U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
CENTER FOR DISEASE CONTROL
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH
CINCINNATI, OHIO 45226

HEALTH HAZARD EVALUATION DETERMINATION
REPORT NO. 77-38-504

WESTERN ELECTRIC COMPANY
MESQUITE, TEXAS

JULY 1978

I. TOXICITY DETERMINATION

The following determinations have been made based upon the: (a) results of environmental air samples collected on June 6, 8, 15, 1977; (b) evaluation of local exhaust ventilation for spraying and cleaning operations; (c) the administering of confidential employee interviews/questionnaires; and (d) available toxicity information.

Measured airborne concentrations of perchloroethylene; toluene; n-Butyl acetate; 1,1,1-trichloroethane; isopropanol; acetone and methylene chloride did not exceed the recommended criteria/applicable standards on an 8-hour time-weighted average (TWA) concentration basis, within the work environment at the time of this evaluation.

The workers in the group with reportedly much exposure to perchloroethylene may be experiencing toxic effects from their exposure. When compared to a group receiving no exposure to perchloroethylene, the exposed group reported greater incidence of the following current symptoms: throat irritation, cough, and light headedness. The difference in incidence of throat irritation was statistically significant, and that of cough possibly so. The exposed group also reported, by history, a greater incidence of headache, tiredness at work, blurred vision, dizziness and a "drunken" feeling, loss of sense of smell, and loss of appetite during the five (5) months prior to this study. The difference in loss of smell was possibly statistically significant.

The pre-shift total trichloro compound (TTC's) in the workers' urine suggest that at least some of the workers are sufficiently exposed to perchloroethylene to accumulate this chemical in their bodies. The working of considerable overtime may contribute to this accumulation by reducing the workers exposure-free time during which time the perchloroethylene could be eliminated from the body.

II. DISTRIBUTION AND AVAILABILITY OF DETERMINATION REPORT

Copies of this Determination Report are currently available upon request from NIOSH, Division of Technical Services, Information and Dissemination Section, 4676 Columbia Parkway, Cincinnati, Ohio 45226. After ninety (90) days, the report will be available through the National Technical Information Service (NTIS), Springfield, Virginia. Information regarding its availability through NTIS can be obtained from NIOSH, Publications Office, at the Cincinnati, Ohio, address. Copies have been sent to:

(a) Western Electric Company
(b) Authorized Representative of Employees
(c) U. S. Department of Labor, Region VI
(d) NIOSH, Region VI

For the purpose of informing the approximately 141 "affected employees", the employer shall promptly "post" the Determination Report in a prominent place(s) near where exposed employees work, for a period of thirty (30) calendar days.

III. INTRODUCTION

Section 20(a)(6) of the Occupational Safety and Health Act of 1970, 29 U.S.C. 669 (a)(6), authorizes the Secretary of Health, Education and Welfare, following receipt of a written request from an employer or authorized representative of employees, to determine whether any substance normally found in the place of employment has potentially toxic effects in such concentrations as used or found.

NIOSH received such a request from the Communication Workers of America (CWA), Local No. 12260 regarding the exposure of workers to perchloroethylene in the circuit pack manufacturing, miniaturized trunks and backplane connector areas of the plant.

IV. HEALTH HAZARD EVALUATION

A. Description of Process - Conditions of Use

This plant, commencing operations in April, 1971, currently employs a total of approximately 2600 persons, and is involved in the production of central office switching equipment. Approximately 141 persons are involved in operations within the circuit pack/mini-trunk/backplane connector areas.

B. Evaluation Design

1. Preliminary Survey

On April 12-13, 1977, an initial survey of the facility was conducted by NIOSH representatives, H. L. Markel, Jr., Regional Industrial Hygienist, and W. D. Keith, M.D. No actual environmental/medical evaluations were performed during this survey. Considerable information was, however, gathered on the characterization of all substances used in the area(s) of concern, as well as conditions of their use.

All areas within the plant where possible significant exposure to perchloroethylene might occur were identified. Other chemicals (toluene, n-Butyl acetate, 1,1,1-trichloroethane, isopropanol, acetone, methylene chloride), used either directly or as an ingredient of other products used within the plant, were also considered applicable to the evaluation.

Plans were also made to evaluate the existing local exhaust ventilation used for spraying/cleaning operations within the applicable work areas.

From a medical standpoint, discussions were held with the plant physician on exposure histories within the plant. A brief review of employee medical records failed to be of any benefit in detecting any unusual prevelance of disease at the plant.

2. Follow-up Environmental/Medical Survey

In order to more fully and adequately evaluate employee exposure to the above-mentioned chemicals, it was deemed appropriate and necessary to collect environmental samples in the circuit pack manufacturing, miniturized trunks and backplane connector areas of the plant.

From a medical standpoint, the study was primarily designed to assess the medical hazards to those employees working in close proximity with perchloroethylene.

Based on job classification, work area, and discussion with company representatives the work force was divided into "much exposed" and "not exposed" groups. A systematic random sample was drawn from each group covering both day and evening shifts. A detailed questionnaire was then administered to this study group consisting of 26 "much exposed" and 27 "not exposed" workers. The questionnaire, a sample of which is shown in Appendix A, was to cover individual work exposures; relevant medical histories, both past and present; and symptomatology during both the current and previous five (5) months employment. For purposes of further statistical analysis in this study, the "much exposed" group was reduced to include only the nineteen (19) individuals, or 76% of the respondents in this category, who indicated a high exposure to perchloroethylene (Table 1). On the questionnaire, the "not exposed" group included only the twenty-three (23) individuals, or 88% of the respondents in this category, who indicated no exposure to perchloroethylene.

Plans were also formulated to collect urine samples on a pre and post shift basis for both exposed and non-exposed workers--each sample being analyzed for total trichloro compounds (TTC).

In order to accomplish the above-described study design, a follow-up environmental/medical evaluation was performed on June 6,8, 1977.

C. Evaluation Methods

1. Environmental

a. Perchloroethylene Toluene, n-Butyl Acetate, 1,1,1-Trichloroethane, Isopropanol, Acetone and Methylene Chloride.

One-hundred-seven personal breathing-zone samples were collected by using low-flow SIPIN, Model SP-1 personal sampling pumps with standard charcoal tubes at a sampling rate of approximately 50 cubic centimeters per minute. Two (2) area samples were collected by using Mine Safety Appliance Model G, battery-operated vacuum pumps with standard charcoal tubes at a sampling rate of 1.0 liter per minute.

All samples were analyzed in accordance with NIOSH Physical and Chemical Analysis Branch Analytical Method #127--namely, adsorption on charcoal, desorption with carbon disulfide, and injection into a gas chromatograph.

A SIERRA Instruments Air Velocity Meter, Model 1555 Thermo Anemometer, was used to measure face velocities at booths and slot velocities at open surface tanks within the circuit pack manufacturing, miniaturized trunk and backplane connector areas.

2. Medical

As related to the 107 urine specimens collected from plant employees, total trichloro compounds were analyzed using the method described by Tanaka and Skeda, Brit. J. Ind. Med. 25: 214 (1968). Specific gravity was measured on all specimens and results were expressed as milligrams/liter (mg/l), corrected to a specific gravity of 1.024.

