LOG OF MEETING

SUBJECT: Carbon Monoxide (CO) Detectors

MEETING DATE: September 28, 1998

LOCATION: CPSC, Room 714, East-West Towers
Bethesda, Maryland

MEETING OF: Newtron Products Company and CPSC staff

LOG ENTRY SOURCE: Elizabeth W. Leland, EC

LOG ENTRY DATE: September 29, 1998

ATTENDEES:

CPSC
Sandra Inkster, EH
Ron Jordan, ES
Mohammed Khan, ES
Elizabeth Leland, EC
Richard Stern, CA
Sharon White, ES

Non-CPSC
Richard Ali, Richard Ali & Associates (representing Newtron Products Company)
Irwin H. Billick, WEC Consulting
Alex Cohen, Consumer
Michael Duty, Newtron Products Company
Ric Erdheim, National Electrical Manufacturers Association
Sandy Ruiter, Underwriters Laboratories Inc.
Ted Williams, American Gas Association

SUMMARY OF MEETING:

(NOTE: The Public Calendar notice for this meeting indicated that a portion of the meeting would be closed in order to discuss information proprietary to Newtron Products Company. Representatives for Newtron indicated at the meeting that it would not be necessary to close the meeting, and the entire meeting was open.)

Newtron Products Company is a manufacturer of residential furnace air filters. Approval by Underwriters Laboratories Inc. is imminent for a new product -- a "whole house" CO detector, which consists of a CO detector imbedded in a furnace air filter. When potentially life-threatening levels of carbon monoxide enter the duct system of the furnace, the CO detector sounds an alarm. Newtron Products Company indicated that the filter/alarm meets the UL standard 2034 for carbon monoxide detectors.

The CO detector imbedded in the filter uses a 9-volt battery, has a 5-year warranty, and uses a biomimetic sensor. The filter with alarm will be distributed primarily through heating, ventilating, and air conditioning (HVAC) contractors.

The cost will be $170. Replacement CO detectors will cost $30.

Information distributed by Newtron Products Company at the meeting is attached.

Newtron Products Company
September 27, 1996

NAME	COMPANY / ORGANIZATION	PHONE
Sandy Rueter	UL - WASHINGTON	202-296-7840
Ronf Jordan	CPSC - Engineering	(301) 504-0508, X-1285
Mohammed KHAN	CPSC - Engineering	504-0508, x1302
TED WILLIAMS	AMERICAN GAS ASSOC.	703/841-8649
Sharon White	CPSC / Human Factors	(301) 504-0468, Ext. 1286
Sandy Inkster	CPSC Health Sciences	301 504 0994 x 1198
Richard Stern	CPSC Office of Compliance	301-504-0608 x1366
CHARO AZI	CONSULTANT	703-560-7070
Michael Duty	Newtron Products Co.	513 5617373
Alex Cohen	Consumer	202 829 9723
Irwin H. Blick	WEC Consulting	301-299-5302
Elizabeth Leland	CPSC	301-504-0962, X.1321
Ric Edhein	NEMA	703-841-3249

NEWTRON
Products Company

Innovators in Air Filtration

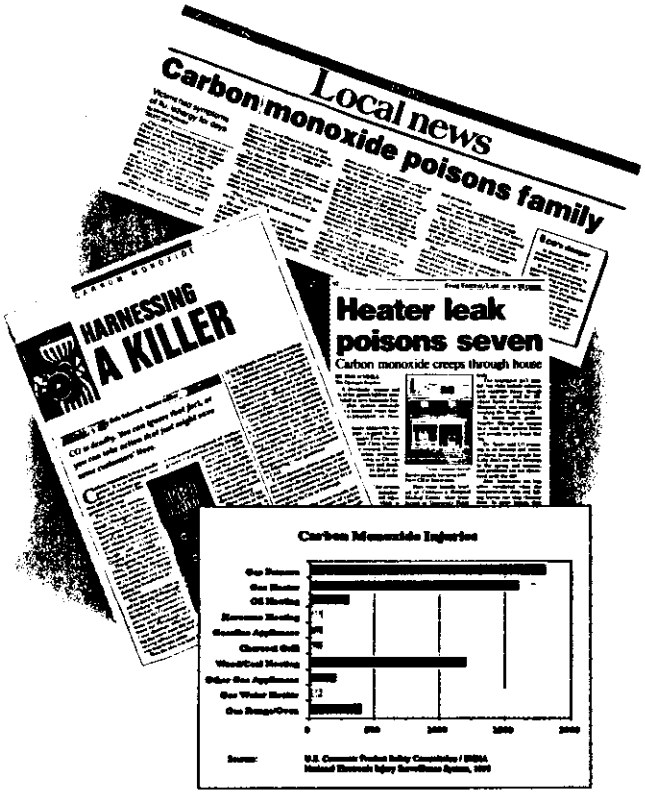
NEWTRON Classic

ORIGINAL NEWTRON

Contractor's Choice

Remind-Air

You c e it, smell it or taste it ...



... and the early warning signs could seem like ordinary flu-like symptoms ... but it can be deadly. Newtron is the only air cleaner that warns your family of dangerous levels of carbon monoxide.

NEWTRON
Products Company

P.O. Box 27175
Cincinnati, Ohio 45227
1-800-543-9149
Email: newtrons@aol.com
Web: www.newtronproducts.com

For the discriminating homeowner who demands the very best in home air filtration, the Newtron Air Cleaner is the wise choice.

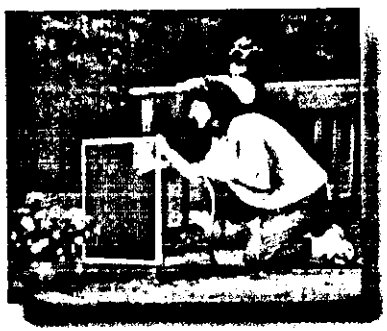
Since 1978 we have perfected our filtration system to provide the ultimate in technology, leading the way for cleaner and safer air in your home.

The special ViBax ™ Anti-bacterial agent is manufactured directly into the filter screens. It helps resist the growth of bacteria, mold and mildew on their surfaces.

"We want to tell you what a fantastic job your Newtron electrostatic air cleaners are doing for Baxter Healthcare... It's not every day that you come across a durable product that provides dramatic savings with minimal maintenance. You have a real winner in your Newtron air cleaner"

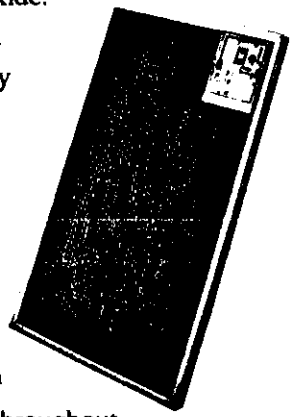
David Jones, Facility Engineer

Easy Cleaning



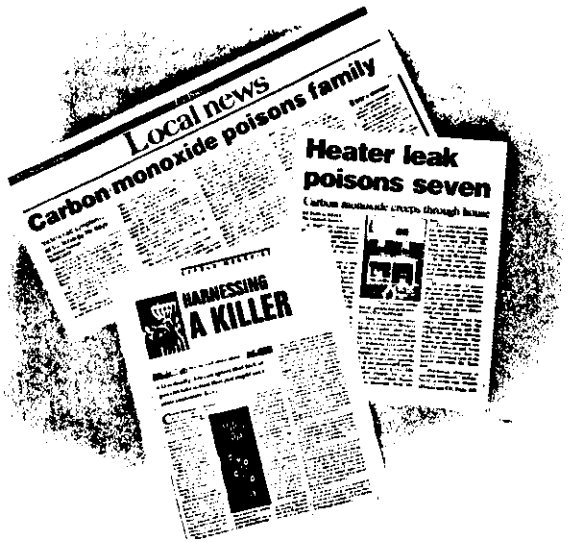
Note these important features:

