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NATIONWIDE SURVEY OF RCP LISTED MITIGATION CONTRACTORS

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ABSTRACT

American Association of Radon Scientists and Technologists (AARST) conducted a nationwide survey of RCP mitigation contractors. A total of 800 survey's were sent to RCP listed contractors and members of AARST who had indicated they were involved in mitigation. Additional follow-up phone calls were made to all those who had not responded or had indicated a willingness to complete the Survey. Approximately 86 mitigation contractors responded. The Survey was broken into two parts. Part A was a questionnaire asking approximately 60 questions about the mitigation companies actual business. Part B was a questionnaire about individual mitigation jobs. Each mitigation company was asked if they would complete five to ten Part B's of completed mitigation jobs. The mitigation contractors completed approximately 340 Part B's of individual mitigation jobs. Each of these mitigated homes was sent an alpha track detector. Approximately 12 of the 340 detectors sent to these homeowners were returned because of the occupant moving. All Survey information was input into a D-Base type program for final analysis and comparison of the Survey responses and alpha track measurements. A total of 226 of the Survey houses, equal to a sixty-six percent, returned their detectors. Ninety-four percent of the Survey houses that returned their detectors had radon results that were less than four picoCuries per Liter. Seventy percent of the Survey houses that returned their detectors had radon results that were less than two picoCuries per Liter.

INTRODUCTION

American Association of Radon Scientists and Technologists (AARST) conducted a nationwide survey of RCP mitigation contractors. The Survey was mailed to all EPA RCP listed contractors and all members of AARST who had indicated they were involved in mitigation in the middle of November, 1994. If no response was received, the persons or company was contacted by phone to determine their willingness to complete the Survey and encouraging them to do so. A second and third phone call was made to all those who had not been contacted directly or had indicated a willingness to complete the Survey but had not completed it.

The Survey was broken into two parts. Part A was a questionnaire that asked particular questions about the mitigation company's actual business. Part B was a questionnaire that asked questions about an individual mitigation job. Each mitigation company was asked if they would complete Part A about their company and to complete five to ten Part B's from five to ten mitigation jobs they had completed. The mitigation companies were informed that each survey house they provided would be sent a long term alpha track detector to be exposed for three months. It was requested that the mitigation contractor contact each individual mitigation job homeowner to gain permission to do the follow-up testing and to ensure the correct occupant was contacted when the long term detectors were shipped.

The total mailing to mitigation contractors was over 800. The follow-up calling revealed that less than half of those listed as doing mitigation by the EPA or AARST were either not doing mitigation because they never had or they were presently out of the business.

Approximately 86 mitigation contractors responded with a completed Part A Survey form by February 1, 1995. These contractors provided approximately 340 survey houses that had been mitigated for an average of four survey houses per mitigation company. The map of the United States indicates that mitigation contractors completed

the Survey from thirty-one predominately northern states.

All of the Survey houses had alpha track detectors mailed to them by February 14, 1995 with a request that they expose the detectors and return them in the enclosed mailers to the analysis lab on May 15, 1995. Approximately 12 of the 340 detectors were returned because of the occupant moving.

A final follow-up phone call was made to each homeowner starting around June 15, 1995 to ask the homeowners if they had returned the detectors and ask if they have had any problems with their mitigation system. All Survey information was input into a D-Base type program for final analysis and comparison using graphs generated by downloading the database information into a spreadsheet program.

MITIGATION COMPANY STRUCTURE

Graph 1 indicates that of the companies still in business, 1987 was the peak year mitigation companies went into business. This also indicates that these older companies have weathered the initial fallout of new businesses and thus they are likely to stay in business in the coming years. Graph 2 indicates that mitigation companies use employees predominately to install mitigation systems although about a third of the Companies do full time or occasionally use sub-contractors to install systems. Graph 3 indicates that in general most mitigation companies have four or less installers with about 40% of the companies using only one person to install mitigation systems. Graph 4 indicates that 70% of the mitigation companies have at least one RCP listed person doing the actual mitigation installations. Graph 5 indicates that 95% of the mitigation companies have RCP listing and half of the companies have RMP listing. Graph 6 indicates that only 36% of the mitigation companies have one or more non-RCP listed contractors competing against them.

MITIGATION COMPANY JOBS

Graph 7 depicts that about 50% of the mitigation companies complete less than fifty jobs per year. Around 30% of the companies complete more than 100 jobs a year which would be approximately the minimum number necessary in order to have radon mitigation a full time occupation. Graph 7 indicates that the Surveyed Companies as a group completed about 8000 mitigations in 1993 and 9300 mitigation in 1994. This represents about 15% of the mitigations in the United States based on a very rough estimate of 60,000 to 70,000 mitigations performed in 1994 which is based on mitigation fan sales. Graph 8 indicates that for two thirds of the mitigation companies 80% or more of their jobs involve real estate transfers.

MITIGATION COMPANY INSTALLATIONS

Graph 9 indicates that more than half of the companies do communication testing less than ten percent of the time while about 25% of the companies do communication testing at least fifty percent of the time. Graph 10 indicates that only 20% of the companies have discovered backdrafting at least one time. Graph 11 indicates that the mitigation companies have discovered that half of all backdrafting occurs from running one or more exhaust fans in the house while only 6% of the time it occurs because of the operation of an ASD mitigation system. Graph 12 indicates that half of the respondents have worked on schools and about one third have worked on at least one commercial job. Graph 14 indicates that only 6% of the mitigation companies have installed any type of radon in water mitigation system. The companies that have installed radon in water systems are predominately in the North Eastern part of the United States.

MITIGATION EQUIPMENT

Graph 13 indicates that 85% of the mitigation installations are installed with u-tube manometers. Graph 15 indicates that the usage of different fans is wide spread through the industry as compared to a few years ago when there was very limited choices in fan usage. Graph 16 indicates that two-thirds of the respondents have continuous radon monitors although less than twenty percent have electronic radon sniffing equipment and about one quarter have electret ion chambers for passive monitoring. Half of the companies have a core drill. About 40% of the companies have a digital micro-manometer while at least 80% have chemical smoke bottles.