D. Evaluation Criteria

1. Environmental Standards or Criteria

The evaluation standards and criteria considered to be applicable to this evaluation are as follows:

a. The Occupational Health Standards as promulgated by the U. S. Department of Labor, Federal Register, May 28, 1975, Title 29, Chapter XVII, Subpart G. Table Z-1 (29 CFR Part 1910.1000).

b. American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) Committee, and

c. NIOSH Criteria Documents recommending occupational standards.

Substance	8-hr. TWA, ACGIH TLV Committee (mg/M_3)**	NIOSH 10-hr TWA Recommended Standard (mg/M_3)**	Comparable OSHA 8-hr TWA Standard (mg/M_3)**
Perchloroethylene*	670	339	670
1,1,1-Trichloroethane	1900	1910(15 min. ceiling)	1900
Toluene	375	375	750
n-Butyl Acetate	710	--	950
Isopropanol	980	984	985
Acetone	2400	--	2400
Methylene Chloride	720	261	360

Occupational health exposure limits for individual substances have generally been established at levels designed to protect workers occupationally exposed on an eight (8) hours per day, forty (40) hours per week basis over a normal working lifetime.

*Based upon recent studies by the National Cancer Institute, indicating that perchloroethylene causes liver cancer in laboratory mice, NIOSH recommends occupational exposure to this compound be minimized while its carcinogenic potential in the workplace is further evaluated.

**mg/M_3 = milligrams of substance per cubic meter of air samples.

2. Toxic Effects

a. General

The primary exposures to be considered in this evaluation were those to organic solvents; namely, perchloroethylene; [1,2] 1,1,1-trichloroethane; [3,4] methylene chloride;[5] toluene; [6,7] acetone;[8] isopropanol[9] and n-Butyl acetate.[10] There are three (3) common effects from these solvents, although the prominence of a given effect, and the concentration which might cause it, will depend on the particular solvent in question.

All can be the causative agent for narcosis--a dulling of the brain--which may ultimately result in headaches, lightheadedness, incoordination, fatigue and, in higher concentrations unconsciousness and even death.

All can be irritating to the eyes, nose, throat and lungs, but not always to the same degree. Except as discussed below, recovery is complete after exposure has ceased.

Additionally, all can prove irritating to the skin to a greater or lesser extent, and can cause a defatting of the skin, and resulting dermatitis, if prolonged or repeated skin contact is permitted.

Finally, it is felt that skin absorption could contribute to possible systemic problems caused by exposure to perchloroethylene, toluene and isopropanol.

b. Perchloroethylene [1,2]

Perchloroethylene is more widely known for its irritation properties than other solvents discussed in this report. Sufficient concentrations may lead to pulmonary edema and prolonged skin contact can result in burns and blistering. In some instances, chronic exposure has been reported to cause difficulties with the sense of balance, visual conditions (optic atrophy), trembling, confusion and memory loss, peripheral neuropathies including numbness of the fingers, general weakness, insomnia/gastrointestinal disturbances and loss of appetite.

Toxic liver and kidney effects have also been reported. Although no human data is available, perchloroethylene has caused fetal abnormalities in mice and fetal reabsorption/liver cancer in one strain of rats.[2]

Perchloroethylene is generally eliminated from the body slowly, and will thus tend to accumulate in the body as the result of repeated frequent exposure.

c. 1,1,1-Trichloroethane [3,4]

Although the irritative effects of 1,1,1-trichloroethane are proven, they are sufficiently mild to permit its use as an anesthetic. Its use it, however, associated with a slow heart rate and a fall in blood pressure.

A number of human fatalities related to industrial exposure in closed spaces have been reported. A five (5) minute exposure to 5,000 parts per million (p.p.m.) can be expected to produce marked incoordination and anesthesia. Prolonged exposure at this concentration may cause coma and death.

Exposure to concentrations in excess of 1,000 p.p.m. for fifteen (15) minutes, or 2,000 p.p.m. for five (5) minutes, can be expected to produce a disturbance of equilibrium in the majority of adults.

Above 1700 p.p.m., minor disturbances of equilibrium have been observed, with complaints of headache and lassitude. In controlled human exposures to 500 p.p.m., no effects other than slight, transient eye irritation were noted; at 1,000 p.p.m. and above, mild eye irritation was experienced by all subjects and some became dizzy.

Workers may complain of burning of the tongue following exposure to 1,1,1-trichloroethane, and prolonged contact with the skin may lead to numbness and a burning sensation. In acute poisoning, gastrointestinal symptoms are present, along with a feeling of fatigue and possibly long congestion.

Following exposure, most of the compound is eliminated unchanged via the lungs--chiefly within 48 hours.

d. Urinary Trichloro Compounds

Both perchloroethylene and 1,1,1-trichloroethane are metabolized to some extent in the body with the metabolities trichloroacetic acid (TCA) and trichloroethanol (TCE) being excreted in the urine. Together they form the total trichloro compounds (TTC). Following exposure to perchloroethylene, approximate equal amounts of TCA and TCE are excreted, whereas approximately twice as much TCE is excreted following exposure to 1,1,1-trichloroethane.[3]

Both perchloroethylene and 1,1,1-trichloroethane tend to accumulate in fatty tissue and are eliminated over a period of time. In the case of 1,1,1-trichloroethane, the body can eliminate one-half the amount absorbed in approximately nine (9) hours. On the other hand, perchloroethylene requires approximately 72 hours for elimination of one-half the amount present in the body--much of it through the lungs. Of this amount, only about three (3) percent appears in the urine as TTC's. [1] Thus, TTC's are not an extremely good measure of the degree of exposure to perchloroethylene, but can be expected to be persistent for some time after exposure. Analysis of the expired breath has proven to be perhaps a better indicator of degree of exposure for both perchloroethylene and 1,1,1-trichloroethane, although urinary TCC's have been shown to be of some value for the latter.[3]

Normal levels of TTC's in the urine, as determined in Japanese man, were less than 1 milligram per liter (mg/l)(detection level).[3]

e. Effects of Long Biological Half-Life and Overtime Work

The TLVs are recommended for workers working a 40 hour work week, 8 hours per day.[10] Although for many substances working a 48 hour, 6 day work week will make no difference, for substances with a long biological half-life the body will accumulate significantly more of the substance when there is only one day per week with no exposure than when there are two unexposed days in a row. The biological half-life represents the time required for the body to eliminate one half of the given substance. Thus if the half-life is 8.7 hours (as is the case with 1,1,1-trichloroethane), 8.7 hours after the end of the shift a worker will have only one half as much chemical left in the body as he did at the end of the shift. In another 8.7 hours he will have gotten rid of half of the half, leaving only one quarter of the chemical in the body. Thus at the start of work the following day, a worker will still have a little over one quarter of the substance in his body, and concentrations in his body will tend to build up over the week. However, over a two day weekend only 0.6% of the level at the end of the work week will be retained. If the work week is extended to 6 days, 4.1% will still be retained after the one day off. This will allow the chemical to build up to somewhat higher levels by the end of the following week.

Table 2 compares the results of working a 40 hour week with a substance (such as 1,1,1-trichloroethane) with a half-life of 8.7 hours with a substance (such as perchloroethylene) with a half-life of 71.5 hours. Also it shows what happens when the work week is extended to 48 hours, 6 days. This assumes that the amount absorbed is proportional to the length of the exposure and the rate the substance is eliminated from the body is proportional to the concentration in the body.