- **Superb air cleaning** – captures up to 96% of ASHRAE particles*
- **Carbon Monoxide Detection** – Only Newtron Products Company has the patented, exclusive carbon monoxide detector built directly into the air cleaner. It sends a warning when it detects dangerous levels of carbon monoxide.
- **Anti-bacterial agent** – is manufactured directly into the filter screens.
- **Cleaning reminder** – Exclusive built-in, electronic reminder signals necessary cleaning attention which helps provide:
  - ✓ Better air circulation
  - ✓ Even temperatures throughout your home
  - ✓ Faster heating and cooling
  - ✓ Lower utility energy costs
  - ✓ Decreased possibility of high pressure over loads or frozen air conditioning coils
  - ✓ Reduces the possibility of compressor or blower motor burn out
- **Lifetime warranty** – on air cleaning components



* **Note:** These ASHRAE tests were performed under laboratory conditions and the results may not be obtained by your heating and air conditioning equipment. The best use for these test results is for the purposes of c arison with the results achieved by other air -

The Air Filter
that protects
you and your family.



Only with
Contractor's Choice
by Newtron, do
you have the added
assurance that the moment a
harmful level of
carbon monoxide enters
your furnace system,
it will be detected and
sound the alarm immediately.
Rest Assured.

NEWTRON
Products Company

P.O. Box 27175
Cincinnati, Ohio 45227
1-800-543-9149
Email: newtrons@aol.com
Web: www.newtronproducts.com

New...

Contractor's Choice
Air Filter

Now with
Carbon Monoxide Protection

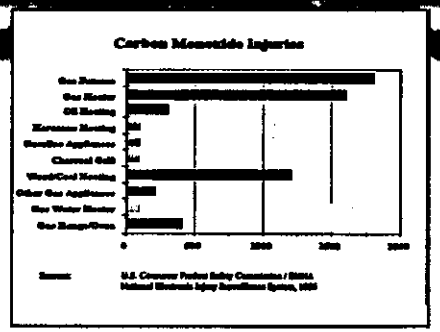
"Because your family's safety matters"

Enjoy these important features:

- **Effective air cleaning** – providing up to 84% dust arrestance*
- **Carbon Monoxide Detection** – Only Newtron Products Company has the patented, exclusive carbon monoxide detector built directly into the filter. It sends a warning at the first sign of carbon monoxide detection.
- **Anti-bacterial agent** – is manufactured directly *into* the filter screens. It helps resist the growth of bacteria, mold and mildew on their surfaces.
- **The industry's lowest air-flow-resistance** – .08" w.g. resulting in:
  - ✓ Better air circulation
  - ✓ More even temperatures throughout your home
  - ✓ Faster heating and cooling
  - ✓ Lower operating costs
  - ✓ Decreased possibility of high pressure overloads or frozen air conditioning coils
  - ✓ Diminished possibility of compressor or blower motor burn out

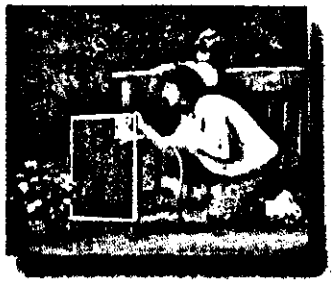
• **Note:** These ASHRAE tests were performed under laboratory conditions and the results may not be obtained by your heating and air conditioning equipment. The best use for these test results is for the purposes of comparison with the results achieved by other air filters.

We have been responsible for some of the cleanest air in circulation...



You can't smell it, see it, or taste it, and the early warning signs could seem like ordinary flu-like symptoms, but it can be deadly.

With the Contractor's Choice air filter you get the cleaner, safer air your family needs.



Easy Cleaning

The exclusive built-in cleaning signal will keep your filter performing like new.

Lifetime Warranty

On air cleaning components. It's the last air filter you will ever buy!

The Newtron Products Company Commitment To Excellence

To lead the industry with the newest technology and highest quality of air filtration for your home.

There's Something New on the Horizon...

in ELECTROSTATIC

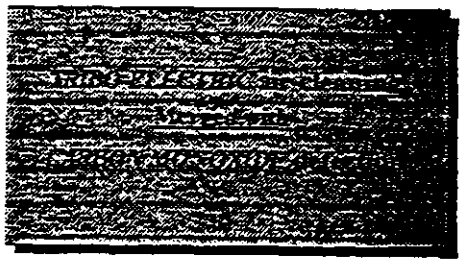
Air filtration

Newtron Products Company

Innovations in Air Filtration

Air cleaners that detect "CO"

Everything Else Is History!



Tri·bo·e·lec·tric·i·ty

·tri·bo·e·lec·tric·i·ty

·An electrical charge produced by friction between two objects.

tri'bo·e·lec'tric adjective

·Greek tribos, a rubbing, from tribein, to rub + electricity.]

The American Heritage® Dictionary

The Next Dimension In Air Cleaning

- Not found in... *Retail outlets!*
- WHOLE-HOUSE "CO detection"
- WHOLE-HOUSE "air cleaning"
- The "cutting edge" in CO monitoring
- The *ultimate* in tribo-electric filtration
- Electronic cleaning reminder
- A *dream* product for HVAC contractors

Carbon Monoxide

"The Silent Killer"

- HVAC contractors can help save lives
- "CO" deaths are one of the most preventable
- Carbon monoxide poisoning is the leading cause of death by poisoning in the U.S.A.
- The U.S. Consumer Product Safety Commission recommends that every home have at least one CO detector
- Newtron's central "Pro Active" monitoring increases detection probabilities!

Bio-mimetic

mi·met·ic (mī-mĕt'ĭk, mĭ-) adjective

1. Relating to, characteristic of, or exhibiting mimicry.
2. a. Relating to an imitation.
   b. Using imitative means of representation.

The American Heritage® Dictionary

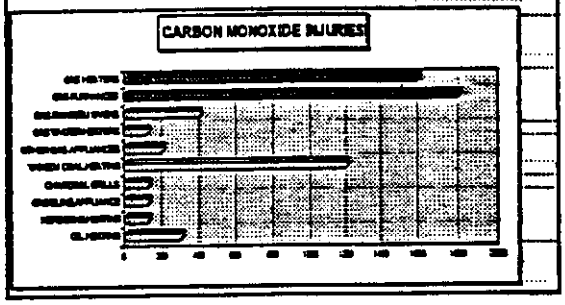
BIO-MIMETIC SENSORY TECHNOLOGY

- The only CO sensor that reacts to CO similar to the way hemoglobin in the human blood reacts. (a mimetic action)
- The Bio-Mimetic sensor is designed with a specific threshold or "sensing window". If the CO concentration is below that level it will not alarm.
- Possibilities of false alarms are minimal.

