

**PERCHLOROETHYLENE SURVEY
RADIATOR SPECIALTY COMPANY
CHARLOTTE, NORTH CAROLINA**



Health & Hygiene, Inc.

**PERCHLOROETHYLENE SURVEY
RADIATOR SPECIALTY COMPANY
CHARLOTTE, NORTH CAROLINA**

March 23, 1994

Prepared by:

Kevin Cosgrove
Industrial Hygienist

**PERCHLOROETHYLENE SURVEY
RADIATOR SPECIALTY COMPANY
CHARLOTTE, NORTH CAROLINA**

DATES OF SURVEY: November 3-5 and 11-12, 1993
January 12 and 14, 1994

LOCATIONS VISITED/ PERSONNEL CONTACTED:	11/3/93	McKenney Jeep Eagle 100 W. Wilkinson Boulevard Belmont, NC 28012 Mr. Kenneth Reeves
	11/4/93	Rockett Auto Parts, Inc. 3302 Wilkinson Boulevard Charlotte, NC 28208 Mr. Gary Rockett
	11/5/93 1/14/94	Honda Cars of Monroe 2301 W. Roosevelt Boulevard Monroe, NC 28110 Mr. Alan Brown
	11/11/93	McKenney Chevrolet Geo 301 E. Wilkinson Boulevard Belmont, NC 28012 Mr. Robbie Towe
	11/12/93 1/12/94	Weaver's Auto Parts & Garage 110 North Hoskins Road Charlotte, NC 28216 Mr. Bobby Weaver

1.0 INTRODUCTION

Health & Hygiene, Inc. was retained by Radiator Specialty Company to conduct an industrial hygiene study at various vehicle repair facilities in the metropolitan Charlotte, North Carolina area. The purpose of this study was to collect objective data on worker exposure to a new formulation of a brake cleaner product containing perchloroethylene. Five sites of different sizes and configurations were visited in an effort to achieve variability in both the type of facility and the work practices of the users.

This study was conducted on the above dates by Kevin Cosgrove, Industrial Hygienist of Health & Hygiene, Inc.



The scope of this project and the sampling strategy were agreed upon with Mr. Darrell Hinnant of Radiator Specialty Company. Air monitoring for perchloroethylene was conducted in order to determine Time Weighted Average (TWA) exposures as well as Short Term Exposure Limits (STEL). Detailed observations were also made documenting the dimensions of each building, temperature, relative humidity, general ventilation in the areas, and the position of garage bay doors during sampling. Other information such as the type of vehicle for which repair was being conducted, the number of wheels requiring repair, and the type of brake encountered (drum or disc) was also collected.

2.0 PROCEDURES

A. Monitoring

1. Air monitoring for all perchloroethylene exposures was conducted in accordance with National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods #1003 for halogenated hydrocarbons. Sampling was performed using a Gilian LFS 113DC low flow personal sampling pump to draw air through an activated coconut shell charcoal tube (SKC # ST-226-01, Lot #120) located in the employee's breathing zone.
2. Duplicate sampling was performed during each sample collection period using a Gilian universal tube holder system which allows two or more samples to be collected in parallel.
3. Containers of the reformulated product were weighted before and after use using an Ohaus 750 SW triple beam balance.
4. Temperature and relative humidity measurements were gathered using a Bacharach Instruments sling psychrometer which measures both dry and wet-bulb temperatures.

B. Equipment Calibration

1. All sampling pumps were operated in the constant pressure mode which permits multiple low flow sampling.
2. All universal tube holder systems were calibrated immediately before and after daily sampling with representative sampling media in line in order to ensure operation at required flow rates.



Calibration was conducted using a Model M5 mini-Buck Calibrator™ which is a primary standard.

3. The Ohaus triple beam balance was set up and zero-set daily in accordance with the manufacturer's instructions.

C. Sample Analysis

1. All samples analyzed were sent to Roche Analytics Laboratory of Richmond, Virginia which is accredited by the American Industrial Hygiene Association (AIHA). Analysis was conducted in accordance with standard analytical methods which are set forth by the National Institute for Occupational Safety and Health (NIOSH). Method #1003 for halogenated hydrocarbons was used for all analysis.

3.0 LOCATIONS VISITED

- A. McKenney Jeep Eagle (see Floor Plan #1)

This facility is an eight-bay garage measuring approximately 4,356 square feet enclosing a volume of almost 70,000 cubic feet. There are two large garage doors (14'x 14'); one is located on the east wall, the other on the west wall. There is an exhaust fan located next to each of these doors. There are also four gas heaters mounted at the ceiling along the north wall.

- B. Rockett Auto Parts, Inc. (see Floor Plan #2)

Rockett Auto Parts is a small, four-bay auto repair shop measuring 1,800 square feet in area and 32,400 cubic feet in volume. There are garage doors (10'W x 12'H) at the entrance to each bay. There are three overhead gas heaters mounted in the center of the facility and adjacent to the east wall.

- C. Honda Cars of Monroe (see Floor Plan #3)

Honda Cars of Monroe is a 10-bay garage measuring 2,875 square feet in area and 42,200 cubic feet in volume. There are garage doors (10'W x 12'H) at the entrance to each bay. There are four overhead gas heaters located throughout the center of the space.

- D. McKenney Chevrolet Geo (see Floor Plan #4)



This facility is a large, 30-bay repair shop covering 15,600 square feet and enclosing a volume of over 270,000 cubic feet. There are two bay doors (14'W x 14'H) at either end of the garage. There are 10 overhead gas heaters mounted on the north and south walls (5 per wall). There are two exhaust fans located on the west wall and an overhead roof vent which runs the length of the garage.

E. Weaver's Auto Parts & Garage (see Floor Plan #5)

This garage is a five-bay facility measuring 2,450 square feet in area and 44,000 cubic feet in volume. There are garage doors (10'W x 12'H) at the entrance to each bay. There is a wood-burning stove in the northwest corner.

4.0 WORK PRACTICES

When used as intended, this product is designed to be sprayed onto disc and drum brake assemblies in order to remove residual dirt and/or dust from the various components of the assembly. The product was used with the supplied extension tube which created a concentrated liquid stream of product which was directed at the specific brake parts requiring cleaning. Each mechanic was told to use the product as he normally would; no instructions on the usage of the product were given except for the use of the extension tube. The mechanics were requested to remove all wheels on each vehicle requiring work, and then use the product, in order to have usage fall within 15 minute periods. Some individuals indicated that this is typical with product usage and work practices; however, it may vary between individuals.

Detailed observations were made during each day of sampling. The amount of product used during each sampling period was determined by weighing each product container before and after use. Also, observations were made pertaining to the different work practices exhibited by the various product users tested. Such information as the application technique (low, moderate, or heavy), the proximity of the product to the brake area, and the proximity of the user to the brake area was noted and used to assist in evaluating the resulting exposure.