As can be seen from the table, for a substance with a biological half-life of 8.7 hours, working a 6 day week instead of a five day week will lead to a greater carry-over of body burden from one week to the next but will not appreciably change the maximum levels obtained by the end of the work week. However, when working with a substance with a 71.5 hour half-life a regular work week of 6 days will give an end of work week level 8.6% higher than will a 5 day week. Most of this increased level will be obtained after two consecutive weeks of 6 days.

f. Methylene Chloride[5]

The chief hazard of methylene chloride, an anesthetic, is loss of consciousness following inhalation of the vapor. The early symptoms of inhaling the vapor are lightheadedness, mental confusion, nausea, vomiting and headache. Continued exposure may result in increasing giddiness and staggering, progressing to loss of consciousness. Recovery is usually rapid and complete but intense and/or prolonged exposure by inhalation may be fatal.

High vapor concentrations sufficient to cause anesthesia may also cause eye and respiratory tract irritation. A single direct contact of the liquid with the skin rarely results in more than minor irritation. However, if the liquid is held in contact with the skin by clothing or other materials, skin burns may result.

Methylene chloride is metabolized to carbon monoxide. This carbon monoxide combines with the hemoglobin of the red cells to form carboxyhemoglobin which interferes with the blood's ability to carry oxygen to the tissues of the body. Symptoms of carbon monoxide poisoning include headache, chest pains, rapid pulse, shortness of breath, muscular pains in the arms and legs, tingling in the hands and feet, irritability, forgetfulness, giddiness, drowsiness, decreased vision and stupor. Recovery is usually complete in the absence of complicating medical disease (i.e. coronary heart disease).

g. Toluene [6,7]

Toluene is a mild central nervous system depressant which produces mild fatigue, weakness, confusion and paresthesia of the skin at 200 p.p.m. for eight (8) hours of exposure. At higher concentrations, extreme fatigue, mental confusion, nausea, headache, and dizziness occur. Exposures to levels of 50 - 100 p.p.m. have repeatedly failed to cause any effects.

h. Acetone[8]

Exposure to very high vapor concentrations, well above those easily recognizable by odor, may cause eye, nose and throat irritation. Exposures to very high concentrations may produce narcotic (anesthetic) symptoms such as headache, drowsiness and incoordination.

E. Evaluation Results and Discussion

1. Environmental

The results of air samples collected during this evaluation are shown in Tables 3 through 5:

104 personal breathing-zone samples resulting in 520 analyses (104 each for perchloroethylene; toluene; 1,1,1-trichloroethane; n-Butyl acetate; and isopropanol).

Two (2) area samples resulting in 10 analyses (2 each for perchloroethylene; toluene; 1,1,1-trichloroethane; n-Butyl acetate and isopropanol).

Ten (10) personal breathing-zone samples resulting in 20 analyses (10 each for acetone and methylene chloride).

It is noted that all samples were well below both NIOSH recommendations and OSHA standards.

An evaluation of existing local exhaust ventilation in the circuit pack manufacturing, miniaturized trunk and backplane connector areas revealed face velocities for small/large booths and slot velocities for open surface tanks to be in accordance with accepted design criteria[11] for such operations as were being conducted.

2. Medical

a. Current Exposure

Table 6 compares symptoms reported by the two exposure groups on the day of the study. The group witnessing high exposure to perchloroethylene was more likely to experience throat irritation, persistent cough, headache or lightheadedness than was the group not witnessing perchloroethylene exposure. The difference in incidence of throat irritation was statistically significant, while that of cough was possibly statistically significant. This suggests that the high exposure group is still receiving excessive exposures to perchloroethylene, although the environmental levels found in the study would indicate that such is not occurring on a continuous basis.

Urinary total trichloro compounds (TTC) as shown in Table 7, indicated that both the high and low exposure groups were, in fact, exposed to substances which led to the TTC excretion. Of interest is the larger number of high exposure workers with measurable TTC's in their pre-shift urine with a possibly significant higher "mean" level. Post-shift findings were very similar between the groups.

Both the increased incidence of symptoms and the increased number of high-exposure workers with TTC's in their pre-shift urines might be expected if the workers are accumulating perchloroethylene as the result of repeated exposure(s). The seriousness of this problem would be reduced for 1,1,1-trichloroethane exposures, as it is eliminated from the body more rapidly. On the other hand, and because it is more rapidly metabolized, workers exposed to 1,1,1-trichloroethane would be more likely to show increases of TTC's in their post-shift urines.

A compounding factor in this study was overtime work performed by the employees. Approximately one-half of the workers on the day shift had worked some overtime on the weekend preceeding the commencement of the study.

b. Past Exposure:

Table 8 indicates a history of past illnesses of the high and low exposure groups-as obtained by the administered questionnaire, while Table 9 indicates symptoms observed during the five (5) month period following Christmas, 1976.

Past illnesses appeared in approximately equal proportions. In considering symptoms during the above-mentioned five (5) month period, the high exposure group was more likely to report headaches, tiredness at work, blurred vision, dizziness, "drunken" feelings, loss of sense of smell, and loss of appetite, than the low exposure group. The difference in loss of smell is possibly statistically significant. More also reported no symptoms. This suggests that although perchloroethylene is not the only substance presenting problems, it had definitely presented problems during the five-month period in question.

Again, overtime may be a compounding factor as there has been considerable overtime during the past two years.

F. Conclusions

1. Environmental

No concentrations in excess of the evaluation criteria used herein for perchloroethylene; toluene; 1,1,1-trichloroethane; n-Butyl acetate; isopropanol; acetone; or methylene chloride were found to exist in the work environment of the plant at the time of the evaluation.

2. Medical

The workers in the group with reportedly much exposure to perchloroethylene may be experiencing toxic effects from their exposure. When compared to a group receiving little exposure to perchloroethylene, the exposed group displayed a greater incidence of throat irritation, cough, headache and lightheadedness on the days of the study. The exposed group also reported, by history, a greater incidence of headache, tiredness at work, blurred vision, dizziness, a "drunken" feeling, loss of sense of smell, and loss of appetite during the five (5) months prior to the study.

The pre-shift TTC's in the workers' urine suggest that at least some of the workers are sufficiently exposed to perchloroethylene to accumulate this chemical in their bodies. The working of considerable overtime may contribute to this accumulation by reducing the workers' exposure-free time during which the perchloroethylene could be eliminated from the body.

V. RECOMMENDATIONS

1. Because of the possible contribution of skin absorption to toxic effects caused by perchloroethylene, emphasis should be directed toward preventing prolonged skin contact with said chemical. Impervious gloves may prove to be effective.

2. Suggestions for medical surveillance are contained in the various NIOSH Criteria Documents for the solvents/compounds in question. Specifically, it is recommended that provisions are made for pre-employment and periodic medical assessments. Similar provisions should be made for adequate maintenance of records for a period of years. Record retention is recommended until possible questions on teratogenicity and/or carcinogenicity are resolved.

3. Occupational health standards are not designed for a seven-day work week. A significant reduction in the amount of overtime worked by employees may be required to ensure that recommended exposure levels fall within the "safe" range.