MITIGATION COMPANY ESTIMATES

Graph 17 indicates that for half of the companies the average one way travel time is less than 30 minutes. For 6% of the companies the average travel time is greater than one hour. Graph 18 indicates that about half the companies get less than one half of the jobs they estimate. About 25% of the companies claim that 75% of their estimates turn into jobs for them. Graph 19 indicates that for one third of the respondents, one quarter of their income comes from radon mitigations. About half of the Survey companies get more than half of their income from mitigation while only 8% get 100% of their income from mitigation jobs. Graph 20 refers to a typical simple radon installation that includes two suction points in the basement with some sealing and the fan installed outside with the exhaust routed to the roof. Retesting is to be done separately by the homeowner. One third of the companies said they would charge from \$650 to \$900 for this job. One half of the companies said they would charge from \$900 to \$1400 dollars for this job while 6% said they would charge from \$1400 to \$2000 for this job. The average of all the median job costs from each state of Survey houses is about \$1000. Graph 21 indicates that 80% of the survey companies give a three year warranty on the fan and more than half of the companies include replacement labor with the warranty. One third of the survey companies have a one year warranty that the radon levels will stay below the guidelines while more than one half of the companies warranty the radon levels will be below the EPA guidance for three years or longer. Graph 22 indicates that 20% of the Survey companies occasionally give no radon warranty for a mitigation job and 6% of the companies never give a radon warranty. About 20% of the Survey companies occasionally give a 2 pCi/L warranty on the job and about 16% of the companies at least half of the time give a 2 pCi/L warranty. Graph 23 indicates that half the survey companies leave test kits about half the time. About one third of the companies always leave test kits after the job. About 60% of the companies never use an independent to retest after the installation while 7% of the companies always use an independent for post mitigation testing. Twenty percent of the companies one half of the time let the owner do the retest and 7% of the companies always let the owner do the retest. Graph 24 indicates that the largest callback problem is for failed fans with the second highest from radon levels still elevated after the job.

SURVEY RESULTS FROM 226 MITIGATIONS

Graph 25 indicates that only 6% of the 226 mitigation jobs were still elevated and 70% of the jobs were now less than 2 pCi/L. The age of the system does appear to have some affect upon its performance. This could be due to a slight system deterioration in the system or the fact that newer systems are being installed with higher system performance. Graph 26 indicates that there is not a correlation between the initial radon levels and the final system performance except if the system fails with a level greater than 8.1 pCi/L. This later group was so small that the results should not be considered significant. Graph 27 indicates that in general, a post mitigation result does indicate the general performance of a long term followup. Graph 28 is used to indicate if a block foundation versus a poured foundation has higher or lower, initial or post mitigation radon. It appears that a block foundation has 30% to 40% more initial radon and that it is slightly more difficult to reduce radon levels below 4 pCi/L. Graph 29 initiates that the survey houses with only one suction hole in the basement cost around \$960 while a two hole system had a mid range cost of about \$1000. The estimated costs from the mitigation companies of a simple two hole system also had a mid-value of about \$1000. Graph 30 indicates that there is no significant relationship between house age and final radon system results. Graph 31 indicates there is also no significant correlation

between the house age and the initial radon results. The second United States maps lists the median system price in each state from the survey houses. There were at least three survey houses in each of the listed states except North Carolina and Wyoming which had only one Survey house.

Part A
AARST Confidential Survey of Mitigation Companies

Please fill in above underline sections or circle correct answer.

Company Name: _____

Co Owner or Pres: _____ Doing Radon Work Since: _____

Co. Name: _____ Street: _____

City: _____ State: _____ Zip: _____

Work Ph: _____ Fax #: _____ RCP #: _____

Company Information:

State Certified in: _____ Are your installers: Subs - Employees - Both

Are you EPA listed: RCP - RMP # of Installers: _____ How many of your installers are RCP: _____

How many of your competitors are non-RCP listed: _____ # of Active soil depressurization 1993 Jobs: _____

of ASD 1994 Jobs (estimated): _____ What % of your jobs involving real estate transfer: _____%

What % of your estimates do you perform communication tests: _____%

How many '93 & '94 jobs had backdrafting? _____ How often was it caused by ASD system: _____

How often was backdrafting caused by: Air handler _____, Blocked chimney _____, Chimney too short _____,

Other exhaust fans _____, Other combustion appliances _____, (list other situations on the back of this form)

Total # of commercial mitigations: _____ Total # of school mitigation jobs: _____

What type of system indicator do you use: U-tube - Magnehelic - Elec pressure switch - Flow ball

Total # of installed GAC water systems: _____ Total # of installed water Aeration systems: _____

Presently Using: F100 - F150 - F175 - GP201 - GP301 - GP501 - GP500 - XP151 - XP201 - KT series
(If fan uses same motor as F series indicate as F-series)

I presently own: _____ Continuous radon monitor(s) Core drill _____ Radon Sniffer(s)

E-PERM system Digital Micromonmeter Chemical smoke bottle

AARST Confidential Survey of Mitigation Companies

Cost of Business:

Bookkeepers hrs/wk: _____ Site visits & typing estimates hrs/wk: _____

Answer Phones & Scheduling hrs/wk: _____ Phone ads \$/month: \$ _____

Avg one way travel time to job: _____ min Job percentage versus estimates: _____ %

What % of your income comes from mitigation: _____ % What % of you income from testing: _____ %

Do you regularly charge for first visit diagnostics: No - Yes If so, how much: \$ _____

Were you able to afford or get Liability Ins.: No - Yes

Liability insurance cost/yr: \$ _____ Liability Insured by: _____

Do you provide your employees with:

Health Insurance, Holiday pay, 1 - 2 week vacation/yr, # of sick days/yr: _____

What is avg. mitigation cost for 2 story house w/2 bas suction, fan outside, retest by other \$ _____

Company Warranty:

What is length of your guarantee for radon reduction below 4 pCi/L: none - 1yr - 2yr - 3yr - _____

How long is your fan warranty: none - 1yr - 2yr - 3yr - 5yr Does it include replacement labor: Yes - No

Job % done w/no radon reduction guarantee: _____ % Job % done with 2 pCi/L guarantee: _____ %

If you offer a 2 pCi/L option, how much extra: \$ _____ For post mitigation testing what % do you:

Leave test kits: _____ %, Pay for independent re-test: _____ %, Let owner provide retest: _____ %

In '93 & '94 how many times did you have callbacks for: Fan failure: _____ High Radon: _____

Wet basement: _____ Fan noise: _____ System indicator failure: _____ Water in Pipe: _____

Please describe other system failures on the back of this form.

By the signature below, I certified that to my knowledge the above information is correct and I give permission for the information to be used as a Survey without releasing any names or addresses of companies, company employees, company owners or homeowners included in the Survey.

