the quantity of material placed in the building, the ventilation and recirculation rates, and the time since the material was placed in the building.

The concentration of formaldehyde in the Congressman's office over a 139 minute period was 0.02 ppm which is well below any of the current guidelines which are designed to protect against irritation. Some individuals are sensitive to formaldehyde as low as 0.1 to 0.2 ppm, 5 to 10 times higher than was found. Also, since only a small portion of the population is sensitive to formaldehyde at very low levels, it would be rare for all individuals in an area to exhibit symptoms.

Hydrogen fluoride, a strong acidic compound, is a component of "Con-coil" which is used to clean off the coils in the cooling chamber of the ventilation system. This compound is used only once per year and was used in May of 1985, several months after the symptoms of irritation were first noticed. One air sample was taken in the congressman's office to determine whether hydrogen fluoride was present in the air. The results indicate that total fluorides were present at a concentration of 0.01 milligrams of fluoride per cubic meter of air. This level is well below any of the current occupational exposure guidelines.

In summary, none of the specific compounds investigated in this study were found at levels which would induce the irritant symptoms exhibited by the employees. Other compounds which might be present, such as residual pesticides from previous treatments and rug shampoos, were not evaluated. However, it is considered unlikely that these compounds are responsible since they were applied long before symptoms were initially noticed.

#### Physical Environment

Temperature measurements in the offices ranged from 73 to 77°F during the day, and relative humidity was measured in the 62-68% range. The relative humidity was a little higher than what is generally considered as the "comfort range" of 40-60% relative humidity.

Because symptoms began in March which is about the time that the air conditioning system was turned on, there may be a cause-effect relationship. One way to check this out would be to turn off the unit servicing the area and install window air conditioners on a temporary basis. If the symptoms disappear, the agent(s) is likely in the ventilation system, or the ventilation

Mr.  
July 18, 1985  
Page Three

system itself. If the symptoms do not disappear, the source(s) is likely in the offices. The amount of fresh make-up air was determined by calculating the quantity of air which is supplied to the system and the amount of air coming through the recirculation ducts. These measurements and calculations indicate that only about 40% of the air is recirculated. Carbon dioxide levels were generally 500 ppm which indicates that there were sufficient quantities of fresh air being brought into the area.

### **Recommendations**

If the agent(s) is in the ventilation system, the system should be modified in one of the following ways. As the make-up air is passed over the coils to chill the air, water is condensed because cold air cannot hold as much water as warm air. The water drops into a pan beneath the coils where it accumulates up to a certain level, and is then drained out above the minimum level. At the time of the survey, the drain pipe appeared to be leaking either because of a poor seal or a partial clog in the drain pipe.

The water pan is a potential breeding ground for microbiological agents such as fungi and bacteria. It should be drained thoroughly and kept as close to dry conditions as possible to reduce the potential for the fungal spores to enter the work areas through the ventilation system. Microbiological agents have been shown to cause hypersensitive pneumonitis which produces symptoms similar to those exhibited by the employees.

Inside the offices, the ceilings were about 15 feet high; the make-up air vents and the exhaust vents were next to each other. Using smoke tubes, it was observed that below about the 12 foot level, the smoke dissipated slowly, indicating poorer air mixing. However, above the 12 foot level, there was significant air movement. The actual fresh air that reaches the personnel at floor level appears to be minimal. If a suspended ceiling were placed in these offices at about 8 feet, and the ventilation system blew in one side and exhausted on the other, significantly more fresh air would reach the employees.

In summary, adjustments to the ventilation system could increase the fresh air actually reaching the workers. Modifications of the drain pan could reduce the potential for microbiological agents which have been shown to cause symptoms similar to those exhibited by the workers.



In addition to these measures, a thorough investigation of the convection heaters may be necessary to assure that there are no microbial agents or other agents originating from these areas.

If these measures do not reduce or eliminate the symptoms exhibited by the workers, then more testing can be done to attempt to identify the causative agents involved. Suggested sampling would be for pesticides, and for long-term sampling on various media with subsequent gas chromatography/mass spectrometry analysis.

Mr.  
July 18, 1985  
Page Four

If you have any questions about this report or any other aspect of the problem, please feel free to contact us.

Sincerely,

 Paul J. Middendorf, CIH   
Research Scientist  
Environmental, Health, and  
Safety Division

✓  
cc:

PJM:dl

Enclosures