4. The "anesthetic" effects of all the solvents can add to each other, as well as to the effects of alcohol, tranquilizers and, possibly, antihistamines. Thus, combinations of solvents, with or without drugs, are more likely to cause symptoms such as tiredness, headache, "drunkenness" and dizziness.

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Table 1
Workers' History of Chemical Exposure
Western Electric Company
Mesquite, Texas
June 6, 8, 1978

I. High Exposure Group: Includes 25 Respondents*

Chemical Agent	Much Exposed		Seldom Exposed		No Exposure	
	Number	Percent(%)	Number	Percent(%)	Number	Percent(%)
Perchloroethylene#	19	76	3	12	3	12
Acryloid	7	28	1	4	17	68
Flux/solder	8	32	1	4	16	64
Isopropanol	5	20	1	4	19	76
Trichloroethane	4	16	0	0	21	84
Other@	3	12	4	16	18	72

No Exposures - 1 (4%)

II. Low Exposure Group: Includes 26 Respondents¢

Chemical Agent	Some Exposure		No Exposure	
	Number	Percent (%)	Number	Percent (%)
Perchloroethylene#	3	12	23	88
Acryloid	0	0	26	100
Flux/solder	4	15	22	85
Isopropanol	2	8	24	92
Trichloroethane	0	0	26	100
Other@	9	35	17	65

No Exposures - 14 (54%)

Notes: *One worker did not complete the questionnaire and so was, therefore, excluded from the original 26 respondents.

@Includes: Xylene, acetone, "Markem Cleaner", epoxi, dust, powdered plastic, glue, Freon, and ethylene chloride.

#Includes: Bees Wax Lube which is mainly perchloroethylene.

¢One worker was transferred from the "High Exposed" Group to the "Low Exposure" Group since Christmas, 1976. He was excluded from the original 27 respondents.

TABLE 2

Body Level of Toxicant as a Multiple of Amount Absorbed in One Hour of Exposure for Different Biological Half-Lives and Different Lengths of Work Week

	8.7 hour half-life		71.5 hour half-life	
	40 hour 5 day week	48 hour 6 day week	40 hour 5 day week	48 hour 6 day week
Concentration (as multiple of amount absorbed in 1 hour)				
Start of work "Monday morning" stable exposure	0.0423	0.287	16.972	23.458
End of work end of work week stable exposure	6.945	6.945	31.464	34.626
% Difference in concentration end of week stable exposure $\frac{\text{48 hr. week-40 hr. week}}{\text{40 hr. week}} \times 100$	0%		8.6%	
Time to reach stability with a stable exposure	1 week		5+ weeks	
entration				
End of work				
End of work week				
After 1st overtime week	6.945		32,757	
After 2nd overtime week in a row	"		34,262	
After 3rd overtime	"		34,555	
After 4th overtime	"		34,613	
After 5th overtime	"		34,624	

Absorption formula $C_t = C_o \times k \times t$

Elimination formula $C_t = C_o \times e^{-k' \times t}$

C_o = Concentration at 0 time

C_t = concentration at time t

t = time (in same units as half-life)

e = root for natural logarithm

k = rate of absorption based on exposure and biologic factors (assumed to be constant and, in this case, assumed to be 1)

k = $\frac{\text{natural log of 2}}{\text{half-lif}}$ $\left(\frac{\ln 2}{\text{half-life}}\right)$

Table
Perchloroethylene (Tetrachloroethylene) Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M3) A.M. or P.M.	(b) Concentration (mg/M3) 8-hr. TWA
1	6-6	Miniaturized Trunks	P	7:07A-10:27A	5	8
1A	"	Miniaturized Trunks	P	11:22A- 3:18P	10	
2	"	Ferrod Sensors	P	7:10A-11:46A	10	10
2A	"	Ferrod Sensors	P	12:16P- 3:21P	10	
3	"	Ferrod Switches	P	7:12A-11:26P	7	7
4	"	Circuit Pack Manufacturing	P	7:14A-11:24A	14	16
4A	"	Circuit Pack Manufacturing	P	11:52A- 3:19P	19	
5	"	Moulding	P	7:15A-12:01P	2	2
5A	"	Moulding	P	12:49P- 3:03P	2	
6	"	Miniaturized Trunks	P	7:17A-10:41A	12	15
6A	"	Miniaturized Trunks	P	11:26A- 3:03P	18	
7	"	Electronic Switching Systems	P	7:19A-10:44A	2	3
7A	"	Electronic Switching Systems	P	11:32A- 3:10P	3	
8A	"	Circuit Pack Manufacturing	P	11:50A- 3:22P	79	79
9	"	Circuit Pack Manufacturing	P	7:24A-11:21A	33	53
9A	"	Circuit Pack Manufacturing	P	11:49A- 3:22P	75	

Table
Perchloroethylene (Tetrachloroethylene) Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M3) A.M. or P.M.	(b) Concentration (mg/M3) 8-hr. TWA
10	6-6	Electronic Switching Systems (ESS)	P	7:25A-11:10A	4	5
10A	"	Electronic Switching Systems (ESS)	P	12:01P- 3:25P	7	
11	"	Cast Wired Equipment	P	7:26A-11:45A	2	3
11A	"	Cast Wired Equipment	P	12:26P- 3:26P	3	
12	"	Electronic Switching Systems (ESS)	P	7:27A-10:45A	3	4
12A	"	Electronic Switching Systems (ESS)	P	11:20A- 3:23P	5	
13	"	Electronic Switching Systems (ESS)	P	7:29A-10:55A	2	3
13A	"	Electronic Switching Systems (ESS)	P	11:32A- 2:47P	4	
14	"	Circuit Pack Manufacturing	P	7:30A-11:15A	21	25
14A	"	Circuit Pack Manufacturing	P	11:58A- 3:22P	31	
15	"	Circuit Pack Manufacturing	P	7:31A-11:15A	12	14
15A	"	Circuit Pack Manufacturing	P	11:55A- 3:15A	15	
16	"	Miniaturized Trunks	P	7:32A-10:42A	20	40
16A	"	Miniaturized Trunks	P	11:24A- 1:56P	56	
17	"	Electronic Switching Systems (ESS)	P	7:33A-10:44A	2	2
17A	"	Electronic Switching Systems (ESS)	P	11:30A- 2:42P	4	

Table
Perchloroethylene (Tetrachloroethylene) Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M3) A.M. or P.M.	(b) Concentration (mg/M3) 8-hr. TWA
18	6-6	Miniaturized Trunks	P	7:35A-10:39A	6	8
18A	"	Miniaturized Trunks	P	11:22A- 2:45P	10	
19	"	Miniaturized Trunks	P	7:36A-10:39A	6	8
19A	"	Miniaturized Trunks	P	11:16A- 2:42P	9	
20	"	Circuit Pack Manufacturing	P	7:40A-11:23A	17	19
20A	"	Circuit Pack Manufacturing	P	11:54A- 3:20P	21	
21	"	Ferrod Sensors	P	7:42A-11:27A	7	8
21A	"	Ferrod Sensors	P	12:02P- 3:23P	9	
22	"	Ferrod Sensors	P	7:42A-11:45A	5	6
22A	"	Ferrod Sensors	P	12:17P- 3:22P	6	
23	"	Plug-In Trunks	P	7:44A-11:05A	12	12
23A	"	Plug-In Trunks	P	11:30A- 3:00P	11	
24	"	Miniaturized Trunks	P	8:27A-10:27A	8	10
24A	"	Miniaturized Trunks	P	11:21A- 2:57P	11	
25A	"	Circuit Pack Manufacturing	P	7:47A-10:20A	19	19
26	"	Circuit Pack Manufacturing	P	7:54A-11:24A	48	44
26A	"	Circuit Pack Manufacturing	P	12:01P- 3:21P	40	