Signed: _____

Date: _____

Part B - AARST Survey of Individual Mitigation Installations

Cust Name: _____ Date Customer Contacted: _____

Street: _____

City: _____ State: _____ Zip: _____

Home Ph: _____ Work Ph (opt) : _____

Mitigation Company: _____

Hse Type: Rnch - 2Stry - 3Stry - Bilv - Split - Cape - Twnh - Contemp - Other: _____

System installed during real estate transfer: Yes - No Foundation Mat: Poured - Blk - Stn - Wood

House Age: _____ yrs Total Basement (BAS) / Crawlspace (CS) / SLAB area: _____ s.f.

Foundation Type: BAS - CRAWLSPACE (CS) - SLAB - BAS/CS - BAS/SLAB - BAS/CS/SLAB

Lower Level Finished: No - Totally - Partially -> 1/8 - 1/4 - 1/2 - 3/4 - 7/8

If house has CS, is CS floor: Conc - Dirt -> no treatment - poly - rubber - sealed - unsealed

of Individual Slabs that might need Suctions (Incl Garage): 1 - 2 - 3 - 4 - 5 - 6

Slab Suctions installed: 1 - 2 - 3 - 4 # Blk Wall Suctions: 0 - 1 - 2 - 3 - 4

CS Suctions: 0 - 1 - 2 Heating Fuel: Oil - Gas - Elec - Wood - Coal - HP

Garage Suction installed: yes - no Htg Sys: Hot Air - Hot Water - Radiant - Stove - Elec bas

Fan Type: F100 - F150 - F175 - GP201 - GP301 - GP501 - GP500 - XP151 - XP201 - KT150

Fan Loc: Outside - Gar - Gar Att - Hse Att Interior Piping: 3" - 4" - Sch20 - Sch40

Exhaust Piping Type: 3"pvc - 4"pvc - Sch20 - Sch40 - 2x3 alum - 3x4 alum - 3x3sq pvc - 4x4sq pvc

Perimeter Canal Drain: No - Yes -> Sealed - Unsealed Final U-tube or system vacuum: _____"

Installed Cost: \$ _____ System Installation Date: _____

Was there any call back for this job: No - Yes If so, what was callback for: (Use back of form to answer)

Measurement Data in Lowest Area Tested

(Use average of duplicates or highest reading if measured more than once or in different locations)

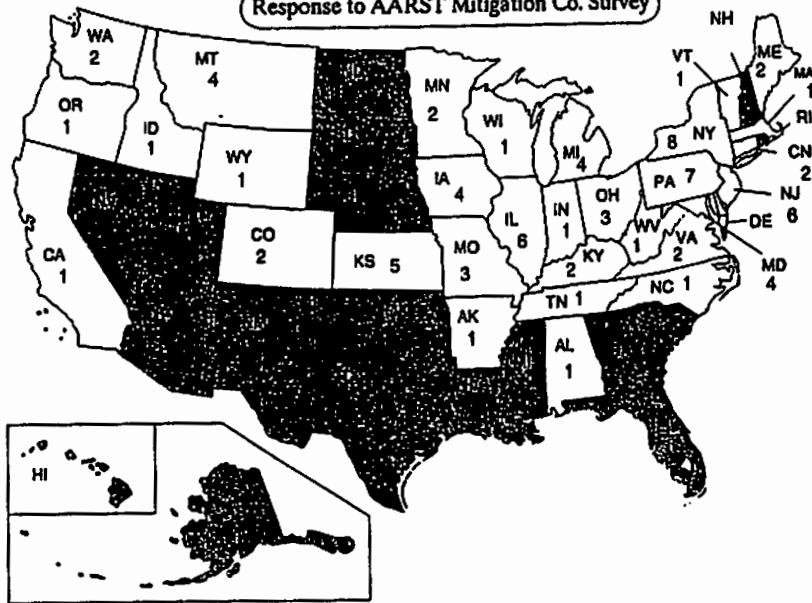
Pre-Mit: _____ pCi/L Detector: AT - CC - EP - CR - CW Test ending Date: _____

1st Post-Mit: _____ pCi/L Detector: AT - CC - EP - CR - CW Test ending Date: _____

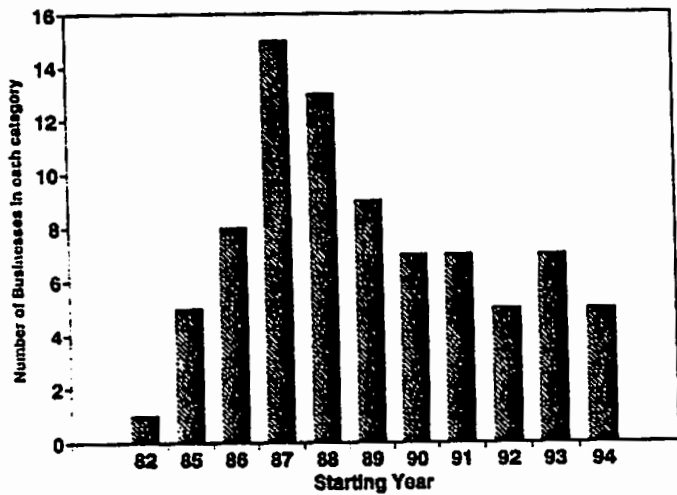
2nd Post-Mit: _____ pCi/L Detector: AT - CC - EP - CR - CW Test ending Date: _____

Put Additional Comments on the back of this form.