5.0 DISCUSSION

All of the perchloroethylene exposures, with the exception of one STEL sample, were within the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PELs) and Short Term Exposure Limits (STELs) and the American Conference of Governmental Industrial Hygienists (ACGIH)



Threshold Limit Values (TLVs) and STELs.

The results are summarized below (see Results section for all result data):

SAMPLE TYPE	OBSERVED RANGE	OSHA TRANSITIONAL LIMIT	OSHA FINAL LIMIT	ACGIH TLV*
TWA	4.69 - 16.65 ppm	100 ppm	25 ppm	25 ppm
STEL	10.6 - 101 ppm	200 ppm	----	100 ppm

* Perchloroethylene is classified by the ACGIH as an "animal carcinogen." This classification means, "The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that are not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.¹

The OSHA PELs/STELs and ACGIH TLVs/STELs are regulatory and recommended limits respectively. It should be noted that these are not fine lines between safe and harmful concentrations, and efforts should be made to minimize exposure to all agents to the lowest feasible limit.

It should be noted that the OSHA Final Rule Limits were recently struck down by the Eleventh Circuit Court and Federal OSHA has reverted back to the Transitional Limits. Some states recognize the Final Rule Limits, while others follow Federal OSHA in reverting back to the Transitional Limits.

In an effort to further analyze the reported data, several statistical analyses were performed on the report data.

Time Weighted Average

The calculated TWA values for each of the seven days of sampling were used as the data for the following statistical calculations.

- The arithmetic mean or average for the TWA values is 7.65 ppm.

¹1993-1994. Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, American Conference of Governmental Industrial Hygienists.



- The standard deviation is calculated to be 4.16 ppm. This figure represents the average deviation value of the data from the mean.
- The 95% Upper Confidence Limit is calculated to be 14.49 ppm. This predicts an upper value -- a value that stands only a 5% chance of being exceeded. Ninety five percent of all values observed should fall under this limit. This prediction is supported by the TWA data; six of the seven calculated TWA values do in fact fall below 14.49 ppm.

Short Term Exposures

The STEL values for each exposure period during the seven days of sampling were used as the data for the following statistical calculations.

- The arithmetic mean is 42.16 ppm.
- The standard deviation is calculated to be 23.73 ppm.
- The 95% Upper Confidence Limit is 81.20 ppm for all samples analyzed during this survey. This Upper Confidence Limit prediction is again supported by the STEL exposures gathered as 23 of the 24 STEL exposures, over 95%, are below the limit of 81.20 ppm.

In addition to the standard deviation and confidence limits calculated, other methods of statistics, such as multiple linear regression, are often used in considering the relationship between two or more variables. This technique was used to study the relationship between the reported results and the amount of product used.

For the TWA results obtained, a multiple linear regression analysis estimated that there is only a 43% chance that the correlation between the TWA results and the amount of product used is substantive; the correlation between these two variables is 57% likely due to chance.

When this same analysis was performed on the STEL results, it calculated a greater than 99% likelihood that there is a correlation between the STEL results and the amount of product used. All things being equal, it is expected that as the amount of product used increases, the corresponding perchloroethylene exposure would increase; however, other factors were observed during the field studies to be significant in relation to the results obtained.

As can be seen in Figure 1, the use of this product produces a mist of atomized liquid around the application area. This mist is created by the release of the product under pressure from the



container and also from the spraying and splashing of the product on the various surfaces in the brake assemblies.

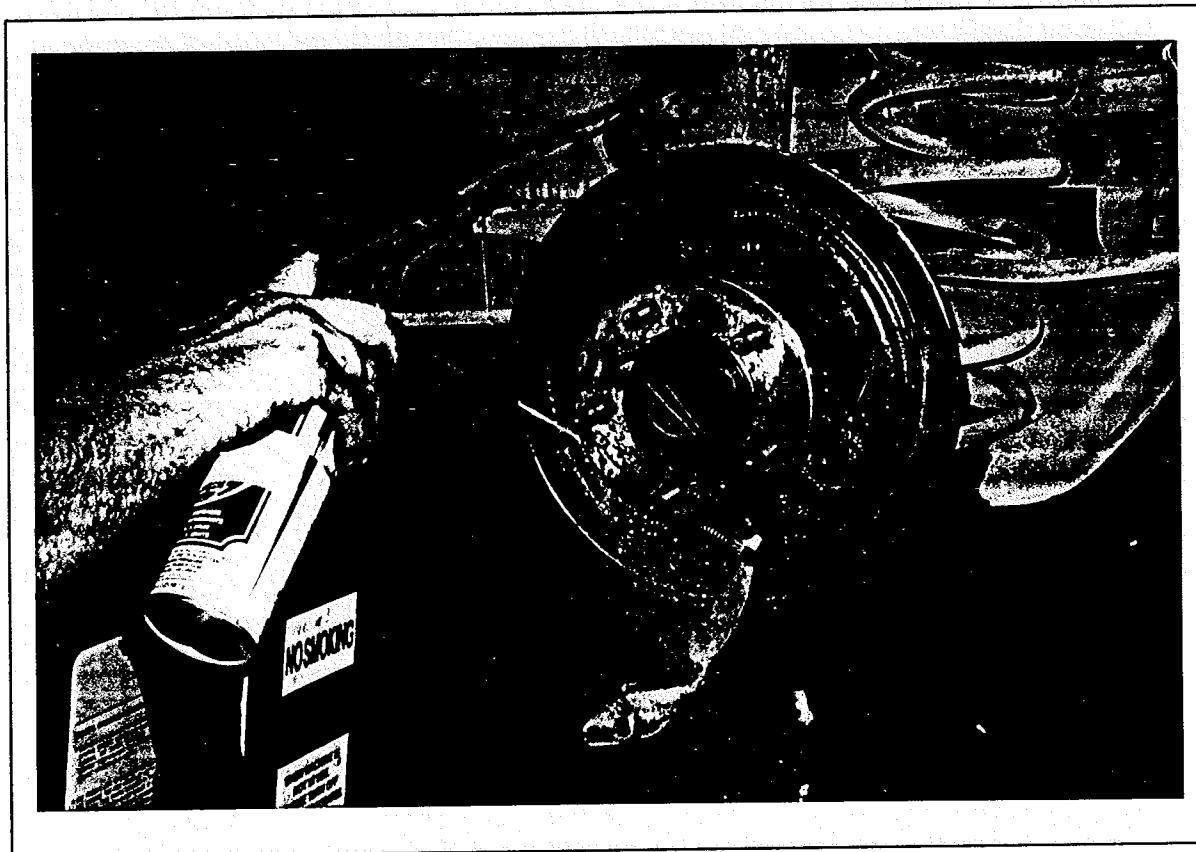


Figure 1

Intuitively, if a user is in close proximity to this mist, his exposure would be expected to increase. Conversely, the greater the distance between the user and this mist, the lower the potential for inhalation of the product. During the seven days of sampling, each individual user was observed to position himself at various distances from the brake assembly being cleaned. This varied not only from individual to individual, but also within one cleaning operation by a single user. The mechanics were observed to stand away initially when spraying (largest release of residual dust at outset), but gradually move in closer to the brake to inspect the efficiency of the cleaning process. Some individuals stood no more than 12 inches away during the final stages of the brake cleaning.