Table
Perchloroethylene (Tetrachloroethylene) Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M3)	
					A.M. or P.M.	8-hr. TWA
27	6-6	Miniaturized Trunks	P	7:58A-10:42A	19	49
27A	"	Miniaturized Trunks	P	11:27A- 2:53P	73	
28	"	Unit Operations	P	8:04A-10:56A	2	3
28A	"	Unit Operations	P	11:32A- 3:17P	3	
29	"	Cast Wired Equipment	P	8:06A-11:36A	3	4
29A	"	Cast Wired Equipment	P	12:17P- 3:13P	4	
30	"	Miniaturized Trunks	P	8:10A-10:56A	2	2
30A	"	Miniaturized Trunks	P	11:32A- 3:15P	3	
31	"	Circuit Pack Manufacturing	P	9:15A-11:21A	16	15
31A	"	Circuit Pack Manufacturing	P	11:49A- 3:27P	15	
32	"	Miniaturized Trunks	P	9:36A-10:43A	32	47
32A	"	Miniaturized Trunks	P	11:26A- 2:42P	51	
33	"	Lunchroom	GA	10:05A-10:20A	2	2
51	6-8	Miniaturized Trunks	P	2:45P- 7:44P	9	8
51A	"	Miniaturized Trunks	P	8:29P-12:32A*	8	
52	"	Miniaturized Trunks	P	2:46P- 7:46P	19	21
52A	"	Miniaturized Trunks	P	8:31P-10:52P	24	

Table
Perchloroethylene (Tetrachloroethylene) Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M3) A.M. or P.M.	(b) Concentration (mg/M3) 8-hr. TWA
53	6-8	Miniaturized Trunks	P	2:56P- 7:44P	35	49
53A	"	Miniaturized Trunks	P	8:26P-10:53P	79	
54	"	Moulding	P	3:00P- 8:30P	1	1
54A	"	Moulding	P	9:21P-11:44P	1	
55	"	Electronic Switching Systems (ESS)	P	3:13P- 7:53P	3	5
55A	"	Electronic Switching Systems (ESS)	P	8:27P-12:42A*	8	
56	"	Miniaturized Trunks	P	3:22P- 7:45P	4	5
56A	"	Miniaturized Trunks	P	8:27P-10:57P	7	
57	"	Miniaturized Trunks	P	3:24P- 7:47P	5	4
57A	"	Miniaturized Trunks	P	8:24P-11:43P	4	
58	"	Moulding	P	3:25P- 8:30P	1	1
58A	"	Moulding	P	9:03P-11:45P	1	
59	"	Miniaturized Trunks	P	3:29P- 7:29P	14	21
59A	"	Miniaturized Trunks	P	8:01P-11:47P	29	
60	"	Ferrod Sensors	P	3:30P- 7:46P	10	9
60A	"	Ferrod Sensors	P	8:09P-12:16A*	8	

Table
Perchloroethylene (Tetrachloroethylene) Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M3) A.M. or P.M.	8-hr. TWA
61	6-8	Miniaturized Trunks	P	3:35P- 7:30P	11	11
61A	"	Miniaturized Trunks	P	8:02P-11:48P	10	
62	"	Backplane Connectors	P	3:39P- 7:30P	41	35
62A	"	Backplane Connectors	P	8:18P-11:42P	29	
63	"	ESS Apparatus	P	3:40P- 7:08P	6	6
63A	"	ESS Apparatus	P	8:10P-12:35A*	5	
64	"	DHEW Representative	P	3:45P- 9:25P	2	2
65	"	Unit Operations	P	3:44P- 7:40P	6	5
65A	"	Unit Operations	P	8:19P-12:15A*	5	
66	"	Circuit Pack Manufacturing	P	3:46P- 7:45P	11	9
66A	"	Circuit Pack Manufacturing	P	8:35P-12:19A*	8	
67	"	Circuit Pack Manufacturing	P	3:50P- 7:46P	17	11
67A	"	Circuit Pack Manufacturing	P	8:37P-12:16A*	6	
68	"	Ferrod Sensors	P	3:56P- 7:58P	8	7
68A	"	Ferrod Sensors	P	8:39P-12:19A*	5	
69	"	Plug-In Trunks	P	4:00P- 7:31P	7	5
69A	"	Plug-In Trunks	P	8:18P-12:04A	4	

Table
Perchloroethylene (Tetrachloroethylene) Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M_3)	
					A.M. or P.M.	8-hr. TWA
70	6-8	Unit Operations	P	4:19P- 8:09P	5	5
70A	"	Unit Operations	P	9:01P-12:02A*	4	
71	"	Unit Operations	P	4:20P- 8:14P	5	5
71A	"	Unit Operations	P	8:54P-12:06A*	6	
72	"	Miniaturized Trunks	P	4:48P- 7:29P	6	5
72A	"	Miniaturized Trunks	P	8:02P-11:25P	4	
86	"	Lunchroom	GA	8:25P- 8:35P	6	6

(a) - P=Personal; GA=General Area
(b) - mg/M_3 = milligrams of substance per cubic meter of air sampled.
* - A.M. on June 9, 1977
** - Miniaturized Trunks, Circuit Pack Manufacturing, and Backplane Connectors associated with "high exposure" group; all others associated with "low exposure group".

Table
Toluene; n-Butyl Acetate; 1,1,1-Trichlo nane; Isopropanol Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	Type of Sample	Sampling Period	Concentration (mg/M3)			
					Toluene	n-Butyl Acetate	Trichloro-ethane	Isopro anol
1	6-6	Miniaturized Trunks	P	7:07A-10:27A	0.2	<0.1	0.3	0.5
1A	"	Miniaturized Trunks	P	11:22A- 3:18P	0.2	<0.1	0.3	0.7
2	"	Ferrod Sensors	P	7:10A-11:46A	0.3	<0.1	0.5	0.8
2A	"	Ferrod Sensors	P	12:16P- 3:21P	<0.1	<0.1	0.5	0.9
3	"	Ferrod Switches	P	7:12A-11:26P	0.1	<0.1	0.4	0.7
4	"	Circuit Pack Manufacturing	P	7:14A-11:24A	0.3	<0.1	0.3	0.6
4A	"	Circuit Pack Manufacturing	P	11:52A- 3:19P	0.2	<0.1	0.4	0.7
5	"	Moulding	P	7:15A-12:01P	<0.1	<0.1	0.2	<0.1
5A	"	Moulding	P	12:49P- 3:03P	<0.1	<0.1	0.3	<0.1
6	"	Miniaturized Trunks	P	7:17A-10:41A	0.3	<0.1	0.4	0.5
6A	"	Miniaturized Trunks	P	11:26A- 3:03P	0.2	<0.1	0.3	0.6
7	"	Electronic Switching Systems	P	7:19A-10:44A	<0.1	<0.1	0.4	0.3
7A	"	Electronic Switching Systems	P	11:32A- 3:10P	<0.1	<0.1	0.4	0.4
8A	"	Circuit Pack Manufacturing	P	11:50A- 3:22P	0.2	<0.1	0.5	0.8
9	"	Circuit Pack Manufacturing	P	7:24A-11:21A	0.1	<0.1	0.3	0.5
9A	"	Circuit Pack Manufacturing	P	11:49A- 3:22P	0.2	<0.1	0.5	0.8