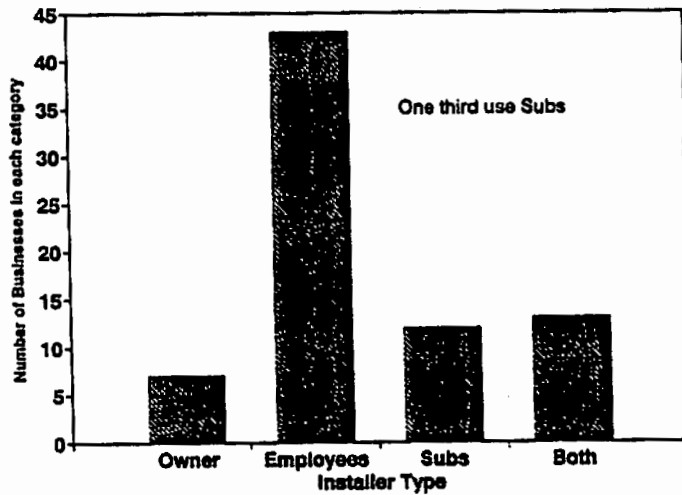
Response to AARST Mitigation Co. Survey



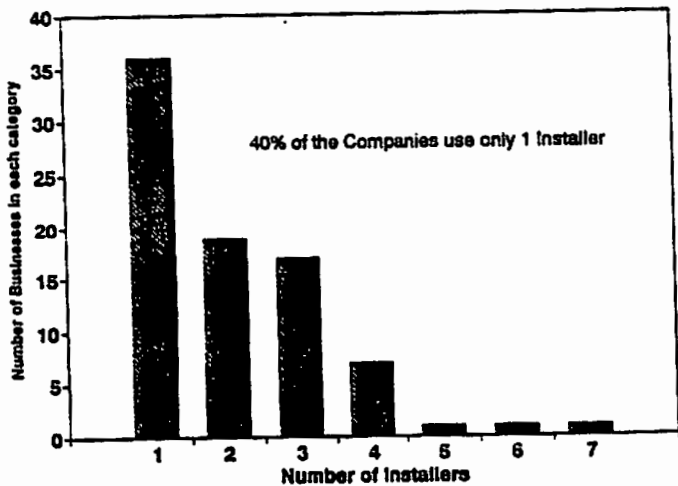
1 Mitigation Company Survey Starting Year of Business



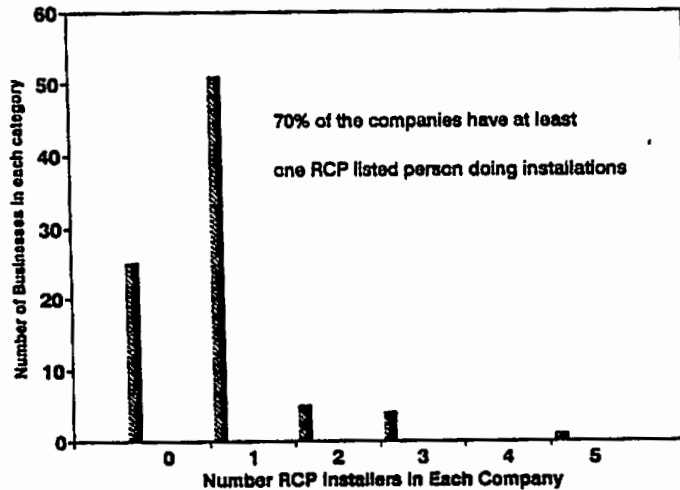
2 Mitigation Company Survey Type of Installers



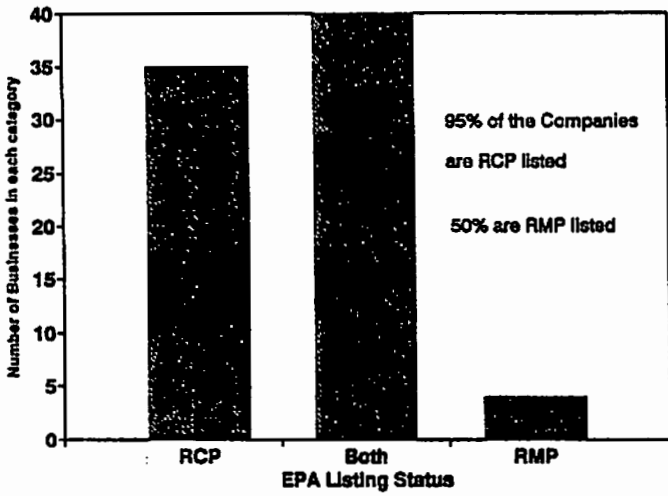
3 Mitigation Company Survey Number of Installers



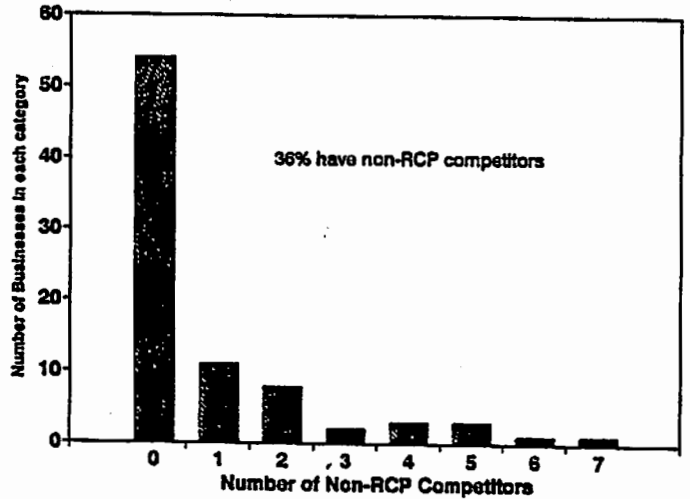
4 Mitigation Company Survey Number of RCP Installers



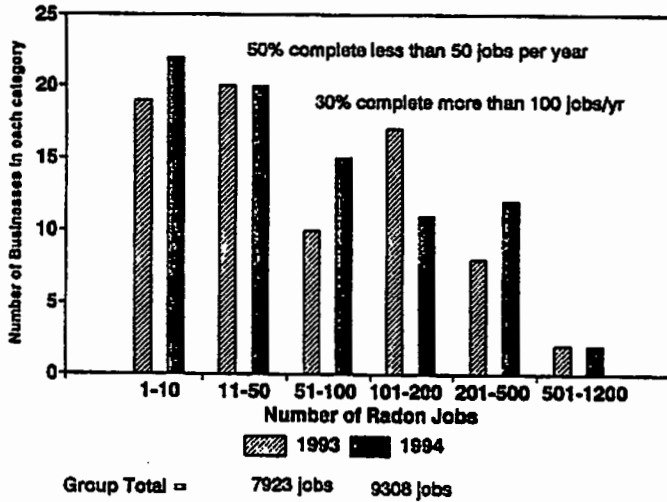
**5 Mitigation Company Survey
RMP or RCP Listing**