It should be noted that perchloroethylene has a low vapor pressure (14mm Hg), therefore, evaporation of the liquid is assumed not to be a significant contributing factor to the overall exposures observed.

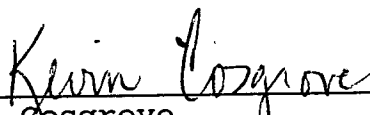


Another observation made during the field sampling again concerns the mist generated during the spraying process. As much of this sampling was conducted in the fall season, many locations chose to open several or all of the garage bay doors for ventilation purposes. It was observed that natural air currents can direct the mist in the direction of air flow. If a user had his back to the air flow, this mist was seen to be drawn away from the individual. If, however, the individual was facing the air current, this mist would be carried back towards him and potentially increase his exposure.


It appears that a combination of these three factors (amount of product used, proximity to spray area, and air movement) directly influence the outcome of the exposure.

It should be pointed out that different conditions and different user techniques create the potential of different exposures; it was in this light that Health & Hygiene, Inc. tried to introduce sufficient variability into the sampling strategy. Based upon the observations made and the exposures documented, it is anticipated that future monitoring in similar conditions would produce similar results; all sampling results to date show a TWA 95% Upper Confidence Limit below the PEL and a STEL 95% Upper Confidence Limit below the STEL.

The sample results presented within this report are indicative of conditions only at the time of the sampling. This study only assessed perchloroethylene. Other health hazards (i.e., asbestos from brake linings) were not included in the scope of this project.



Kevin Cosgrove
Industrial Hygienist



Brad Lackey, CIH
Senior Industrial Hygienist



RESULTS

PERCHLOROETHYLENE RESULTS

SAMPLE DATE: November 12, 1993
 SAMPLE LOCATION: Weaver's Auto Parts & Garage

SAMPLE #	SAMPLE TIME (MINUTES)	SAMPLE VOLUME LITERS	PRODUCT QUANTITY USED (GRAMS)	RESULT (PPM)	TWA (PPM)
<u>TWAS</u>					
20115	267	14.09	1,592.5	10.2	8.7
20120	210	10.99	1,102.8	6.8	
<u>STELS</u>					
20116	15	2.30	1,033.6	59.5	
20118	15	2.30	558.9	44.8	
20122	15	2.30	1,102.8	101	

TWA = Time weighted average for total sample time.
 STEL = 15 minute Short Term Exposure Limit.
 PPM = Parts per million.

PERCHLOROETHYLENE RESULTS

SAMPLE DATE: January 12, 1994
 SAMPLE LOCATION: Weaver's Auto Parts & Garage

SAMPLE #	SAMPLE TIME (MINUTES)	SAMPLE VOLUME LITERS	PRODUCT QUANTITY USED (GRAMS)	RESULT (PPM)	TWA (PPM)
<u>TWAS</u>					
20231	228	10.90	2,257.3	6.4	6.1
20237	180	8.60	1,185.9	5.7	
<u>STELS</u>					
20233	15	2.38	502.6	56.9	
20235	15	2.38	1,754.7	18.7	
20239	15	2.38	1,185.9	54.8	

TWA = Time weighted average for total sample time.
 STEL = 15 minute Short Term Exposure Limit.
 PPM = Parts per million.

PERCHLOROETHYLENE RESULTS

SAMPLE DATE: November 11, 1993
 SAMPLE LOCATION: Mckenney Chevrolet Geo

SAMPLE #	SAMPLE TIME (MINUTES)	SAMPLE VOLUME LITERS	PRODUCT QUANTITY USED (GRAMS)	RESULT (PPM)	TWA (PPM)
<u>TWAS</u>					
20101	268	14.03	1,270.4	6.04	5.33
20108	210	10.20	971.6	4.43	
<u>STELS</u>					
20103	15	2.24	722.7	32.2	---
20105	15	2.24	547.7	17.6	---
20109	15	2.24	552.9	26.7	---
20111	15	2.24	418.7	15.4	---

TWA = Time weighted average for total sample time.
 STEL = 15 minute Short Term Exposure Limit.
 PPM = Parts per million.

PERCHLOROETHYLENE RESULTS

SAMPLE DATE: November 5, 1993
 SAMPLE LOCATION: Honda Cars of Monroe

SAMPLE #	SAMPLE TIME (MINUTES)	SAMPLE VOLUME LITERS	PRODUCT QUANTITY USED (GRAMS)	RESULT (PPM)	TWA (PPM)
<u>TWAs</u>					
P-14 A	232	11.71	2,430.3	8.7	5.93
P-17 A	219	11.05	422.1	3.0	
<u>STELs</u>					
P-13 A	15	2.23	566.0	39.8	
P-15 A	15	2.23	536.8	21.4	
P-16 A	15	2.23	1,327.5	45.7	
P-18 A	15	2.23	422.1	16.6	

TWA = Time weighted average for total sample time.
 STEL = 15 minute Short Term Exposure Limit.
 PPM = Parts per million.

PERCHLOROETHYLENE RESULTS

SAMPLE DATE: January 14, 1994
 SAMPLE LOCATION: Honda Cars of Monroe

SAMPLE #	SAMPLE TIME (MINUTES)	SAMPLE VOLUME LITERS	PRODUCT QUANTITY USED (GRAMS)	RESULT (PPM)	TWA (PPM)
<u>TWAS</u>					
20242	180	8.31	1,479.3	20.6	16.65
20248	195	9.00	1,348.8	13.0	
<u>STELS</u>					
20244	15	2.49	556.7	63.4	
20246	15	2.49	922.6	71.7	
20250	15	2.49	482.2	72.2	
20252	15	2.49	866.6	51.6	

TWA = Time weighted average for total sample time.
 STEL = 15 minute Short Term Exposure Limit.
 PPM = Parts per million.

PERCHLOROETHYLENE RESULTS

SAMPLE DATE: November 3, 1993
 SAMPLE LOCATION: McKenney Jeep Eagle

SAMPLE #	SAMPLE TIME (MINUTES)	SAMPLE VOLUME LITERS	PRODUCT QUANTITY USED (GRAMS)	RESULT (PPM)	TWA (PPM)
<u>TWAS</u>					
P-1 A	227	12.76	944.6	7.6	4.69
P-4 A	237	13.32	539.5	1.9	
<u>STELs</u>					
P-2 A	15	2.24	538.7	10.6	---
P-3 A	15	2.24	405.9	25.6	---
P-5 A	15	2.24	539.5	16.1	---

TWA = Time weighted average for total sample time.
 STEL = 15 minute Short Term Exposure Limit.
 PPM = Parts per million.