Table
Toluene; n-Butyl Acetate; 1,1,1-Trichloroethane; Isopropanol Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	Type of Sample	Sampling Period	Concentration (mg/M3)			
					Toluene	n-Butyl Acetate	Trichloro-ethane	Isopropanol
10	6-6	Electronic Switching Systems(ESS)	P	7:25A-11:10A	0.2	<0.1	3.0	1.4
10A	"	Electronic Switching Systems(ESS)	P	12:01P- 3:25P	0.2	<0.1	0.5	0.6
11	"	Cast Wired Equipment	P	7:26A-11:45A	<0.1	<0.1	0.6	0.5
11A	"	Cast Wired Equipment	P	12:26P- 3:26P	0.1	<0.1	0.6	0.6
12	"	Electronic Switching Systems(ESS)	P	7:27A-10:45A	0.2	<0.1	0.4	0.4
12A	"	Electronic Switching Systems(ESS)	P	11:20A- 3:23P	<0.2	<0.1	0.4	0.5
13	"	Electronic Switching Systems(ESS)	P	7:29A-10:55A	<0.1	<0.1	0.4	0.4
13A	"	Electronic Switching Systems(ESS)	P	11:32A- 2:47P	<0.1	<0.1	0.4	0.5
14	"	Circuit Pack Manufacturing	P	7:30A-11:15A	0.1	<0.1	0.3	0.6
14A	"	Circuit Pack Manufacturing	P	11:58A- 3:22P	0.1	<0.1	0.4	0.6
15	"	Circuit Pack Manufacturing	P	7:31A-11:15A	0.2	<0.1	0.4	0.6
15A	"	Circuit Pack Manufacturing	P	11:55A- 3:15P	0.3	<0.1	1.0	0.8
16	"	Miniaturized Trunks	P	7:32A-10:42A	0.2	<0.1	0.7	0.5
16A	"	Miniaturized Trunks	P	11:24A- 1:56P	0.3	<0.1	0.8	0.8
17	"	Electronic Switching Systems(ESS)	P	7:33A-10:44A	0.1	<0.1	0.4	0.4
17A	"	Electronic Switching Systems(ESS)	P	11:30A- 2:42P	<0.1	<0.1	0.3	0.4

Table
Toluene; n-Butyl Acetate; 1,1,1-Trichloroethane; Isopropanol Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	Type of Sample	Sampling Period	Concentration (mg/M3)			
					Toluene	n-Butyl Acetate	Trichloro-ethane	Isopro anol
18	6-6	Miniaturized Trunks	P	7:35A-10:39A	<0.1	<0.1	0.4	0.9
18A	"	Miniaturized Trunks	P	11:22A- 2:45P	0.1	<0.1	0.3	0.7
19	"	Miniaturized Trunks	P	7:36A-10:39A	0.2	<0.1	0.4	0.7
19A	"	Miniaturized Trunks	P	11:16A- 2:42P	0.1	<0.1	0.3	0.5
20	"	Circuit Pack Manufacturing	P	7:40A-11:23A	0.2	<0.1	0.4	0.8
20A	"	Circuit Pack Manufacturing	P	11:54A- 3:20P	0.1	<0.1	0.4	0.9
21	"	Ferrod Sensors	P	7:42A-11:27A	0.2	<0.1	0.5	1.2
21A	"	Ferrod Sensors	P	12:02P- 3:23P	<0.1	<0.1	0.6	1.1
22	"	Ferrod Sensors	P	7:42A-11:45A	0.6	<0.1	0.4	0.8
22A	"	Ferrod Sensors	P	12:17P- 3:22P	0.1	<0.1	0.5	1.1
23	"	Plug-In Trunks	P	7:44A-11:05A	0.3	<0.1	0.6	0.8
23A	"	Plug-In Trunks	P	11:30A- 3:00P	<0.1	<0.1	0.5	0.8
24	"	Miniaturized Trunks	P	8:27A-10:27A	0.3	<0.1	0.4	1.0
24A	"	Miniaturized Trunks	P	11:21A- 2:57P	0.2	<0.1	0.3	2.3
25A	"	Circuit Pack Manufacturing	P	7:47A-10:20A	0.2	<0.1	3.0	1.7
26	"	Circuit Pack Manufacturing	P	7:54A-11:24A	0.3	<0.1	0.3	0.7
26A	"	Circuit Pack Manufacturing	P	12:01P- 3:21P	0.1	<0.1	0.4	1.1

Table
Toluene; n-Butyl Acetate; 1,1,1-Trichloroethane; Isopropanol Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	Type of Sample	Sampling Period	Concentration (mg/M3)			
					Toluene	n-Butyl Acetate	Trichloro-ethane	Isopropanol
27	6-6	Miniaturized Trunks	P	7:58A-10:42A	0.1	<0.1	0.4	0.8
27A	"	Miniaturized Trunks	P	11:27A- 2:53P	0.2	<0.1	0.3	0.8
28	"	Unit Operations	P	8:04A-10:56A	<0.1	<0.1	0.4	0.4
28A	"	Unit Operations	P	11:32A- 3:17P	<0.1	<0.1	0.4	0.4
29	"	Cast Wired Equipment	P	8:06A-11:36A	0.2	<0.1	0.4	0.5
29A	"	Cast Wired Equipment	P	12:17P- 3:13P	0.1	<0.1	0.3	0.4
30	"	Miniaturized Trunks	P	8:10A-10:56A	0.1	<0.1	0.4	0.4
30A	"	Miniaturized Trunks	P	11:32A- 3:15P	0.1	<0.1	0.5	0.5
31	"	Circuit Pack Manufacturing	P	9:15A-11:21A	0.2	<0.1	0.3	0.7
31A	"	Circuit Pack Manufacturing	P	11:49A- 3:27P	0.2	<0.1	0.4	0.8
32	"	Miniaturized Trunks	P	9:36A-10:43A	0.3	<0.1	<0.1	1.7
32A	"	Miniaturized Trunks	P	11:26A- 2:42P	0.2	<0.1	0.4	1.7
33	"	Lunchroom	GA	10:05A-10:20A	<0.1	<0.1	0.3	0.4
51	6-8	Miniaturized Trunks	P	2:45P- 7:44P	0.1	<0.1	0.3	0.7
51A	"	Miniaturized Trunks	P	8:29P-12:32A*	0.3	<0.1	0.3	0.9
52	"	Miniaturized Trunks	P	2:46P- 7:46P	0.1	<0.1	0.2	0.5
52A	"	Miniaturized Trunks	P	8:31P-10:52P	0.3	<0.1	0.1	0.4