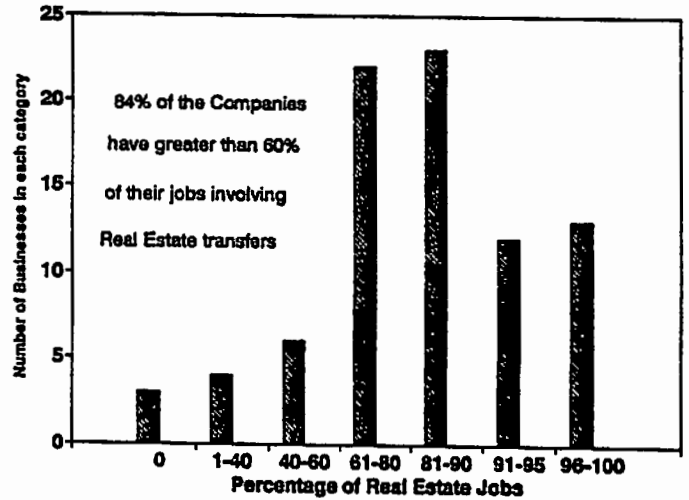
**6 Mitigation Company Survey
Number of Non-RCP Competitors**



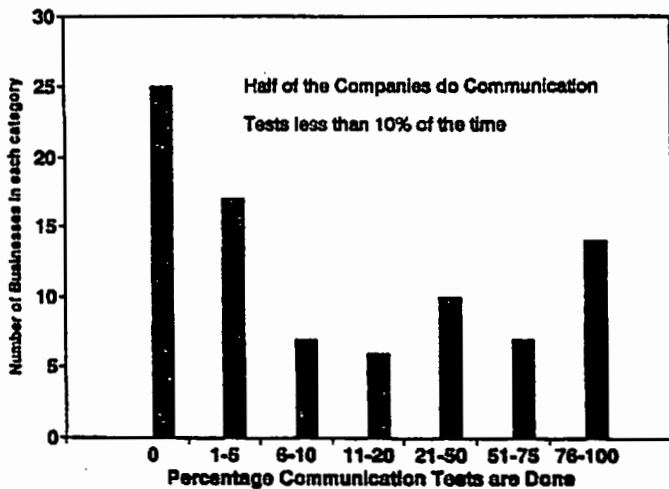
**7 Mitigation Company Survey
Number of Radon Jobs**



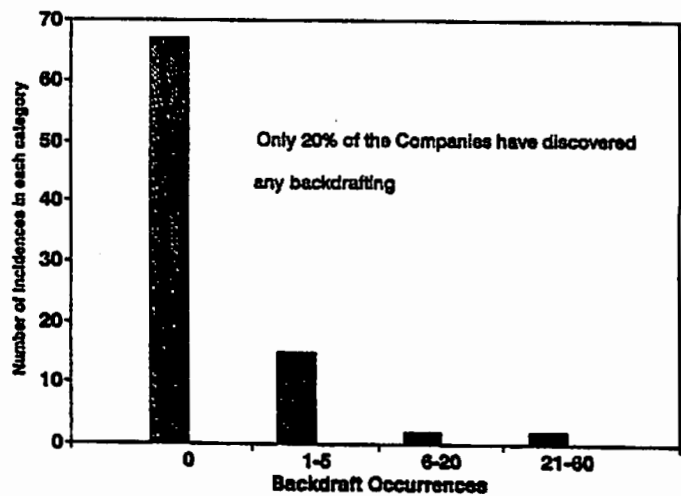
**8 Mitigation Company Survey
Percentage of Real Estate Jobs**



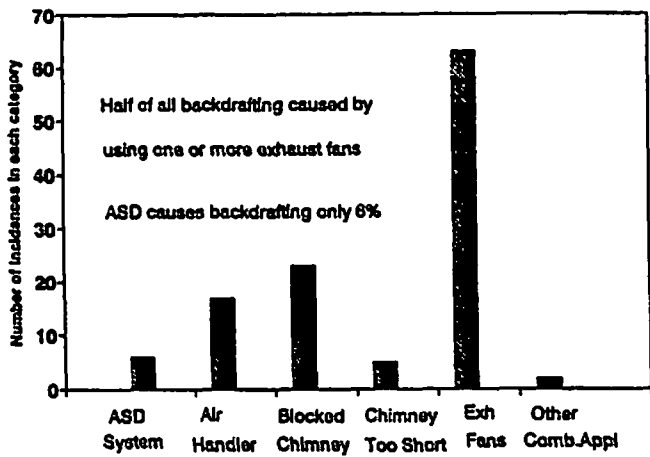
**9 Mitigation Company Survey
Percentage Communication Tests are Done**



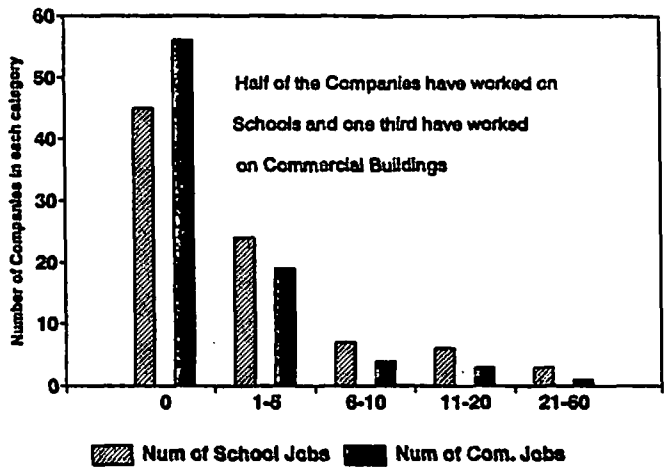
**10 Mitigation Company Survey
Number of Backdrafts Discovered**



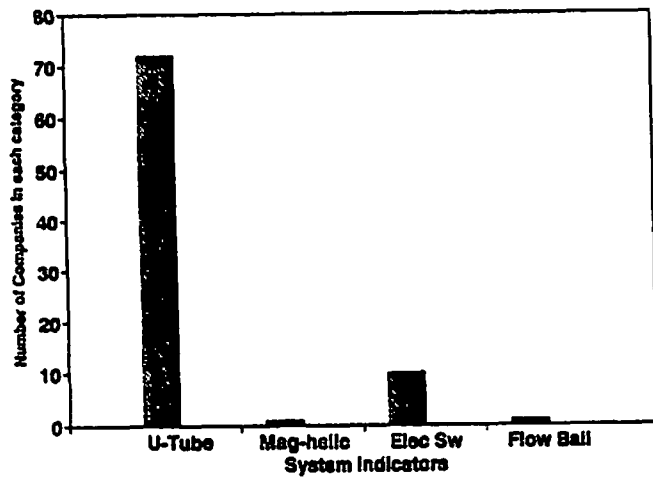
11 Mitigation Company Survey Causes of Backdrafting