PERCHLOROETHYLENE RESULTS

SAMPLE DATE: November 4, 1993
 SAMPLE LOCATION: Rockett Auto Parts

SAMPLE #	SAMPLE TIME (MINUTES)	SAMPLE VOLUME LITERS	PRODUCT QUANTITY USED (GRAMS)	RESULT (PPM)	TWA (PPM)
<u>TWAS</u>					
P-7 A	240	13.47	2,334.1	9.3	6.18
P-10 A	204	11.45	587.8	2.5	
<u>STELS</u>					
P-8 A	15	2.23	1,172.3	52.4	---
P-9 A	15	2.23	1,161.8	71.4	---
P-11 A	15	2.23	587.8	25.8	---

TWA = Time weighted average for total sample time.
 STEL = 15 minute Short Term Exposure Limit.
 PPM = Parts per million.

SAMPLING OBSERVATIONS

**SAMPLING OBSERVATIONS
MCKENNEY JEEP/EAGLE
NOVEMBER 3, 1993**

SAMPLE: P-2 TIME: 8:45 AM TEMP: 65° RH: 36%
GENERAL VENTILATION: Fans off, overhead heaters on
POSITION OF DOORS: All doors closed
TYPE OF BRAKES WORKED: (2) 9½" drum, (2) 11" disc
ELAPSED TIME FOR PRODUCT USAGE: 3 minutes

SAMPLE: P-3 TIME: 11:30 AM TEMP: 68° RH: 46%
GENERAL VENTILATION: Fans off, overhead heaters on
POSITION OF DOORS: West door open, east door closed
TYPE OF BRAKES WORKED: (2) 7½" drum, (2) 9½" disc
ELAPSED TIME FOR PRODUCT USAGE: 3 minutes

SAMPLE: P-5 TIME: 3:00 PM TEMP: 64° RH: 60%
GENERAL VENTILATION: Fans off, overhead heaters on
POSITION OF DOORS: All doors open
TYPE OF BRAKES WORKED: (2) 9½" drum
ELAPSED TIME FOR PRODUCT USAGE: 2 minutes



**SAMPLING OBSERVATIONS
MCKENNEY CHEVROLET GEO
NOVEMBER 11, 1993**

SAMPLE: 20103 TIME: 8:30 AM TEMP: 69° RH: 37%
GENERAL VENTILATION: Overhead heaters on
POSITION OF DOORS: All doors closed
TYPE OF BRAKES WORKED: (2) 10" drum, (2) 11" disc
ELAPSED TIME FOR PRODUCT USAGE: 5½ minutes

SAMPLE: 20105 TIME: 11:30 AM TEMP: 65° RH: 37%
GENERAL VENTILATION: Overhead heaters on
POSITION OF DOORS: All doors open
TYPE OF BRAKES WORKED: (2) 8" drum, (2) 9½" disc
ELAPSED TIME FOR PRODUCT USAGE: 4½ minutes

SAMPLE: 20109 TIME: 2:30 PM TEMP: 69° RH: 33%
GENERAL VENTILATION: Overhead heaters on
POSITION OF DOORS: All doors open
TYPE OF BRAKES WORKED: (4) 10" disc
ELAPSED TIME FOR PRODUCT USAGE: 3 minutes

SAMPLE: 20111 TIME: 3:30 PM TEMP: 69° RH: 30%
GENERAL VENTILATION: Overhead heaters on
POSITION OF DOORS: All doors open
TYPE OF BRAKES WORKED: (2) 10" disc
ELAPSED TIME FOR PRODUCT USAGE: 2 minutes



**SAMPLING OBSERVATIONS
WEAVER'S AUTO PARTS & GARAGE
JANUARY 12, 1994**

SAMPLE: 20233 TIME: 8:50 AM TEMP: 66° RH: 46%
GENERAL VENTILATION: Reddy Heater 110,000 BTU operating
POSITION OF DOORS: All closed.
TYPE OF BRAKES WORKED: (2) 11" disc, (2) 10" disc
ELAPSED TIME FOR PRODUCT USAGE: 2 minutes

SAMPLE: 20235 TIME: 11:00 AM TEMP: 67° RH: 54%
GENERAL VENTILATION: Reddy Heater 110,000 BTU operating
POSITION OF DOORS: 1 half open (approx. 4'). All others closed.
TYPE OF BRAKES WORKED: (2) 8" disc, (2) 10" drum, (2) 11" disc
ELAPSED TIME FOR PRODUCT USAGE: 6 minutes

SAMPLE: 20239 TIME: 3:10 PM TEMP: 64° RH: 55%
GENERAL VENTILATION: Reddy Heater 110,000 BTU operating
POSITION OF DOORS: 2 and 4 half open (approx. 4'). All others
closed.
TYPE OF BRAKES WORKED: (2) 10" drum, (2) 11" disc
ELAPSED TIME FOR PRODUCT USAGE: 4 minutes



**SAMPLING OBSERVATIONS
HONDA CARS OF MONROE
JANUARY 14, 1994**

SAMPLE: 20244 TIME: 9:20 AM TEMP: 58° RH: 66%
GENERAL VENTILATION: None
POSITION OF DOORS: 6 open. All others closed.
TYPE OF BRAKES WORKED: (2) 9" drum, (2) 11" disc
ELAPSED TIME FOR PRODUCT USAGE: 3½ minutes

SAMPLE: 20246 TIME: 11:20 AM TEMP: 61° RH: 58%
GENERAL VENTILATION: None
POSITION OF DOORS: 6 open. All others closed.
TYPE OF BRAKES WORKED: (2) 11" drum, (2) 12" disc
ELAPSED TIME FOR PRODUCT USAGE: 4½ minutes

SAMPLE: 20250 TIME: 1:40 PM TEMP: 63° RH: 55%
GENERAL VENTILATION: None
POSITION OF DOORS: All closed.
TYPE OF BRAKES WORKED: (2) 8" drum, (2) 9½ disc
ELAPSED TIME FOR PRODUCT USAGE: 2 ½ minutes

SAMPLE: 20252 TIME: 3:15 PM TEMP: 60° RH: 62%
GENERAL VENTILATION: None
POSITION OF DOORS: 1 and 3 open. All others closed.
TYPE OF BRAKES WORKED: (2) 11" drum, (2) 12" disc
ELAPSED TIME FOR PRODUCT USAGE: 3½ minutes



LABORATORY ANALYSIS

Roche Analytics Laboratory



a division of Roche Biomedical Laboratories, Inc.