Infant Market

- $ The CO market penetration is only 10% of homes in the United States
- $ Smoke detector are 85%
- $ Current CO sales are 6 to 8 million units per year
- $ Projected annual sales to reach 15 million- plus units

Carbon Monoxide Injuries



The Evolution of "CO" Protection

- The Yellow Canary... area detector
- The pad that changed colors... area detector
- The plug in wall... area detector
- The digital plug in wall... area detector
- The battery operated... area detector
- NEWTRON'S... Whole House detector
  - "This changes everything!"

HVAC'S Role

- Carbon Monoxide is a deadly poison.
- HVAC Contractors can be proactive by using CO checks as good will marketing.
- HVAC Contractors have more contact with CO producing equipment than anyone else.
- HVAC personnel are in the best position to discover and correct CO problems.
- HVAC personnel can help save lives.

One School of Thought

- Place the CO detector in the hallway outside the bedrooms.
- Problem: Family members and pets not in the bedroom area are exposed to lethal amounts of the spreading CO. This sleeping quarters strategy does not provide adequate detection for the rest of the home during the day or night.

The second "School of thought"

- Placing monitors in proximity to combustion appliances, since that is where the CO will likely originate.
- Problem:The potential sources are located in totally different areas of the home. Garage auto exhaust, family room & living room fireplaces, kitchen gas range & oven, basement or attic furnace, utility room water heater etc...

"Pro Active" Monitoring School of thought

- Monitor for CO where the family sleeps.
- Monitor all CO producing appliances.
- Monitor return air ducts for dangerous CO levels.
- Monitor the whole house for CO.
- Monitor every fifteen minutes.
- Monitor at the heart of the ventilation system.
- Actively and "Pro Actively" monitor the area of the worst offender... the furnace.

Is "CO" lighter than air?

- Yes, by 3%. And due to that fact, carbon monoxide mixes readily with the air being re-circulated in your home by the heating and air conditioning system. Even slight increases in the air temperature will equalizes their specific gravity's.

Area Detector ...*Problem!*

- When the furnace fan is operating, carbon monoxide from most sources will be picked up by the return air duct system and delivered to all rooms, via the supply air ducts. If doors are closed,especially bedroom doors, CO detectors located in the hallways (as recommended by the manufacturers), may be impaired in timely detecting the presents of CO.

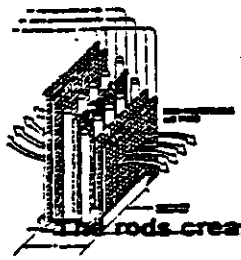
The pros of *"Pro Active"* Whole House "CO" Monitoring

- Provides a greater degree of safety day and night. With the fan in the "on position" the total volume of air in an average home will be electrostatically cleaned and analyzed for dangerous levels of carbon monoxide every fifteen minutes.
- It can monitor at a rate up to 600 FPM.

Compare Newtron's *Air Cleaning Performance ...96.3%*

- Removes up to *96.3%* of ASHRAE dust composed of particulate from 0 to 80 microns
- A *91.7%* peak air cleaning performance was achieved by capturing a composition of particles ranging in size from 0 to 5 microns
- A *95%* peak air cleaning performance was achieved by capturing a composition of ASHRAE dust and actual ragweed pollen.

Design Patent ...# 4115082



Patented Rod Assembly

The rods create an intensified magnetic field

Electronic Cleaning Reminder promotes maximum air flow

- Reminds the homeowner every 45 days
- Clean Filters Promote:
- Better air circulation
- Even temperatures throughout the home
- Faster heating and cooling
- Lower operating cost
- Decreased possibilities of frozen a/c coils
- Diminished possibilities of compressor failure

ViBax ™ Anti Bacterial

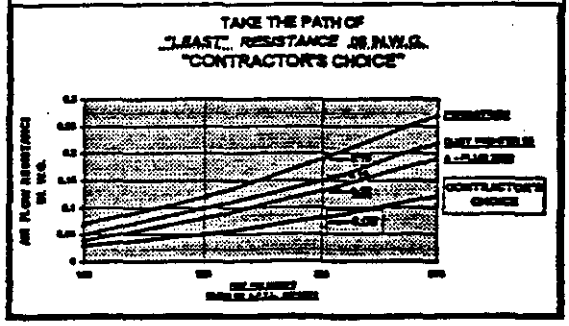
- Helps control bacteria on the filter screens
- Inhibits the growth of odor causing germs
- Resist the growth of mold and mildew
- Uniformly distributed within the structure of the polypropylene strands
- Does not wash off
- Viable for ten years or more

Contractor's Choice *air filter*

.08 in W.g.

•Big Sales Point!

Contractor's Choice *air filter* The path of least resistance



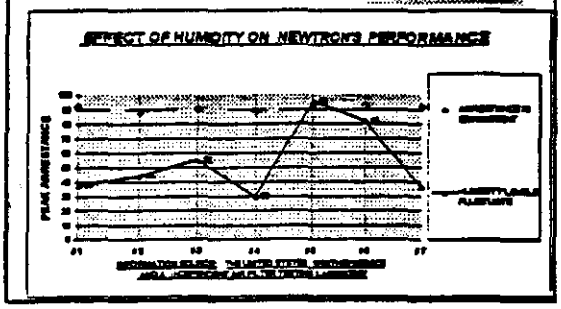
Contractor's Choice

air cleaning performance

- Excellent air filtration combined with the industry's lowest air flow resistance.
- Initial resistance — Peak arrestance
- **.08 in.w.g. — 84%**
- Compare our combined airflow resistance and arrestance test results with the results achieved by any other air filters.

Humidity Proof

...relative humidity has no effect



The Disciplines...

- CO detector built under ISO 9000 QC
- Air cleaner built under ISO 9000 certified facility
- UL Listed 2034 includes latest revised requirements
- UL Listed 2015 includes special induct requirements
- Tested under ASHRAE Protocol
- Protected under Patent #5451542
- Made in USA

"New Prices".... NEWTRONS

- NEWTRON "CO"
- Less than 400 SQ. IN (standard)...$ 100.00
- 400 SQ. IN. or more (standard).....$ 105.00
- NEWTRON CLASSICS
- Less than 400 SQ. IN. (standards)...$ 70.00
- 400 SQ. IN. or more (standard).....$ 75.00
- Custom charge on NEWTRONS...$ 15.00

"New Prices"....

Contractor's Choice

- Contractor's Choice "CO"
- Less than 400 SQ. IN.(standard)....$ 70.00
- 400 SQ. IN. or more(standard).....$ 75.00
- Contractor's Choice
- Less than 400 SQ. IN. (standard)....$ 27.50
- $400 SQ. IN. or more (standard)....$ 29.50
- Custom Charge .....$ 10.00

* Indicates "standard sizes" that were moved to a different sq. in. price category

Less than 400 sq.in.	400 sq.in.or more
1212	1430*
1224	1625* 1628*
1228	1824*
1414	2020*2025 2028 2030
1420	2424
1424	2328
1425	2630
1620	2830

Policy Changes

- "NEW" Freight Policies
- Free freight on orders of $1500.00 or more.
- Freight will be charged on all other orders.
- Freight will be charged on custom units
- All freight charges are F.O.B. Memphis,TN.

