

Minnesota Attorney General: Administrative Rules Proceedings

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Version 3
August 20, 2018

Our File No. 816

RULE REVIEW CHECKLIST

DATE RULE RECEIVED 5-20-82
DATE FOR REVIEW 5-31-82
DATE DUE 6-9-82

Adopted w/a hearing ✓
Adopted w/o hearing
Temporary rule

Approved 6-9-82 Disapproved Returned to Agency 6-11-82

Resubmitted Due
Approved Disapproved Returned to Agency

Date filed w/Secretary of State 6-10-82 Revisor approved / disapproved

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✓ Rule as Adopted

✓ Rule as Proposed

✓ Order Adopting 5.6.82 Date see my comment

✓ Notice of Intent to Solicit Outside Opinion SR. 6.8.81

✓ Order for rulemaking
11.23.81 date of Hearing

N/A Certificate of Board's Authorizing Resolution

✓ Notice of rulemaking
✓ Sufficiency

✓ Affidavit of Mailing Notice or rulemaking
10.20 - 10.22 81 At least 30 days prior to hearing/~~adoption~~

✓ Mailing list Certificate

✓ Publication in State Register
10.19.81 At least 30/~~20~~ days prior to hearing/~~adoption~~

✓ Hearing Examiner's Report

✓ Chief Hearing Examiner's Report(s)
3.2.82 ~~Approving H.E.'s Report~~ Disapproving in part, approving in part
5.17.82 Approving agency action

✓ Agency's Findings of Fact

N/A LCRAR Report or agency Affidavit

N/A Certificate of Board's Resolution Adopting Rules

✓ Order Approving Incorporation by Reference

✓ Statement of Need and Reasonableness

N/A Petition for Adoption of a Rule

✓ Record (includes transcript or tape, exhibits, comments received by agency, requests for a hearing, and other relevant materials)

✓ Certificate of Compliance w/Rulemaking Procedures

✓ Affidavit of Mailing Notice of Submission to Attorney General

✓ Notice of Submission to the Attorney General

✓ Comments to this office

ADMIN 1000 (Rev. 1/78)

STATE OF MINNESOTA

DEPARTMENT ATTORNEY GENERAL - Health

Office Memorandum

TO : Judith Wehrwein
Attorney General-Administration
204 Administration Building

DATE: May 20, 1982

FROM : Paul G. Zerby
Special Assistant
Attorney General

PHONE: 341-7272

SUBJECT: In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units (7 MCAR §1.448)

Enclosed are the following documents submitted for your review pursuant to 1 MCAR § 1.202:

1. Rule as Adopted showing changes from State Register version (four copies);
2. Order Adopting (two copies);
3. Notice of Intent to Solicit Opinion (no written materials received) (one copy)
4. Order for Hearing (one copy);
5. Notice of Hearing as mailed (one copy);
6. Affidavit of Mailing Notice of Hearing (one copy);
7. Mailing List Certificate (one copy);
8. Rule as Proposed and published in State Register (one copy);
9. Hearing Examiner's Report (one copy);
10. Chief Hearing Examiner's Reports (one copy);
11. Commissioner's Findings and Conclusions (~~one~~ two copy);
12. Order of Revisor permitting incorporation by reference (one copy);
13. Statement of Need and Reasonableness;
14. Record (two boxes including catalog of items contained in record, and seven recording tapes);
15. Affidavit of Mailing Notice of Submission to the Attorney General and accompanying Notice (one copy); and
16. Statement of Compliance with Rulemaking Procedures.

PGZ:cs

Enclosures

cc: Pauline Bouchard

SP-00006-02

DEPARTMENT ATTORNEY GENERAL

STATE OF MINNESOTA
Office Memorandum

TO : GEORGE R. PETTERSON
Commissioner of Health

DATE: 6/9/82

ATTN : PAUL G. ZERBY, Spec. Ass't. Atty. Gen.

FROM : TED A. MARTINEZ
Special Assistant
Attorney General

PHONE: 296-4692

SUBJECT: In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units

Enclosed herewith are the rules you have submitted for approval. These rules have been approved by this office and filed with the Secretary of State. Please note that they have not been filed with the State Register. This must be done promptly by your agency.