ANALYSIS REPORT

P.O. BOX 25249
RICHMOND, VA. 23260

ANALYTICS NO: 013-0099
ACCOUNT NO: 32809180
DATE: January 24, 1994

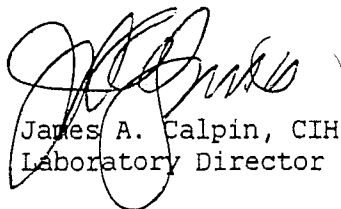
KEVIN COSGROVE
HEALTH & HYGIENE
5500 77 CENTER DR STE 130
CHARLOTTE NC 28217

SAMPLE TYPE: 7 Charcoal Tubes

DATE RECEIVED: 01/13/94

REMARKS: μg = micrograms, ppm = parts per million
ND = Not Detected, L = Liters
NIOSH Method #1003 For Perchloroethylene = PCE
Project Name: Radiator Specialty

Sample #	Analytics #	Volume(L)	Analyte	μg Found			Results, ppm
				Front	Back	Total	
20231	0135310099-001	10.90	PCE	475	ND	475	6.4
20233	-002	2.38	PCE	919	ND	919	56.9
20235	-003	2.38	PCE	302	ND	302	18.7
20236	-004	2.37	PCE	301	ND	301	18.7
20237	-005	8.60	PCE	334	ND	334	5.7
20238	-006	2.38	PCE	885	ND	885	54.8
20240 BLANK	-007	--	PCE	< 20	ND	< 20	--



James A. Galpin, CIH
Laboratory Director

F:01399



P.O. BOX 25249
RICHMOND, VA. 23260

ANALYTICS NO: 020-0074
ACCOUNT NO: 32809180
DATE: January 26, 1994

KEVIN COSGROVE
HEALTH & HYGIENE
5500 77 CENTER DR STE 130
CHARLOTTE NC 28217


SAMPLE TYPE: 8 Charcoal Tubes

DATE RECEIVED: 01/20/94

REMARKS: μg = micrograms, ppm = parts per million
ND = Not Detected, L = Liters
NIOSH Method #1003 For Perchloroethylene = PCE
Project Name: Radiator Specialty

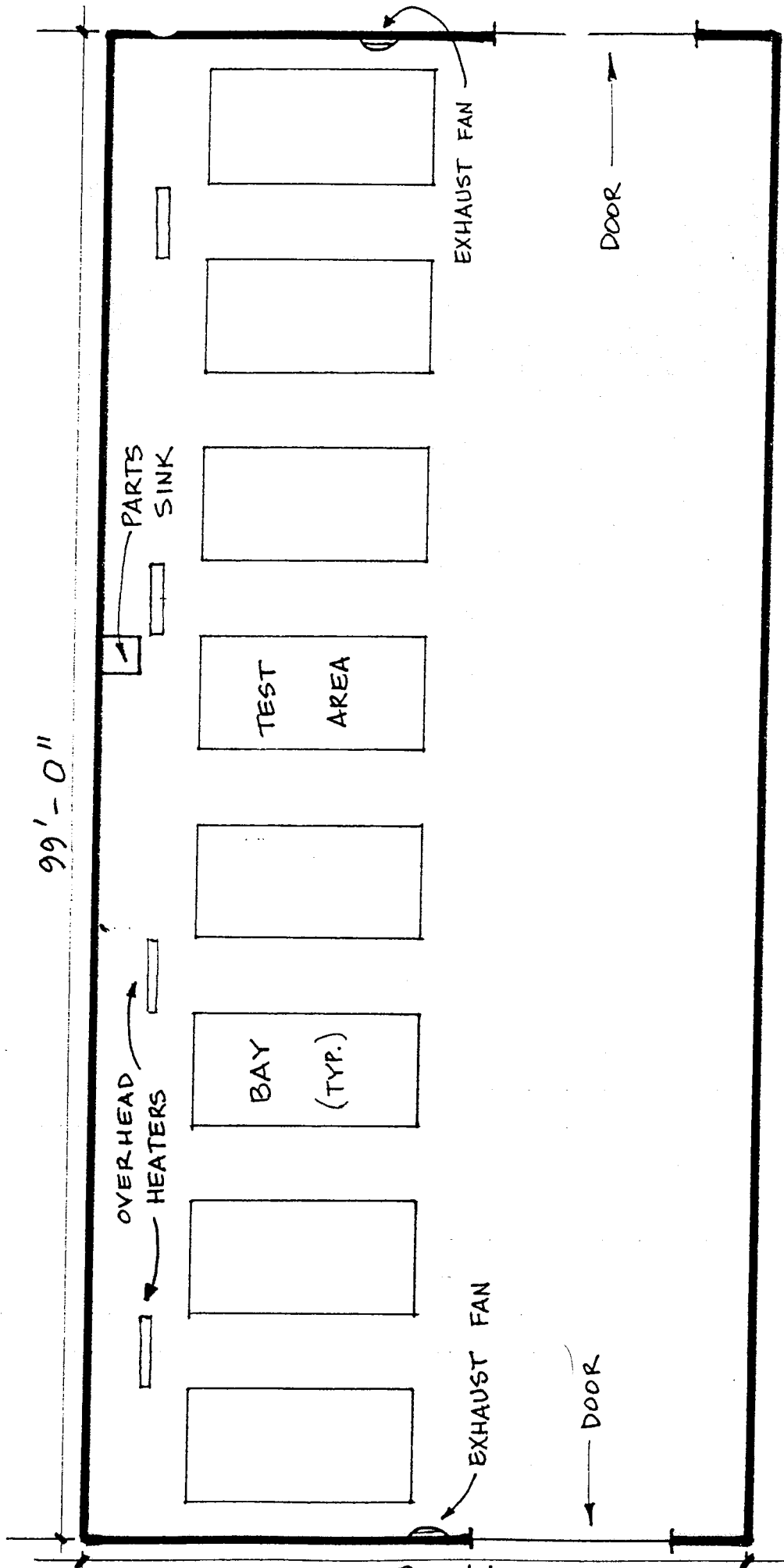
Sample #	Analytics #	Volume(L)	Analyte	<u>μg Found</u>			Results, ppm
				Front	Back	Total	
20242	0205310074-001	8.31	PCE	1160	ND	1160	20.6
20244	-002	2.49	PCE	1070	ND	1070	63.4*
20245	-003	2.45	PCE	1090	ND	1090	65.6*
20246	-004	2.49	PCE	1210	ND	1210	71.7*
20248	-005	9.00	PCE	793	ND	793	13.0
20250	-006	2.49	PCE	1220	ND	1220	72.2*
20252	-007	2.49	PCE	871	ND	871	51.6*
20254 BLANK	-008	--	PCE	< 20	ND	< 20	--