Suggested retail price

- Contractor's Choice "CO"...$ 185.00
- Newtron "CO".....$ 260.00

Join *Pro Active* "CO" monitoring... *or be left behind*

$ Once again, there is money in air cleaners!

Newtron® Products Company

Innovators in Air Filtration

Compare Newtron's *Air Cleaning Performance...96.3%*

- Removes up to **96.3%** of ASHRAE dust composed of particulate from 0 to 80 microns
- A **91.7%** peak air cleaning performance was achieved by capturing a composition of particles ranging in size form 0 to 5 microns
- A **95%** peak air cleaning performance was achieved by capturing a composition of ASHRAE dust and actual ragweed pollen

1. It is the only electrostatic air cleaner that contains an aerodynamically designed pro-active CO detector providing for the first time: whole house protection, a 45-day cleaning alert, and low battery chirp.

2.

	Particle Size Range	0.5 in w.g. Peak		1.0 in w.g. Peak*
AFTL Report #6625	0-80 microns	91.9 %	up to	96.3%
AFTL Report #6862	0-5 microns	90%	up to	91.9%
AFTL Report #6972	Pollen-Ragweed	93%	up to	95%

3. It is the only electrostatic air cleaner that offers ASHRAE Reports demonstrating its ability to trap particles predominately ranging in size from 0-5 microns.

4. It is the only electrostatic air cleaner that provides an ASHRAE Report (AFTL #6714) demonstrating it washes clean and does not clog up. This same test also demonstrates that both the air resistance and efficiencies remain relatively constant.

5. It is the only electrostatic air cleaner to demonstrate its ability to remove actual ragweed pollen.

6. **Lifetime Warranty:**

Quality construction, materials, and performance are enjoyed and appreciated year after year

*These tests were performed under laboratory conditions and the results may not be obtained by your heating and air conditioning equipment. The best use for these test results is for the purposes of comparison with the results achieved by other air filters.

AFTL is the Air Filter Testing Laboratories, Inc., located in Crestwood, Kentucky

3874 Virginia Avenue
P.O. Box 27175
Cincinnati, Ohio 45227

T 513 561 7373
F 513 561 3673
1 800 543 9149

AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52-76
STATICALLY TESTED DEVICES

REPORT NO. 6625
TEST NO. 1A
SHEET NO. 1

DEVICE TESTED

TEST REQUESTED BY NEWTRON PRODUCTS COMPANY
MANUFACTURER NEWTRON PRODUCTS COMPANY
PRODUCT NAME ELECTROSTATIC PANEL
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. 1-2424 DIMENSIONS 24 IN. H 24 IN. W 1 IN D

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.			DATED	
AIR FLOW CAPACITY		→	→	
INITIAL RESISTANCE		→	→	
FINAL RESISTANCE				
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE				
ASHRAE DUST HOLDING CAPACITY				

TEST RESULTS

TEST AIR FLOW RATE	1200 CFM	300	→	→	FPM
INITIAL RESISTANCE		0.15	→	→	IN. W.G.
FINAL RESISTANCE				0.50	IN. W.G.
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				12.2	%
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				13	%
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE		PEAK	91.9	89	%
ASHRAE DUST HOLDING CAPACITY				80	Gm.

TEST SECTION DUCT SIZE 24 IN. x 24 IN. DUST FEEDING RATE 2.0 Gm / 1000 CF

SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. x 24 IN. Nom
DEPTH 1 IN. Nom.
MEDIA AREA 3.36 FT.²
TYPE MEDIA WOVEN SYNTHETIC & FOAM
TYPE & AMOUNT ADHESIVE NONE

STATE OF KENTUCKY
DAVID J. MURPHY JR.
6035
REGISTERED PROFESSIONAL ENGINEER

DATE 2-14-1992
TEST SUPERVISOR J.P.S.
ENGINEERING APPROVAL David J. Murphy Jr.

NDARD ASHRAE TEST USING 0 - 80 MICRONS DUST

AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52-76
STATICALLY TESTED DEVICES

REPORT NO. 6625
TEST NO. 1
SHEET NO. 1

DEVICE TESTED

TEST REQUESTED BY NEWTRON PRODUCTS COMPANY
MANUFACTURER NEWTRON PRODUCTS COMPANY
PRODUCT NAME ELECTROSTATIC PANEL
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. 1-2424 DIMENSIONS 24 IN. H 24 IN. W 1 IN D

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.			DATED	
AIR FLOW CAPACITY			→	
INITIAL RESISTANCE			→	
FINAL RESISTANCE				
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE				
ASHRAE DUST HOLDING CAPACITY				

TEST RESULTS

TEST AIR FLOW RATE 1200 CFM	300		→	FPM
INITIAL RESISTANCE	0.15		→	IN. W.G.
FINAL RESISTANCE			1.00	IN. W.G.
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY			12.2	%
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY			12	%
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE	PEAK	96.3	91	%
ASHRAE DUST HOLDING CAPACITY			140	Gm.

TEST SECTION DUCT SIZE 24 IN. x 24 IN. DUST FEEDING RATE 2.0 Gm / 1000 CF

SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. x 24 IN. NOM
DEPTH 1 IN. NOM.
MEDIA AREA 3.36 FT.²
TYPE MEDIA WOVEN SYNTHETIC & FOAM
TYPE & AMOUNT ADHESIVE NONE

STATE OF KENTUCKY
DAVID J. MURPHY JR.
6035
REGISTERED
PROFESSIONAL ENGINEER

DATE 2-14-1992 TEST SUPERVISOR J.P.S. ENGINEERING APPROVAL David J. Murphy Jr.

STAN D ASHRAE TEST USING 0 - 80 MICRONS TEST T

AIR FILTER TESTING LABORATORIES, INC.

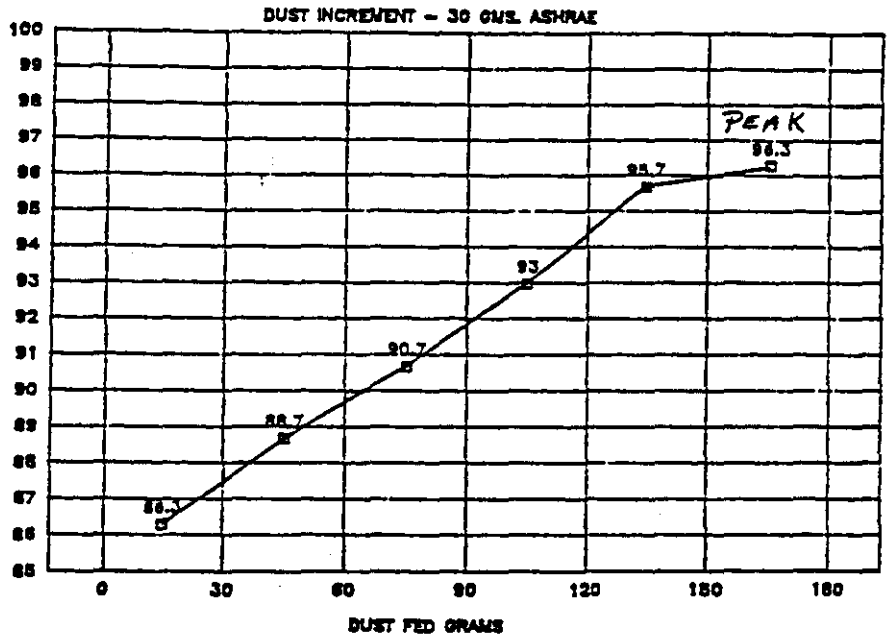
4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE STANDARD 52-76
AIR FILTER PERFORMANCE CURVES