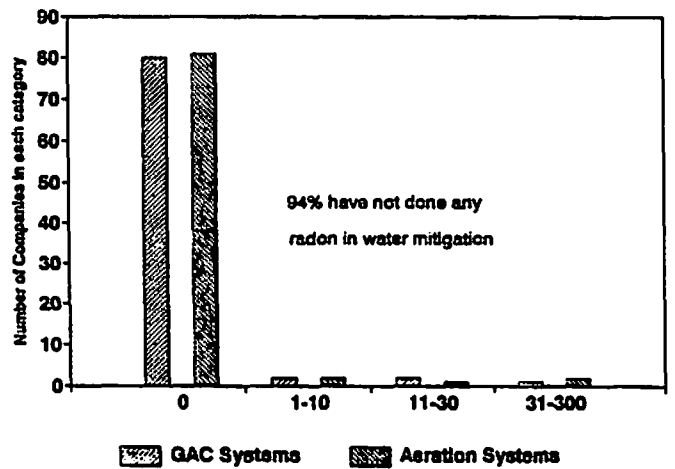
12 Mitigation Company Survey Number of Commercial & School Jobs



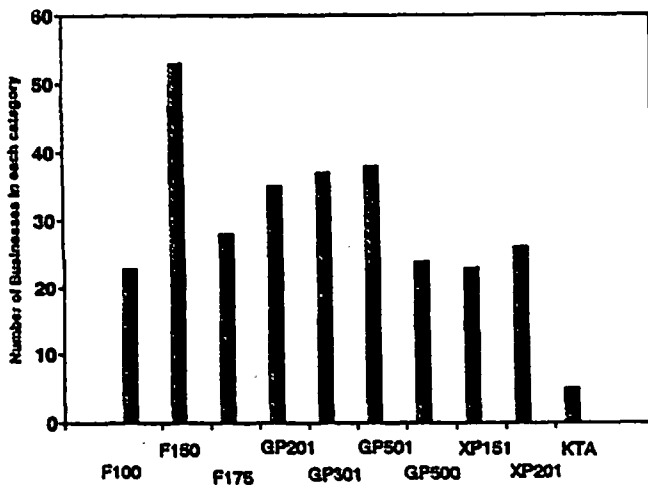
13 Mitigation Company Survey Use of Different System Indicators



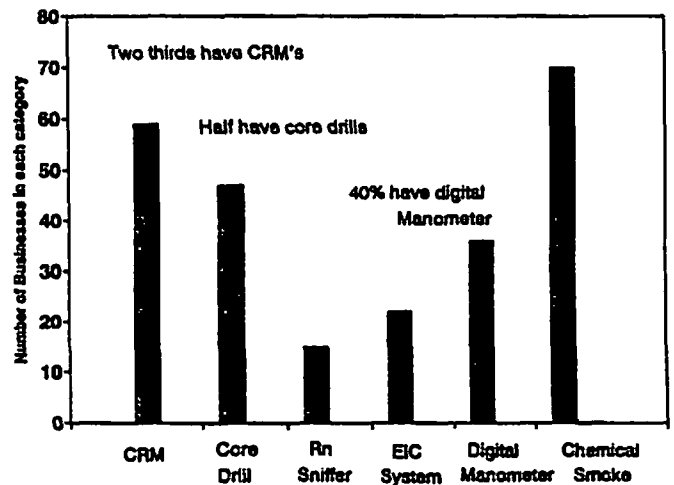
14 Mitigation Company Survey Number of GAC & Aeration Systems



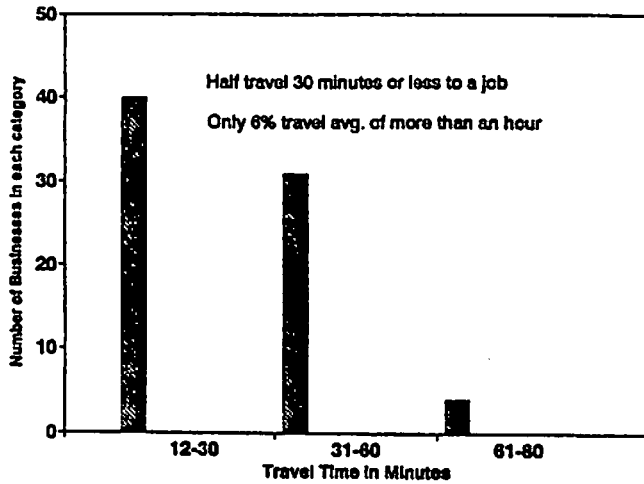
15 Mitigation Company Survey Usage of Different Fans



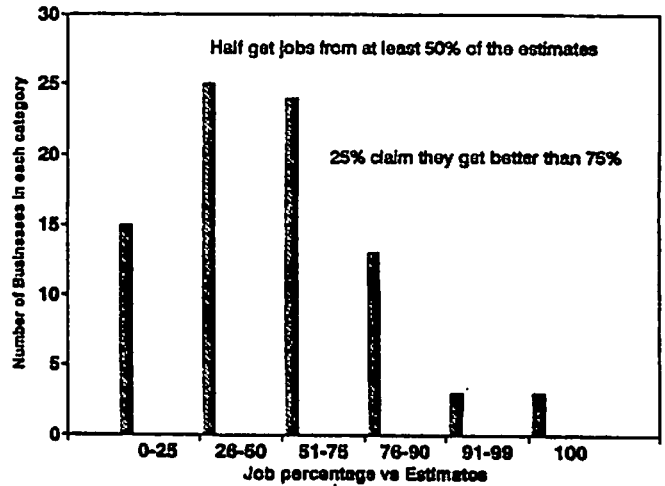
16 Mitigation Company Survey Usage of Different Equipment



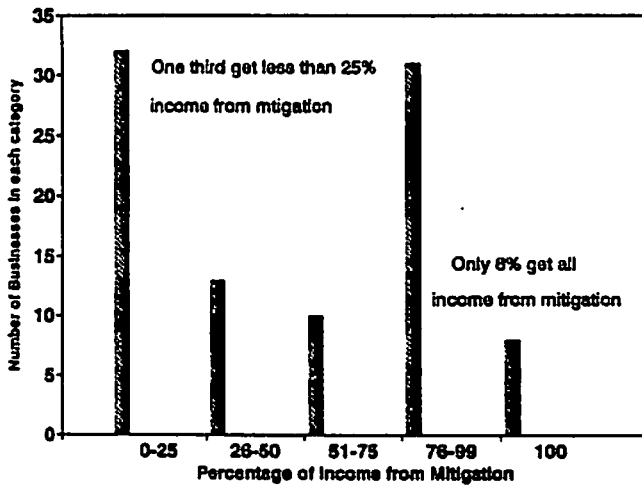
17 Mitigation Company Survey
Average one way Travel Time to Job