*Exceeds the TLV


James A. Calpin, CIH
Laboratory Director

F:02074

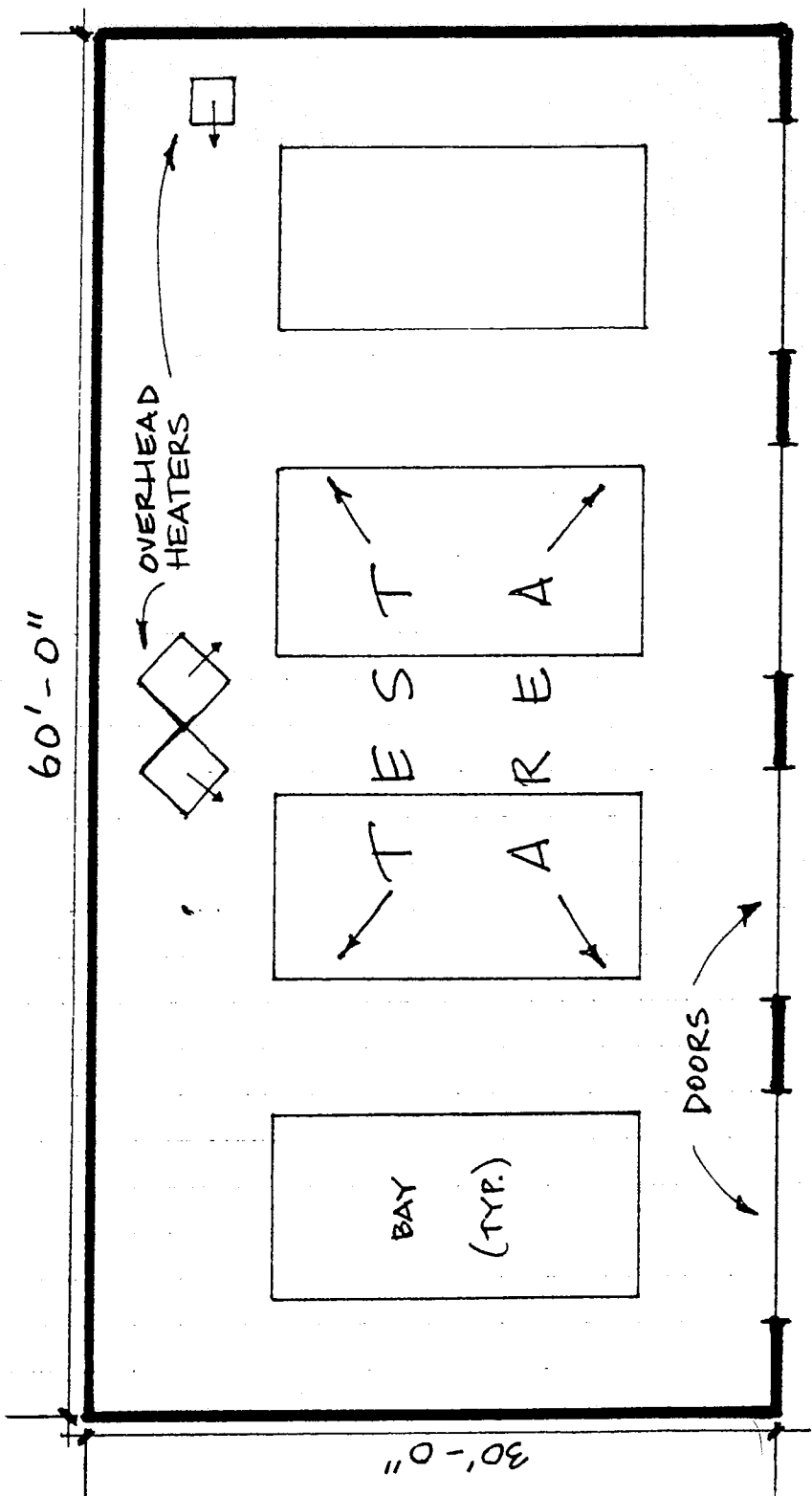
FLOOR PLANS



McKENNEY JEEP EAGLE

FLOOR PLAN # 1

APPROX. SCALE: 1" = 10'-0"

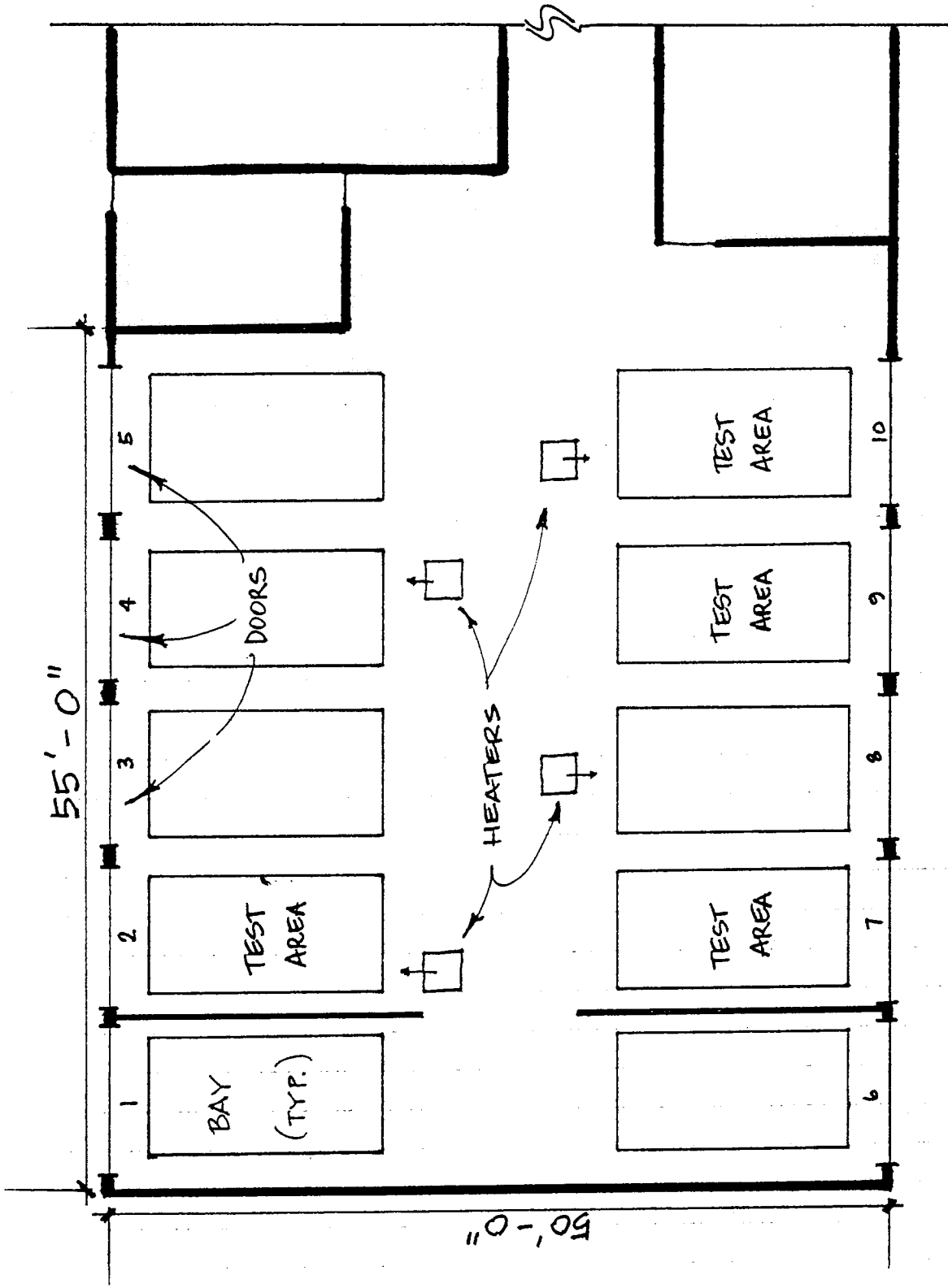


ROCKETT AUTO PARTS.