Table
Toluene; n-Butyl Acetate; 1,1,1-Trichloroethane; Isopropanol Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	Type of Sample	Sampling Period	Concentration (mg/M3)			
					Toluene	n-Butyl Acetate	Trichloro-ethane	Isopropanol
53	6-8	Miniaturized Trunks	P	2:56P- 7:44P	0.1	<0.1	0.3	0.5
53A	"	Miniaturized Trunks	P	8:26P-10:53P	0.4	<0.1	0.3	0.7
54	"	Moulding	P	3:00P- 8:30P	<0.1	<0.1	0.1	0.2
54A	"	Moulding	P	9:21P-11:44P	0.3	<0.1	0.1	0.1
55	"	Electronic Switching Systems(ESS)	P	3:13P- 7:53P	<0.1	<0.1	0.4	0.4
55A	"	Electronic Switching Systems(ESS)	P	8:27P-12:42A*	0.3	<0.1	0.2	0.3
56	"	Miniaturized Trunks	P	3:22P- 7:45P	0.1	<0.1	0.3	0.9
56A	"	Miniaturized Trunks	P	8:27P-10:57P	0.4	<0.1	0.3	1.4
57	"	Miniaturized Trunks	P	3:24P- 7:47P	0.1	<0.1	0.2	0.5
57A	"	Miniaturized Trunks	P	8:24P-11:43P	0.3	<0.1	0.3	0.6
58	"	Moulding	P	3:25P- 8:20P	0.1	<0.1	<0.1	0.3
58A	"	Moulding	P	9:03P-11:45P	0.3	<0.1	<0.1	0.4
59	"	Miniaturized Trunks	P	3:29P- 7:29P	0.2	<0.1	0.7	0.2
59A	"	Miniaturized Trunks	P	8:01P-11:47P	0.3	0.2	0.9	0.3
60	"	Ferrod Sensors	P	3:30P- 7:46P	0.2	<0.1	0.7	1.7
60A	"	Ferrod Sensors	P	8:09P-12:16A*	0.1	<0.1	0.4	1.8

Tab.
Toluene; n-Butyl Acetate; 1,1,1-Trichloroethane; Isopropanol Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	Type of Sample	Sampling Period	Concentration (mg/M3)			
					Toluene	n-Butyl Acetate	Trichloro-ethane	Isopr anol
61	6-8	Miniaturized Trunks	P	3:35P- 7:30P	0.9	0.6	5.0	1.1
61A	"	Miniaturized Trunks	P	8:02P-11:48P	0.9	0.6	0.4	0.4
62	"	Backplane Connectors	P	3:39P- 7:30P	0.2	<0.1	0.8	1.9
62A	"	Backplane Connectors	P	8:18P-11:42P	0.4	<0.1	0.9	1.9
63	"	ESS Apparatus	P	3:40P- 7:08P	<0.1	<0.1	0.6	1.6
63A	"	ESS Apparatus	P	8:10P-12:35A*	0.3	<0.1	0.3	1.8
64	"	DHEW Representative	P	3:45P- 9:25P	0.1	<0.1	0.1	0.2
65	"	Unit Operations	P	3:44P- 7:40P	0.1	<0.1	0.8	1.4
65A	"	Unit Operations	P	8:19P-12:15A*	0.2	<0.1	0.6	1.2
66	"	Circuit Pack Manufacturing	P	3:46P- 7:45P	0.2	<0.1	0.3	0.8
66A	"	Circuit Pack Manufacturing	P	8:35P-12:19A*	0.2	<0.1	0.4	.7
67	"	Circuit Pack Manufacturing	P	3:50P- 7:46P	<0.1	<0.1	0.4	.7
67A	"	Circuit Pack Manufacturing	P	8:37P-12:16A*	<0.1	<0.1	0.2	.4
68	"	Ferrod Sensors	P	3:56P- 7:58P	0.2	<0.1	0.7	.6
68A	"	Ferrod Sensors	P	8:39P-12:19A*	0.2	<0.1	0.3	2.0
69	"	Plug-In Trunks	P	4:00P- 7:31P	0.1	<0.1	1.0	2.2
69A	"	Plug-In Trunks	P	8:18P-12:04A*	0.1	<0.1	0.5	1.2

Tab
Toluene; n-Butyl Acetate; 1,1,1-Trichloroethane; Isopropanol Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M_3)			
					Toluene	n-Butyl Acetate	Trichloro-ethane	Isopr anol
70	6-8	Unit Operations	P	4:19P- 8:09P	0.1	0.1	0.8	1.4
70A	"	Unit Operations	P	9:01P-12:02A*	0.2	0.1	0.4	1.0
71	"	Unit Operations	P	4:20P- 8:14P	0.2	0.1	0.7	1.2
71A	"	Unit Operations	P	8:54P-12:06A*	0.1	0.1	0.1	1.6
72	"	Miniaturized Trunks	P	4:48P- 7:29P	0.3	0.1	0.3	0.6
72A	"	Miniaturized Trunks	P	8:02P-11:25P	0.4	0.1	0.5	0.6
86	"	Lunchroom	GA	8:25P- 8:35P	0.1	0.1	0.4	1.1

(a) - P=Personal; GA-General Area
(b) - mg/M_3=milligrams of substance per cubic meter of air sampled.
* - A.M. on June 9, 1977
** - Miniaturized Trunks, Circuit Pack Manufacturing, and Backplane Connectors associated with "high exposure" group; all others associated with "low exposure" group.

Table 5
Perchloroethylene (Tetrachloroethylene) Concentrations
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

Sample No.	Date	**Department	(a) Type of Sample	Sampling Period	(b) Concentration (mg/M_3)	
					Acetone	Methylene Chloride
15B (34)	6-6	Circuit Pack Manufacturing	P	2:06P- 3:15P	<0.3	1.6
25B (35)	"	Circuit Pack Manufacturing	P	2:06P- 3:15P	<0.3	1.6
31B (36)	"	Circuit Pack Manufacturing	P	2:12P- 3:28P	<0.3	1.6
18B (37)	"	Miniaturized Trunks	P	1:50P- 2:45P	<0.3	1.0
6B (38)	"	Miniaturized Trunks	P	1:53P- 3:03P	<0.3	1.0
16B (39)	"	Miniaturized Trunks	P	1:53P- 3:04P	<0.3	1.0
66B (74)	6-8	Circuit Pack Manufacturing	P	1:59P- 3:10P	<0.3	1.6
59B (75)	6-15	Miniaturized Trunks	P	4:30P- 5:30P	<0.3	<0.3
61B (76)	"	Miniaturized Trunks	P	4:30P- 5:30P	<0.3	0.7
72B (77)	"	Miniaturized Trunks	P	4:34p- 5:35P	<0.3	0.7

(a) - P=Personal
(b) - mg/M3= milligrams of substance per cubic meter of air sampled.
** - Circuit Pack Manufacturing and Ministurized Trunks both associated with "high exposure" group.