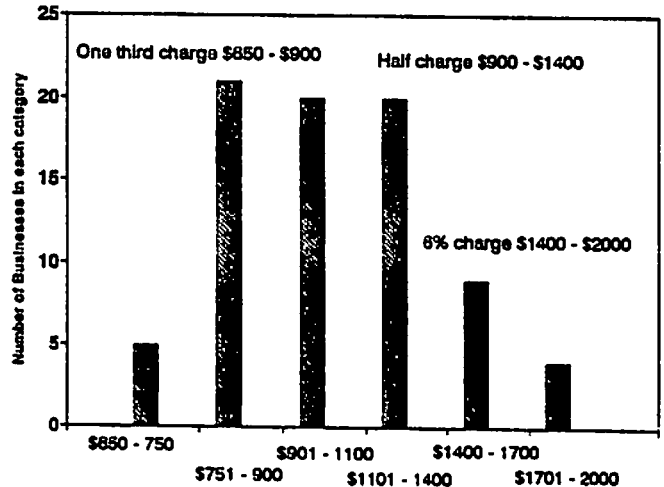
18 Mitigation Company Survey
Percentage of Jobs vs Estimates



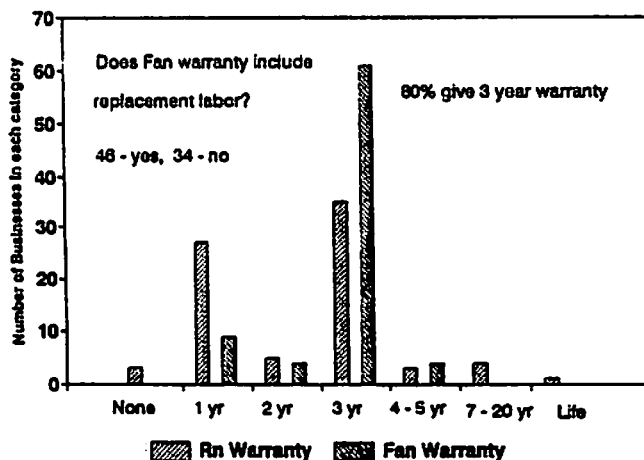
19 Mitigation Company Survey
Percentage of Income from Mitigation



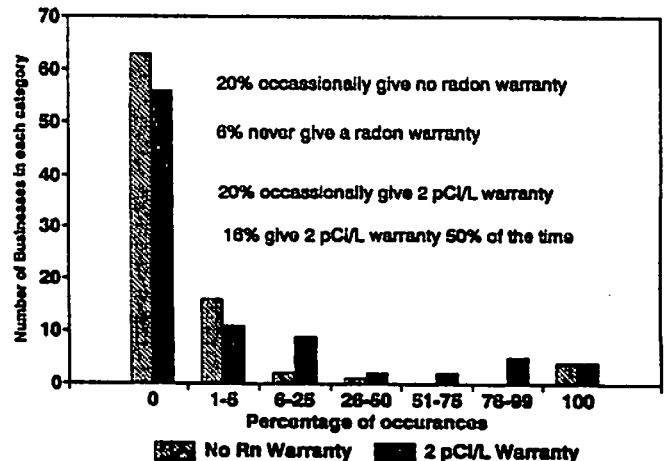
20 Mitigation Company Survey
Cost of 2 SSD, Fan O/S, wo-retest



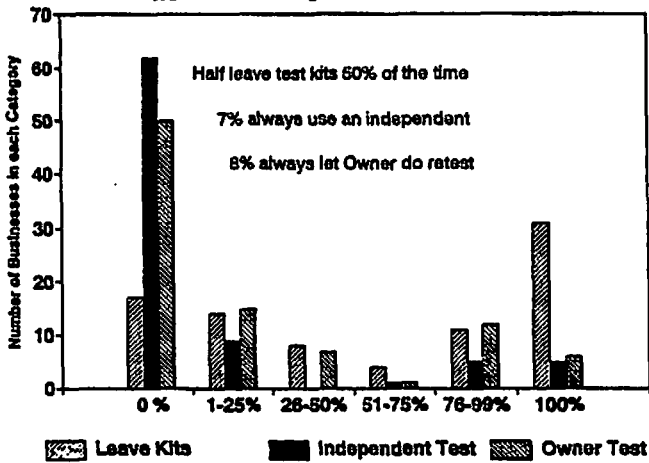
21 Mitigation Company Survey
Length of Radon Warranty



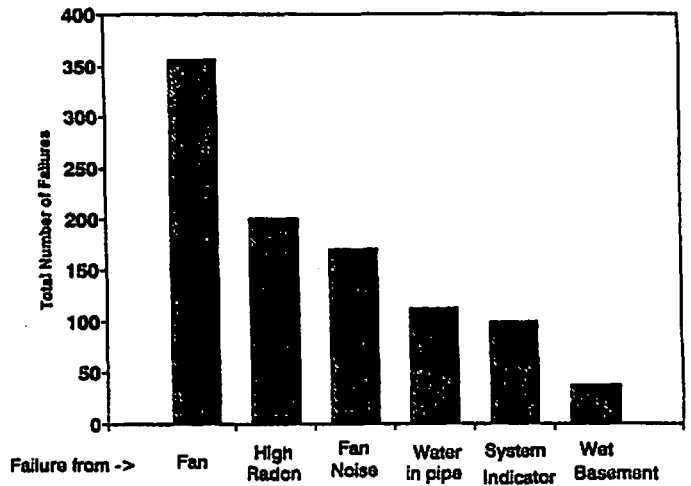
22 Mitigation Company Survey
Job % with different Rn Warranties