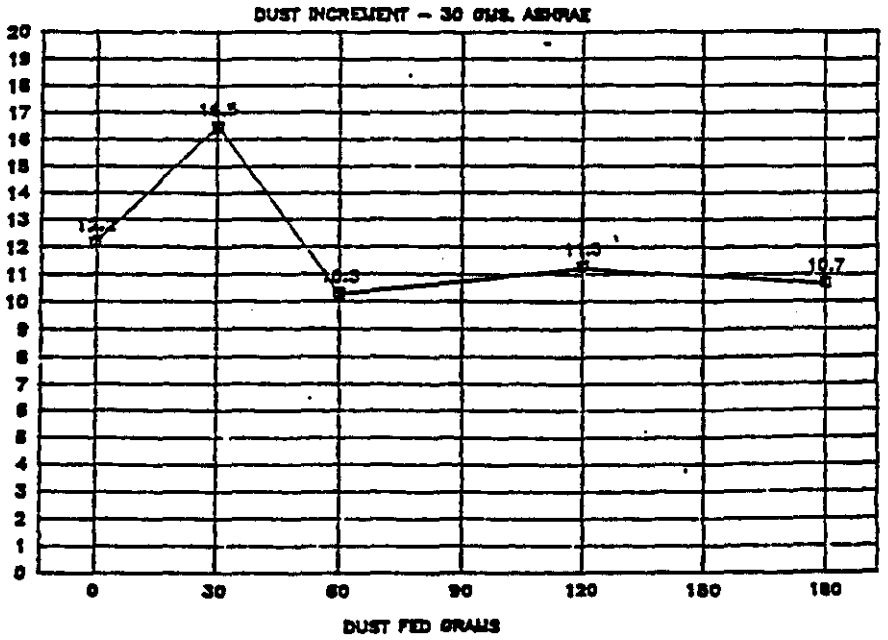
STATICALLY TESTED DEVICES

REPORT NO. 6625
TEST NO. 1
SHEET NO. 3

DUST FED VS. ARRESTANCE



DUST FED VS. ATMOS. DUST SPOT EFF.



DATE
2-14-1992

TEST SUPERVISOR
J.P.S.

ENGINEERING APPROVAL
David J. Murphy Jr.

STATE OF KENTUCKY
DAVID J. MURPHY JR.
6035
REGISTERED PROFESSIONAL ENGINEER

AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52-76
PERMANENT CLEANABLE TYPE OF DEVICES

DEVICE TESTED

TEST REQUESTED BY NEWTRON PRODUCTS CO.
MANUFACTURER NEWTRON PRODUCTS CO.
PRODUCT NAME ELECTROSTATIC AIR CLEANER
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. NEWTRON/CO DIMENSIONS 24 IN. H 24 IN. W 1 IN. D

REPORT NO. 6714
TEST NO. (1-7)A
SHEET NO. 1

TEST RESULTS

* DEVICE IS CLEANED IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS PRIOR TO EACH SUCCEEDING TEST.

TEST NUMBER	1	2	3	4	5	6	7	
TEST AIR FLOW RATE	1200	1200	1200	1200	1200	1200	1200	CFM
INITIAL RESISTANCE	0.16	0.16	0.16	0.16	0.17	0.16	0.17	IN.W.G.
FINAL RESISTANCE	0.50	0.50	0.50	0.50	0.50	0.50	0.50	IN.W.G.
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY	<20	<20	<20	<20	<20	<20	<20	%
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY	<20	<20	<20	<20	<20	<20	<20	%
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE	87	85	88	85	88	88	88	%
AVERAGE DUST HOLDING CAPACITY	85	90	95	85	70	85	80	Gm.

TEST SECTION DUCT SIZE 24 IN. × 24 IN. DUST FEEDING RATE 2.0 Gm/1000 CF

SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. × 24 IN. NOM.
DEPTH 1 IN. NOM.
MEDIA AREA 3.36 FT²
TYPE MEDIA WOVEN SYNTHETIC & FOAM
TYPE & AMOUNT ACHESIVE NONE

* SAME FILTER TESTED IN AFTL, INC. REPORT NO. 6625

STATE OF KENTUCKY
DAVID J. MURPHY JR.
6035
REGISTERED PROFESSIONAL ENGINEER

DATE 7-14-1992
TEST SUPERVISOR J.P.S.
ENGINEERING APPROVAL David J. Murphy Jr.

STANDARD ASHRAE TEST USING 0 - MICRON TEST DUST

AIR FILTER TESTING LABORATORIES, INC.

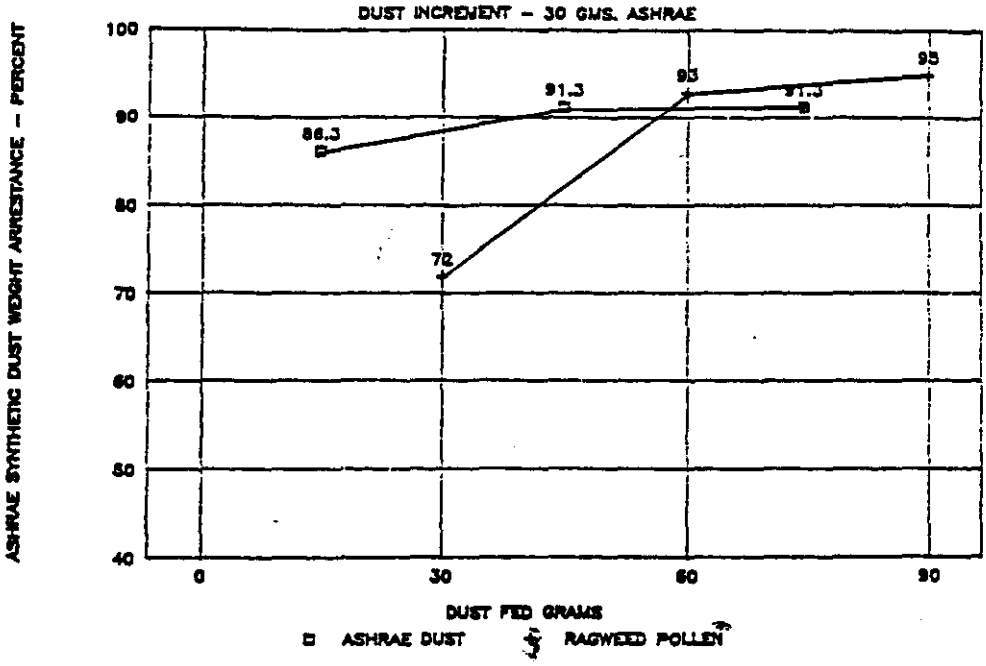
4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE STANDARD 52.1-1992
AIR FILTER PERFORMANCE CURVES

STATICALLY TESTED DEVICES

REPORT NO. 6972
TEST NO. 1
SHEET NO. 3

DUST FED VS. ARRESTANCE



DATE
12-21-1992
TEST SUPERVISOR
J.P.S.
ENGINEERING APPROVAL
David J. Murphy Jr.