Table 6
Employees' Current Symptoms
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

I. High Exposure Group: Includes 19 Respondents

Symptom	Affected	
	Number	Percent (%)
Eyes burning/stinging	6	32
Sore throat without cold	10	53*
Frequent headache at work	5	26
Lightheaded at work	7	37
Head congested without cold	6	32
Persistent cough	7	37**
No symptoms	4	21**

II. Low Exposure Group: Includes 23 Respondents

Symptom	Affected	
	Number	Percent (%)
Eyes burning/stinging	11	48
Sore throat without cold	5	22*
Frequent headache at work	7	30
Lightheaded at work	5	22
Head congested without cold	7	30
Persistent cough	2	9**
No symptoms	10	43**

*Statistically significant difference using chi-square (x^2) at p=0.05 level

**Possibly significant difference using x^2 (p less than 0.1)

Table 7
Urinary Total Trichloro Compounds (TTC)
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

I. High Exposure Group: Includes 19 Respondents

Urines	Detectable TTC		Maximum TTC (mg/1)	Mean TTC* (mg/ℓ)	Standard Deviation
	Number	Percent (%)			
Pre-Exposure	5	26	4	1.1**	1.2
Post-Exposure	9	47	8	1.9	2.1

II. Low Exposure Group: Includes 23 Respondents

Urines	Detectable TTC		Maximum TTC (mg/1)	Mean TTC* (mg/ℓ)	Standard Deviation
	Number	Percent (%)			
Pre-Exposure	2	9	2	0.6**	0.3
Post-Exposure	13	57	7	2.0	2.1

*In calculating means, non-detectable was assumed to be 0.5 mg/ℓ, or one-half the lower limit at detection

**This difference is possibly statistically significant [t=1.98; p(two-tailed) =0.058]

Table 8
Employees' Past Illnesses
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

I. High Exposure Group: Includes 19 Respondents

Disease/Condition	Affected	
	Number	Percent (%)
Pleurisy	1	5
Bronchitis	2	11
Pneumonia	2	11
Hypertension	1	5
Hives/Eczema	1	5
Hay Fever	2	11
Sinus	8	42
*Other	4	21
None	8	42

II. Low Exposure Group: Includes 23 Respondents

Disease/Condition	Affected	
	Number	Percent (%)
Pleurisy	1	4
Bronchitis	3	13
Pneumonia	3	13
Hypertension	2	9
Hives/Eczema	1	4
Hay Fever	5	22
Sinus	9	39
*Other	2	9
None	9	39

*Other includes: Heart trouble, emphysema, bronchiectasis, chest operation, other chest problems, cancer (uterine).

No statistically significant differences existed.

Table 9
Employees' Symptoms Since Christmas, 1976
Western Electric Company
Mesquite, Texas
June 6, 8, 1977

I. High Exposure Group: Includes 19 Respondents

Symptom	Affected	
	Number	Percent (%)
Frequent headache at work	8	42
Usually tired at work	7	37
Blurred vision	5	26
Head congestion	6	32
Dizziness	7	37
Drunken feeling at work	6	32
Loss of sense of smell	4	21*
Loss of appetite	3	16
No symptoms	6	32

II. Low Exposure Group: Includes 23 Respondents

Symptom	Affected	
	Number	Percent (%)
Frequent headache at work	7	30
Usually tired at work	7	30
Blurred vision	4	17
Head congestion	9	39
Dizziness	5	22
Drunken feeling at work	2	9
Loss of sense of smell	0	0*
Loss of appetite	0	0
No symptoms	6	26

*Possibly statistically significant (p less than 0.1)

U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE

PUBLIC HEALTH SERVICE

National Institute For Occupational Safety and Health
522 Post Office Building
Cincinnati, Ohio 45202

CONSENT

I voluntarily agree to participate in a study at the Western Electric Company, Mesquite, Texas. I understand that the medical evaluation will consist of my answering questions about my health, and in certain cases, urine tests will be performed.

DATE _____ SIGNATURE _____

AUTHORITY TO GIVE MEDICAL REPORT

agree to allow the Public Health Service to inform ---

A. My personal physician Yes ___ No ___

Name _____

Address _____

Signature _____

B. My plant physician Yes ___ No ___

Address _____

City _____ Signature _____

--- of any significant results of this study.

INFORMATION OBTAINED IN THIS STUDY WILL BE KEPT CONFIDENTIAL IN ACCORDANCE WITH U.S. PUBLIC HEALTH SERVICE REGULATIONS

NAME _____
Last First Middle

Address _____

City _____ State _____ Zip Code _____

Age _____ Date of Birth _____

Employee Number _____

JOB HISTORY (Previous Jobs at Western Electric - most recent first)

	JOB TITLE	DUTIES	DATE	SAFETY EQUIP. USED
1.				
2.				
3.				

Do you have another current job? _____

Current Medications? _____

Alcohol Consumption _____ Amount _____

Do you have hobbies or other jobs that might expose you to chemicals? Yes ___ No ___

Chemical(s) _____

EXPOSURE HISTORY

Chemicals	Much	Little	Never	Symptoms	Duration
1.					
2.					
3.					
4.					
5.					
6.					
7.					

POSSIBLE LIST OF CHEMICALS

Perchloroethylene, Acetone, Acryloid, Toluene, N-prophylacetate

Have you ever missed work or been sent home from work because of a chemical exposure?

Yes ___ No ___ If Yes, explain _____

PAST ILLNESSES

HAVE YOU EVER HAD ANY OF THE FOLLOWING DISEASES OR CONDITIONS? (CIRCLE CORRECT ANSWE

If the answer is yes, please specify date or dates. (Make other comments you thir are appropriate.)

DISEASE OR CONDITION			DATE OR DATES	COMMENT	
Pleurisy	Yes	No			15
Bronchitis	Yes	No			16
Pneumonia	Yes	No			17
Bronchiectasis	Yes	No			18
Heart Trouble	Yes	No			19
Emphysema	Yes	No			20
High Blood Pressure	Yes	No			21
Tuberculosis	Yes	No			22
Asthma	Yes	No			23
Hives or Eczema	Yes	No			24
Hay Fever	Yes	No			25
Chest Operation	Yes	No			26
Sinus trouble	Yes	No			27
Chest Injury	Yes	No			28
Other Chest Trouble	Yes	No			29
Diabetes	Yes	No			30
Cancer	Yes	No			31

SYMPTOMS SINCE CHRISTMAS

	Yes	No
Blurring of Vision		
Head Congestion		
Persistent Nausea		
Abdominal Pain		
Bloody Diarrhea		
Skin Rash		
Frequent Headaches		
At Work		
At Home		
Unusual Tiredness		
At work		
At Home		
Muscle Cramps		
Tremors of Hands		
Weakness of Hands		
Weakness of Fingers		
Numbness/tingling of hands		
Loss of senses of smell		
Hearing loss		
"Drunken feeling" at work		
Dizziness		
Loss os appetite		
Loss of sexual desire		
Loss of sexual ability		
Difficulty with balance		

SMOKING HISTORY

1. Do you smoke? Yes ____ No ____
   (Record Yes if regular up to one month ago.)
   (If No, ask "Have you ever smoked?") Yes ___ No ___

2. How much?

	AMOUNT	DURATION
Cigaretts/day		
Oz. Tabacco/day (pipe)		
Cigars/day		

Age started regular cigarette smoking. _____

Age stopped regular cigareet smoking. _____

Age started pipe/cigar smoking _____

Age stopped pipe/cigar smoking _____

PRESENT SYMPTOMS

1. Do your eyes ever burn or sting due to the air? Yes ___ No ___
2. Does your throat ever burn or get sore when you do not have a cold? Yes ___ No ___
3. Do you ever have head congestion when you do not have a cold? Yes ___ No ___
4. Do you have frequent headaches at work? Yes ___ No ___
5. Do you usually have a cough? Yes ___ No ___
6. Do you ever feel lightheaded or drunk while at work? Yes ___ No ___