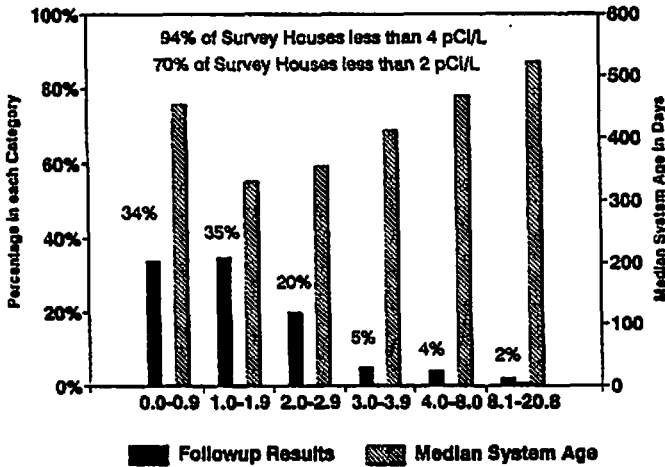
23 Post Mitigation Testing



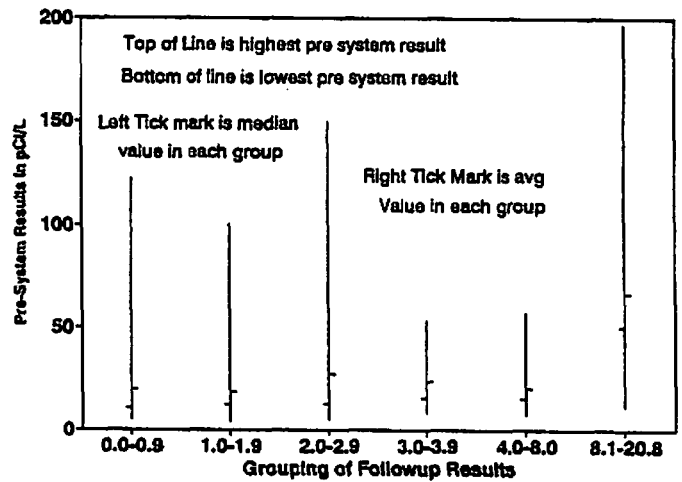
24 Total Reported System Failures from more than 15,000 jobs



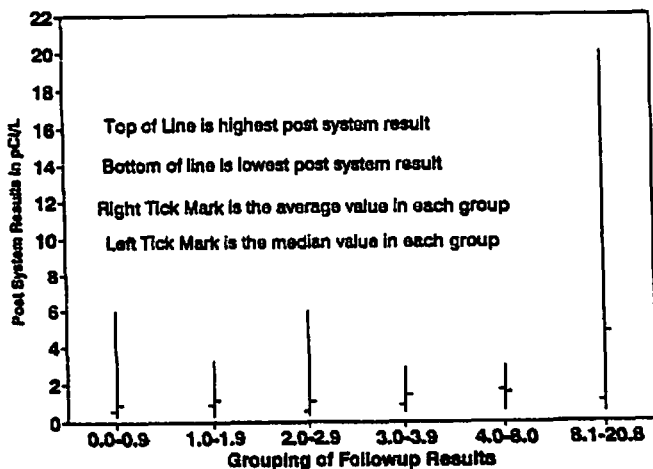
25 Three Month Follow-up Results for 226 Mitigated Houses



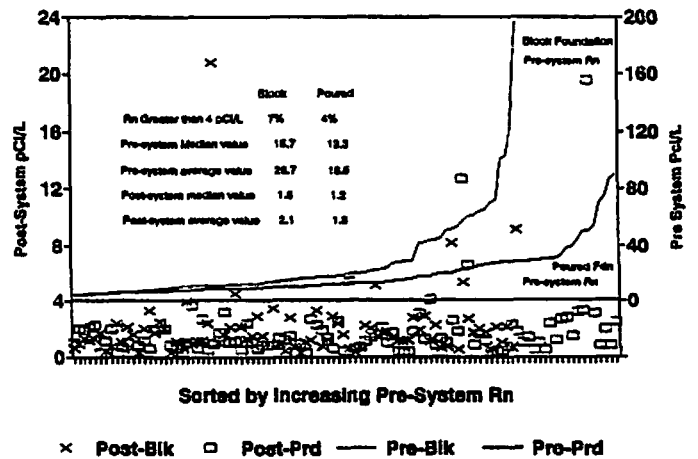
26 Three Month Follow-up Results versus Pre-System Results



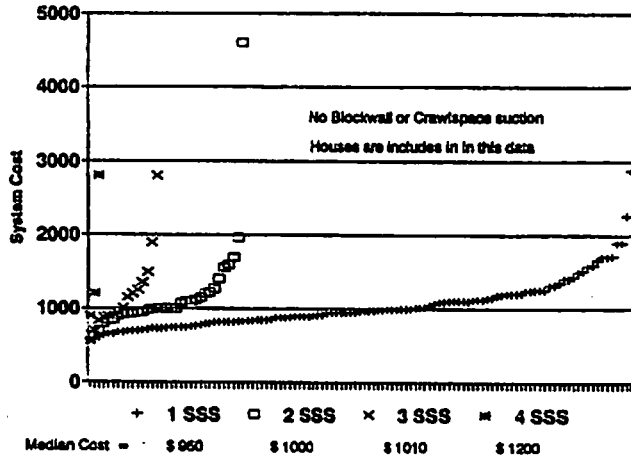
27 Three Month Follow-up Results versus Initial Post System Results



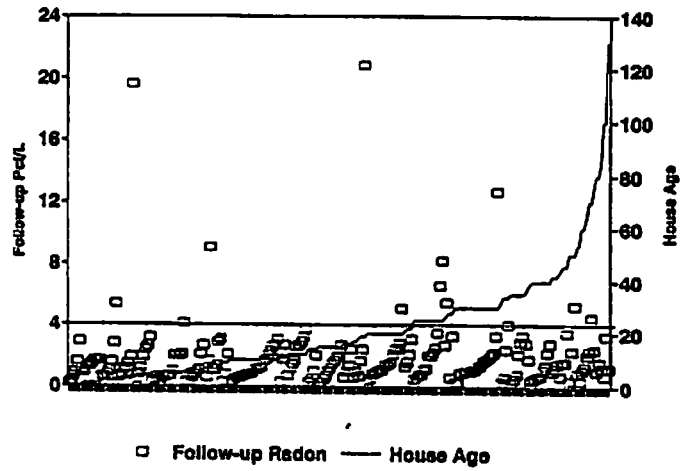
28 Foundation Type versus Pre and Post Radon Levels



29 Number of Suction Holes versus System Cost



30 Three Month Follow-up Result versus House Age



31 Pre-System Radon Levels versus House Age