STATE OF KENTUCKY
DAVID J. MURPHY JR.
6035
REGISTERED PROFESSIONAL ENGINEER

NEW 1'S ABILITY TO REMOVE RAGWEED POLLEN.

AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52.1-1992
STATICALLY TESTED DEVICES

REPORT NO. 6972
TEST NO. 1
SHEET NO. 1

DEVICE TESTED

TEST REQUESTED BY NEWTRON PRODUCTS CO.
MANUFACTURER NEWTRON PRODUCTS CO.
PRODUCT NAME ELECTROSTATIC AIR CLEANER W/MICROBAN "B"
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. I-2424 DIMENSIONS 24 IN. H 24 IN. W 1 IN. D

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.			DATED	
AIR FLOW CAPACITY		→	→	
INITIAL RESISTANCE		→	→	
FINAL RESISTANCE				
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE				
ASHRAE DUST HOLDING CAPACITY				

TEST RESULTS

TEST AIR FLOW RATE 1200 CFM	300	→	→	FPM
INITIAL RESISTANCE	0.15	→	→	IN. W.G.
FINAL RESISTANCE			0.50	IN. W.G.
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY			<20	%
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY			<20	%
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE			90	%
ASHRAE DUST HOLDING CAPACITY			80	Gm.

TEST SECTION DUCT SIZE 24 IN. x 24 IN. DUST FEEDING RATE 2.0 Gm/1000CF

SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. x 24 IN. NOM.
DEPTH 1 IN. NOM.
MEDIA AREA 3.36 FT²
TYPE MEDIA WOVEN SYNTHETIC W/MICROBAN "B" & FOAM
TYPE & AMOUNT ADHESIVE NONE

STATE OF KENTUCKY
DAVID J. MURPHY JR.
6035
REGISTERED PROFESSIONAL ENGINEER

DATE 12-21-1992 TEST SUPERVISOR J.B.S. ENGINEERING APPROVAL David J. Murphy P.E.

RAGW POLLEN TEST

AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52.1-1992
STATICALLY TESTED DEVICES

REPORT NO. 6862
TEST NO. 1A
SHEET NO. 1

DEVICE TESTED

TEST REQUESTED BY NEWTRON PRODUCTS CO.
MANUFACTURER NEWTRON PRODUCTS CO.
PRODUCT NAME ELECTROSTATIC AIR CLEANER
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURER
MODEL NO. NEWTRON/CO DIMENSIONS 24 IN. H 24 IN. W 1 IN. D

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.			DATED	
AIR FLOW CAPACITY		→	→	
INITIAL RESISTANCE		→	→	
FINAL RESISTANCE				
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE				
ASHRAE DUST HOLDING CAPACITY				

TEST RESULTS

	TEST AIR FLOW RATE 1200 CFM	300	→	→	FPM
	INITIAL RESISTANCE	0.17	→	→	IN. W.G.
	FINAL RESISTANCE			0.50	IN. W.G.
	INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY			<20	%
	AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY			<20	%
*	AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE			88	%
*	ASHRAE DUST HOLDING CAPACITY			80	GM

TEST SECTION DUCT SIZE 24 IN. X 24 IN. DUST FEEDING RATE 2.0 GM/1000 CF

SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. X 24 IN. NOM.
DEPTH 1 IN. NOM
MEDIA AREA 3.36 FT²
TYPE MEDIA WOVEN SYNTHETIC & FOAM
TYPE & AMOUNT ADHESIVE NONE

* SPECIAL TEST DUST —
BY WEIGHT
72% SILICA FRACTION 0-5 μm
23% POWDERED CARBON
5% COTTON LINTERS

STATE OF KENTUCKY
DAVID J. MURPHY JR.
6035
REGISTERED
PROFESSIONAL ENGINEER

DATE 10-14-1992 TEST SUPERVISOR J.P.S. ENGINEERING APPROVAL David J. Murphy Jr.

NEWTRON'S ABILITY TO REMOVE SMALL PARTICULATE 11 to 5 MICRONS

MICROBAN EFFECTIVENESS TEST

Air Filter Testing Laboratories, Inc.

4632 Old LaGrange Road • Crestwood, Kentucky 40014 • Phone (502) 222-5720

REPORT # NEW107

I) DEVICE TESTED:

TEST REQUESTED BY: NEWTRON PRODUCTS
MANUFACTURER: NEWTRON PRODUCTS
PRODUCT NAME: NEWTRON 24"x24"x1" W/MICROBAN (FRONT AND REAR SCREENS)

II) TEST CONDITIONS:

TEMPERATURE- 25°C
RELATIVE HUMIDITY- 73%
AIR FLOW RATE- 1,200 CFM
BACTERIA- *ESCHERICHIA COLI*
(1.1-1.5 micron X 2.0-6.0 micron RODS)
DUST LOADED- 180g/RESISTANCE = 0.51" W.G.

III) TEST RESULTS:

PLATE #	CFU UPSTREAM	CFU DOWNSTREAM	% EFFICIENCY
I	266	97	63.53
II	233	56	75.97
III	211	109	48.34
IV	239	88	63.18
V	201	82	59.20 *
VI	209	105	49.76
VII	217	84	61.29
VIII	246	105	57.32
IX	242	102	57.85

*MEDIAN VALUE

AVERAGE BACTERIAL REMOVAL EFFICIENCY (%) = 59.60

SURFACE COUNT AFTER CHALLANGE:
(0 HRS.)- 9 CELLS (E. COLI)/25cm2
(12 HRS.)- 6 CELLS (E. COLI)/25cm2
(24 HRS.)- 6 CELLS (E. COLI)/25cm2

STATE OF KENTUCKY
DAVID J. MURPHY JR.
6035
REGISTERED PROFESSIONAL ENGINEER

DATE: 08/16/1993

TEST SUPERVISOR: MICHAEL A. MURPHY

ENGINEERING APPROVAL: David J. Murphy Jr.

Microban Products Company
Quality Control Laboratory

Report ID: 92-00-25 Page 1 of 2

Client: NEWTRON

Account Rep:

Manufacturer:

Fabricator:

Polymer:

Product: FILTER

Requestor: ROBERT WATTERSON

To Lab:02-24-92 From Lab:02-27-92

Photographs: YES

Contact:

Contact:

Microban Additive: B

End Use: PRODUCTION

TEST METHOD: *Antimicrobial Zone of Inhibition Test; Kirby-Bauer Method **
Manual of Clinical Microbiology, pp 981-984,
Lennett, Balows, Albert, et al, 1985.

Organisms:		STAPH. AUREUS		E. COLI	
Sample #	Microban(%)	Zone Radii (mm)	Contact Growth %	Zone Radii (mm)	Contact Growth %
1. 3762		6.5	0	2.5	0
2.					
3.					
4.					
Positive Control		7.2	0	3	0
Negative Control					

Comments: #3762 - PDH62658 AMBER 20:1 .5% MICROBAN

* Modified: Use 19 - 20 mm diameter or 25 mm square sample.
Use 0.5 McFarland Nepholometer for concentration of organisms,
150 000 000 organisms per millilitre.