FLOOR PLAN # 2



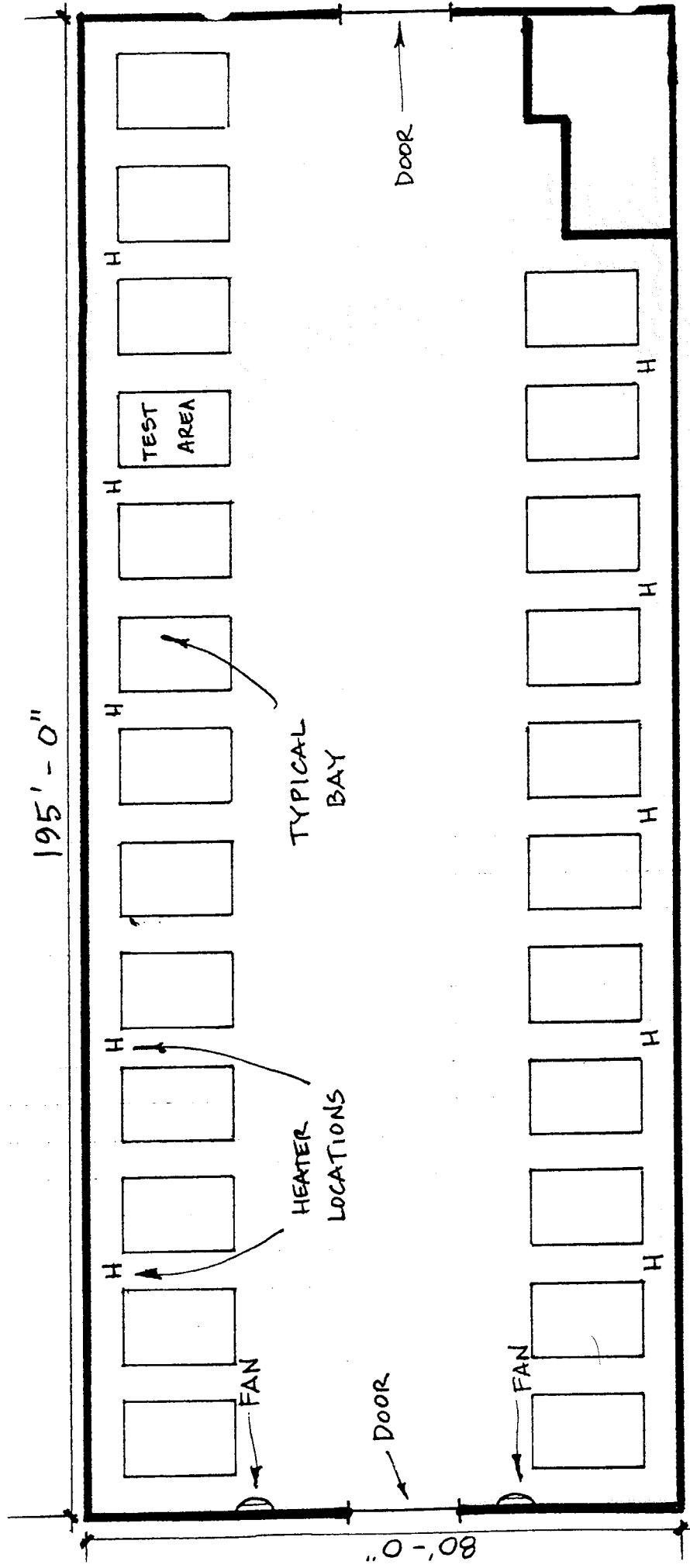
APPROX. SCALE: 1" = 8'-0"



HONDA CARS of MONROE.

FLOOR PLAN # 3

APPROX. SCALE, 1" = 10'-0"