*T Trace (< 0.5 mm)

Gerald F. Taylor, M.T. (ASCP), SM
Microbiologist

Microban Products Company
Quality Control Laboratory

Report ID: 92-00-25 Page 2 of 2

Requestor: ROBERT WATTERSON

Client: NEWTRON

To Lab:02-24-92 From Lab:02-27-92

Account Rep:

Photographs: YES

Manufacturer:

Contact:

Fabricator:

Contact:

Polymer:

Microban Additive: B

Product: FILTER

End Use: PRODUCTION

TEST METHOD: *Antimicrobial Zone of Inhibition Test; Kirby-Bauer Method* *
Manual of Clinical Microbiology, pp 981-984,
Lennett, Balows, Albert, et al, 1985.

Organisms:		LEGIONELLA PNEUMO.			
Sample #	Microban(%)	Zone Radii (mm)	Contact Growth %	Zone Radii (mm)	Contact Growth %
1. 3762		4	0		
2.					
3.					
4.					
Positive Control					
Negative Control					

Comments: #3762 - PDH62658 AMBER 20:1 .5% MICROBAN

* Modified: Use 15 - 20 mm diameter or 25 mm square sample.
Use 0.5 McFarland Nephelometer for concentration of organisms,
150 000 000 organisms per millilitre.

*T Trace (< 0.5 mm)

Gerald F. Taylor, M.T. (ASCP), SM
Microbiologist

AIR FILTER TESTING LABORATORIES, INC.

4632 Old LaGrange Road • Crestwood, Kentucky 40014

ASHRAE AIR FILTER TEST STANDARD 52-76
STATICALLY TESTED DEVICES

REPORT NO. 60668
TEST NO. 1A
SHEET NO. 1

TEST REQUESTED BY NEWTRON PRODUCTS
MANUFACTURER NEWTRON PRODUCTS
PRODUCT NAME CONTRACTOR'S CHOICE
HOW LABORATORY PROCURED TEST SAMPLE FURNISHED BY MANUFACTURE
MODEL NO. CONT CHOICE/CO DIMENSIONS 24 IN H 24 IN W 1 IN D

DEVICE TESTED

RATED PERFORMANCE DATA FROM MANUFACTURERS CATALOG NO.			DATED	
AIR FLOW CAPACITY			→	
INITIAL RESISTANCE			→	
FINAL RESISTANCE				
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY				
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE				
ASHRAE DUST HOLDING CAPACITY				

TEST RESULT

TEST AIR FLOW RATE 1200 CFM	300	→	→	FPM
INITIAL RESISTANCE	0.08	→	→	IN.W.G.
FINAL RESISTANCE			0.50	IN.W.G.
INITIAL ATMOSPHERIC DUST SPOT EFFICIENCY			>20	%
AVERAGE ATMOSPHERIC DUST SPOT EFFICIENCY			>20	%
AVERAGE SYNTHETIC DUST WEIGHT ARRESTANCE			78	%
ASHRAE DUST HOLDING CAPACITY			100	GM

TEST SECTION DUCT SIZE 24 IN. X 24 IN. DUST FEEDING RATE 20 GM/1000 CF

SEE BACK SIDE (PAGE 1A) FOR PERFORMANCE CURVES

PHYSICAL DESCRIPTION

FACE DIMENSIONS 24 IN. X 24 IN. NOM
DEPTH 1 IN. NOM.
MEDIA AREA 3.36 FT²
TYPE MEDIA WOVEN SYNTHETIC & FOAM
TYPE & AMOUNT ACHESIVE NONE

STATE OF KENTUCKY
DAVID J. MURPHY, JR. 6035
REGISTERED PROFESSIONAL ENGINEER

DATE 3-29-1991
TEST SUPERVISOR J.P.S
ENGINEERING APPROVAL David J. Murphy Jr

CO Detectors
How Selective Are They?

William B. Helfman, M.D., Ph.D., Quantum Group Inc.
Lara A. Gundel, Ph.D, Lawrence Berkeley National Laboratory
Michael G. Apte, Ph.D., Lawrence Berkeley National Laboratory

Part One - Early Carbon Monoxide Detection Technology

Why Carbon Monoxide Detectors?

It is a proven fact that exposure to unacceptable levels of carbon monoxide (CO) for an extended period results in illness, and could lead to death. In the United States alone, it is estimated that 10,000[1] people seek medical attention and at least 5,000[2] die from CO poisoning annually.

CO is a highly toxic product of combustion. It is a tasteless, odorless and colorless gas that can leak from heaters that burn fossil fuels. It accidentally took the life of former tennis star Vitas Gerulaitis on September 19, 1994. According to New York's Southampton Police Investigators, Gerulaitis was apparently overcome by exhaust fumes from a faulty propane heater that seeped into the heating and air conditioning systems afflicting the entire residence with lethal levels of CO. He was found lying in bed, fully clothed. It was apparent in the investigation that Gerulaitis was resting, and was unknowingly overcome by these tasteless, odorless CO fumes. Immediately following this senseless death, public awareness of CO detectors rose.

The Rise of CO Detectors Was it Premature?

Increased sales of CO detectors were reported by nationwide manufacturers, suppliers and stock analysts. Satisfying consumer demand became the immediate challenge.

Chicago enacted the nation's first law mandating CO detectors in all single and multiple family housing, and in Class "C" assembly buildings, such as schools, churches, theaters, museums, etc. The law affected residents/ buildings that heated with "fossil fuels", defined in City Ordinance Chapter 13-64-290 "as coal, natural gas, kerosene, oil, propane and wood".

While Chicago's law became effective on October 1, 1994, it was first drafted in 1991 shortly after CO from a faulty heating system killed an entire ten (10) member family. Why did it take three (3) years to enact such a law? Was the ordinance "bogged-down" by bureaucracy? Did Chicago finally react to the public's horror over the death of Vitas Gerulaitis? Was Chicago's reaction premature - or without adequate knowledge of CO detectors?

The False "Sense of Danger"

CO detectors, whether past or present technology, are good life-safety devices. As such, they are designed to alarm in the presence of predetermined levels of CO. Were the devices that flooded the market in the early to mid 90's too good ... too sensitive? Did they react too quickly to minute concentrations of CO? Were the detectors "tricked" by outside stimuli that produced nuisance alarms?

Figure One summarizes some of the major nationwide incidents that led to the early controversy surrounding CO detectors and the question as to whether these life safety devices actually pose a false "sense of danger". These incidents, and several others, generated more stringent regulation, redesign of existing CO detectors, and improved CO sensor technology.

Figure One
Major Nuisance Alarms

Incident	Number of CO Alarms	Major Cause of Alarms
Chicago 12/22/94	1852	Chicago Tribune, 12/23/94: "A weather system known as an inversion appears to have contributed to the 1852 CO alarms in a 24-hour period..."
S. California 11/1/95-12/6/95	3300	Los Angeles Times, 12/8/95: "Fog sets off gas detectors causing scares. Moisture traps CO close to the ground, triggering false alarms and generating more than 3300 calls to authorities. Newer devices avoid these problems."

1. *Medical Essay, Mayo Clinic Health Letter, 2/84*
2. *Journal of American Medical Association (JAMA). 8/7/91. Vol. 266, Issue 5, pages 659-663.*

At the time of the Chicago incident described in Figure One, the majority of the CO detectors in the field already met the existing UL 2034 (Standard for Single and Multiple Station Carbon Monoxide [CO] Detectors). However, in February 1995, Underwriters Laboratories Inc. (UL), the leading product safety testing and standards setting organization, announced revisions to the existing UL 2034 standard. These changes were brought about as a result of an Industry Advisory Group meeting sponsored by UL on December 13, 1994.