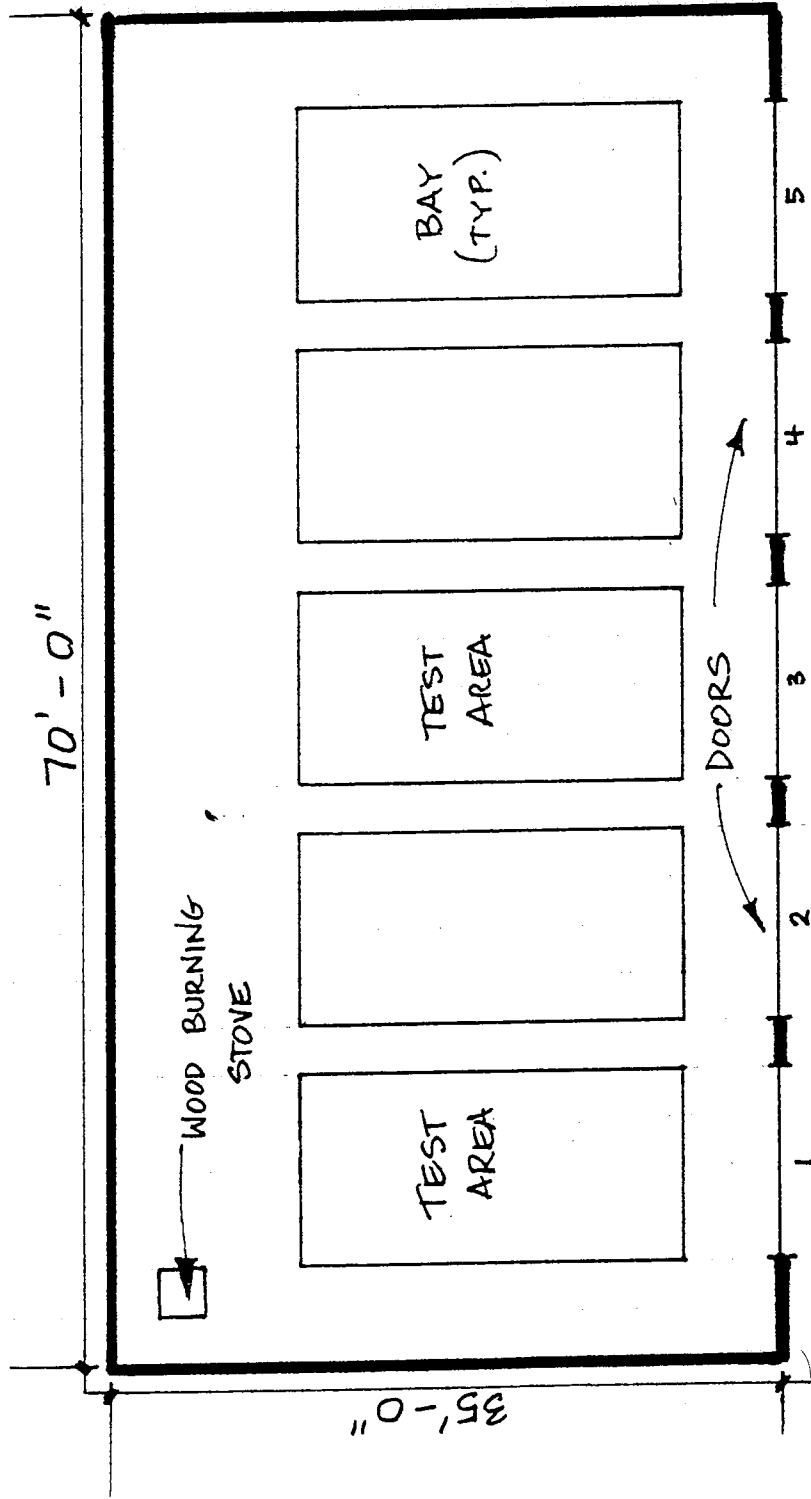


McKENNEY CHEVROLET GEO

FLOOR PLAN #4

APPROX. SCALE: 1" = 20'-0"

NORTH



WEAVER'S AUTO PARTS & GARAGE

FLOOR PLAN # 5

APPROX. SCALE = 1" = 10'-0"

FIELD NOTES



Health & Hygiene, Inc.

ENVIRONMENTAL MONITORING
SAMPLE LOG

DATE	SAMPLE NO.	EMPLOYEE OR SAMPLE LOCATION	PUMP NO.	FLOW RATE L/min	TIME			CONTAMINANT	RESULT - UNITS
					On	Off	Min		
1-12-94	20221	Kevin Tow	1140-1	0.04780	8:15A	12:03P	228	Perc	10.90
	20222	"	1140-2	0.04464	8:15A	12:03P	228	"	10.18
	20233	"	1139-1	0.1588	8:45A	9:00A	15	Perc	2.38
	20234	"	1139-2	0.1577	8:45A	9:00A	15	"	2.37
	20235	"	1139-1	0.1588	10:54A	11:09A	15	Perc	2.38
	20236	"	1139-2	0.1577	10:54A	11:09A	15	"	2.37
	20237	"	1140-1	0.04780	1:08P	4:08P	180	Perc	8.60
	20238	"	1140-2	0.04464	1:08P	4:08P	180	"	8.04
	20239	"	1139-1	0.1588	3:05P	3:20P	15	Perc	2.38
	20240	"	1139-2	0.1577	3:05P	3:20P	15	"	2.37

WORK ACTIVITY: Brake repair

LOCATION: Weaver Auto Parts & Garage
Charlotte NC

COMMENTS:

SAMPLED BY: K. Cozart



Health & Hygiene, Inc.

CALIBRATION LOG

CLIENT
Radiator Specialty

SAMPLING ELEMENT
Universal Holder w/ Charcoal Tubes

PUMP
Gilian 1130 C

NO.:

Config:

Scin/Amt:

VOLUME INDICATOR
mini - Buck

TEMP _____ PRESSURE _____

PUMP NO.	FLOW SET	CALIB VOL	TIME or COUNT				FLOW RATE
			1	2	3	Avg.	
1139-1			0.1593 0.1582	0.1591 0.1581	0.1591 0.1585	0.1592 0.1583	0.1588
1139-2			0.1576 0.1570	0.1584 0.1576	0.1579 0.1572	0.1580 0.1573	0.1577
1140-1			0.04771 0.04780	0.04781 0.04783	0.04772 0.04788	0.04775 0.04784	0.04780
1140-2			0.04444 0.04453	0.04463 0.04459	0.04504 0.04463	0.04470 0.04458	0.04464

By: Kevin Cosgrove
Date: 1-12-94



Health & Hygiene, Inc.

ENVIRONMENTAL MONITORING
SAMPLE LOG

DATE	SAMPLE NO.	EMPLOYEE OR SAMPLE LOCATION	PUMP NO.	FLOW RATE L/min	TIME			CONTAMINANT	RESULT - UNITS
					On	Off	Min		
1-14-94	20242	Gary Burleson	1140-1	0.04614	9:00A	12:00P	180	Perc	8.31
	20243	"	1140-2	0.04529	9:00A	12:00P	180	"	8.15
	20244	"	1139-1	0.1662	9:15A	9:30A	15	Perc	2.49
	20245	"	1139-2	0.1631	9:15A	9:30A	15	"	2.45
	20246	"	1139-1	0.1662	11:12A	11:27A	15	Perc	2.49
	20247	"	1139-2	0.1631	11:12A	11:27A	15	"	2.45
	20248	"	1140-1	0.04614	1:00P	4:15P	195	Perc	9.00
	20249	"	1140-2	0.04529	1:00P	4:15P	195	"	8.83
	20250	"	1139-1	0.1662	1:33P	1:48P	15	Perc	2.49
	20251	"	1139-2	0.1631	1:33P	1:48P	15	"	2.45
	20252	"	1139-1	0.1662	3:05P	3:20P	15	"	2.49
	20253	"	1139-2	0.1631	3:05P	3:20P	15	"	2.45

WORK ACTIVITY: Brake repair

LOCATION: Honda Casa of Monroe
Monroe, NC

COMMENTS: No brake repair from 8 AM to 9 AM
↳ Emergency repair

SAMPLED BY: Kevin Cozart



Health & Hygiene, Inc.
CALIBRATION LOG

CLIENT
Radiator Specialty Co.

SAMPLING ELEMENT
Universal Holder w/Charcoal Tubes

PUMP
Gilian 113 D C

NO.:

Scin/Amc:

Config:

TEMP

PRESSURE

VOLUME INDICATOR
mini-Buck

PUMP NO.	FLOW SET	CALIB VOL	TIME or COUNT				FLOW RATE
			1	2	3	Avg.	
1139-1			0.1670 0.1648	0.1670 0.1655	0.1672 0.1656	0.1671 0.1653	0.1662
1139-2			0.1641 0.1622	0.1637 0.1629	0.1638 0.1618	0.1634 0.1623	0.1631
1140-1			0.04611 0.04562	0.04710 0.04570	0.04668 0.04561	0.04663 0.04564	0.04614
1140-2			0.04551 0.04501	0.04568 0.04493	0.04552 0.04507	0.04557 0.04500	0.04529

By: Kevin Cosgrove
Date: 1-14-94