In summary, all CO detectors bearing the UL mark would now be required to meet additional and/or revised criteria such as:

1. Product markings and instruction booklets to advise residents how to respond to an alarm condition.

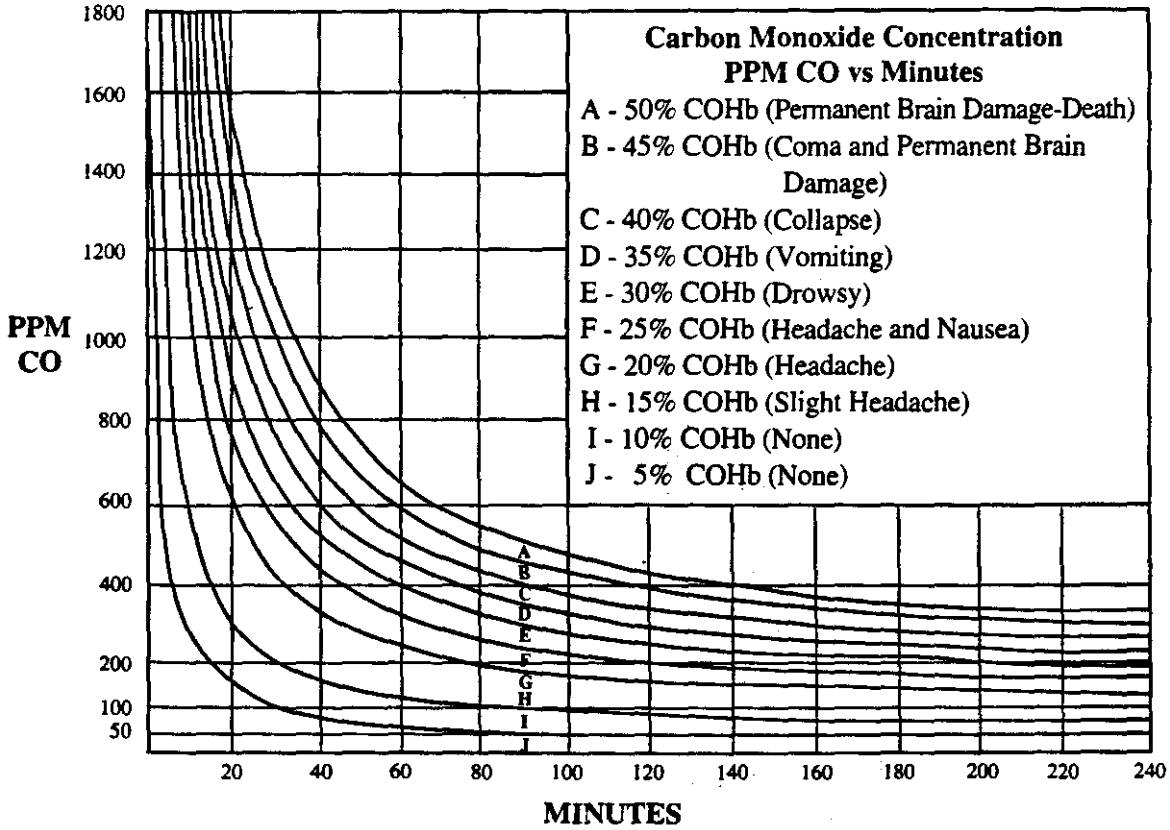
2. The addition of a "reset button" capable of generating both a *warning* and an *alarm*. An initial *warning* that could be manually silenced allowing residents to ventilate and investigate the suspect area, and a *subsequent alarm* should elevated levels of CO (100 parts per million [ppm] or higher) exist after the first 5 minutes and 59 seconds.

3. A stability test, requiring CO detectors to ignore low concentrations (15 ppm) of CO for at least 30 days. (Previously, detectors were only required to ignore 15 ppm for 8 hours.) As a benchmark, it is helpful to note a reproduction of UL's graph (Fig. 38.1 from UL 2034 2nd Edition, Oct. 29, 1996), as illustrated in Figure Two.

4. A "rush hour" test, requiring that detectors do not respond to a 35 ppm CO concentration for a one hour duration, twice a day for thirty (30) days.

5. Alarm threshold markings by which manufacturers are required to indicate their products' alarm thresholds.

Figure Two *Carbon monoxide concentration (ppm CO) versus time (minutes). COHb in the figure below symbolizes carboxyhemoglobin which is the stable combination of CO and hemoglobin formed in the blood when CO is inhaled.*



Part Two - Today's Technology

A New Beginning

The incidents ... the mandatory requirements ... the skepticism ... and the increased standards all equate to a new beginning or "evolution" for the CO detection industry. From the ashes rose a proliferation of manufacturers, with a variety of improved, sophisticated CO life safety devices. How do these products perform today? The "key" is their sensor technology.

CO Sensor Technology

The manufacturers listed in Figure Three all utilize one of the following CO sensor technologies.

1. Biomimetic (BIO) Sensing Technology
Biomimetic (BIO) sensors react to CO similar to the way hemoglobin in human blood reacts. The sensing elements undergo light transmission changes when exposed to CO. Put simply, the darker the sensor, the greater the CO exposure. The BIO sensor is designed with a specific threshold or " sensing window". If the CO concentration in the area is below this preset threshold, then it will not respond. The rate at which the CO concentration changes, and the intensity of the change, is constantly monitored by a highly intelligent circuit.

2. Electrochemical Cells (EC) Technology
Electrochemical (EC) sensors operate similar to a fuel cell, but in reverse. Three (3) platinum wire electrodes are placed in contact with an electrolyte to form an electrochemical sensor. The cell membrane allows gas to enter, and prevents the liquid electrolyte from leaking. The gas diffuses and reacts with the working electrode, changing its potential. This generates a voltage change in the monitoring circuit, proportional to the concentration of CO.

3. Metal Oxide Semiconductor (MOS)
Metal oxide semiconductor (MOS) sensors consist of tin oxide. This is heated to cause oxidation of carbon monoxide to carbon dioxide. This chemical reaction donates electrons to the surface. Next, the surface of the tin oxide changes its resistance to electric current. The corresponding decrease in resistance in the monitoring circuit is set proportional to the carbon monoxide concentration in the air.

***Figure Three** Manufacturer's Technologies*

BIO	EC	MOS
Quantum Group	AIM	First Alert (PICO)
First Alert (NICO)	Coleman	American Sensor
		Nighthawk

An Introduction to LBNL's Testing

Interferent resistance and CO selectivity tests were recently performed at Lawrence Berkeley National Laboratory (LBNL) under the sponsorship of Quantum Group, Inc. This research was conducted in an effort to independently investigate differences among the sensor technologies and to thoroughly explore the effects that a variety of common household vapors have on CO detectors. The information that follows summarizes the results of LBNL's testing. It is our sincere hope that this study will help the public to understand the importance of "selectivity" as a parameter for judging the reliability of CO detectors. We also anticipate that such studies will send a signal to the manufacturers of CO detectors that will lead to the development of more highly selective, therefore more highly reliable, residential CO detectors.