Upon receipt and before transmittal to your agency, however, it is important that you recheck these rules as to:

1. Affixation of stamps of the Attorney General and Secretary of State;

2. Coverage by these stamps of all rules submitted; and

3. Inclusion of all pages to the rules in the approved set.

If you have any questions in this regard, please contact me.

TAM:drw
Encs.

cc: Ms. Kathy Burek
Mr. Duane Harves

Department of Health

Environmental Health Division

Adopted Rule Governing Formaldehyde in Housing Units

Rule as Adopted

7 MCAR S 1.448 Formaldehyde in housing units.

A. Applicability. This rule applies to newly constructed housing units containing urea formaldehyde and to installations of urea formaldehyde foam insulation. The rule establishes a maximum permissible ~~ambient~~ indoor air level for formaldehyde and prescribes the methods for measuring levels of formaldehyde and the conditions under which the measurements are to be made.

B. Definitions. For the purpose of this rule, the following terms have the meanings given them.

1. ~~"Building materials" has the meaning given it in Minn. Stat. S 325F.18, subd. 1a.~~

~~2.~~ "Commissioner" means the Commissioner of Health.

~~3.~~ 2. "Housing unit" means one or more rooms which are intended for long-term human habitation. It includes any mobile home, single family residence, or living unit in a multi-unit structure, regardless of type of ownership, and any health care facility such as a nursing home, boarding care home, intermediate care facility, or hospital.

~~4.~~ 3. "Newly constructed" means that the housing unit has not been previously occupied and that construction of the unit was completed more than 30 days after the effective date of this rule.

C. Maximum permissible formaldehyde level in housing units.

1. At the time of sale of a newly constructed housing unit, the ambient indoor air of any habitable room in the unit shall not contain more than ~~0.4~~ 0.5 parts of formaldehyde per million parts of air as measured according to the procedures specified in D. and E. The seller is responsible for assuring that the unit complies with this level.

2. The installation of urea formaldehyde foam insulation

in a housing unit which is not newly constructed shall not cause the ~~ambient~~ indoor level of formaldehyde in any habitable room in the unit to exceed ~~0.4~~ the higher of 0.5 parts per million or the preinstallation level as measured according to the procedures specified in D., E. and F. The installer of urea formaldehyde foam insulation is responsible for assuring that the installation complies with this level.

D. Test method.

1. Formaldehyde shall be measured according to the National Institutes of Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Volume 1, 2nd Edition, NIOSH 77-157-A, 1977, Method Number P&CAM 125. Air samples shall be collected in a solution of one percent sodium bisulfite in distilled water.

2. For the purpose of determining compliance with C., measurements made using an alternate analytical method are valid only if the alternate method has been approved by the commissioner. The approval shall be granted if the proponent of the alternate method can demonstrate to the satisfaction of the commissioner that the alternate method results in numerical values which have at least the same precision, reliability and accuracy as those obtained with the use of the method described in 1.

E. Testing conditions. Whenever the level of formaldehyde is to be measured, all of the conditions prescribed in 1.-4. must be met before a measurement is considered valid for the purpose of determining compliance with this rule.

1. Testing shall be carried out at an indoor temperature within the range of 70 degrees Fahrenheit to 85 degrees Fahrenheit and at ambient relative humidity. The resulting formaldehyde test levels shall be corrected to a 78 degree Fahrenheit condition using the following formula:

~~$C = C_0 \times e^{-R(1/t - 1/t_0)}$~~

$C = C_0 \times e^{-R(1/t - 1/t_0)}$

Where,

C = test formaldehyde concentration level

C_o = corrected formaldehyde concentration level

e = natural log base

R = coefficient of temperature = 9799

t = actual test condition temperature in degrees Kelvin

t_o = corrected temperature in degrees Kelvin

2. The housing unit shall be prepared for measurement as follows:

a. For two hours prior to the close-up period, the housing unit shall be aired out at a ventilation rate of at least one outdoor air change per hour, with all interior doors, cabinets, closets and drawers open for maximum air exchange;

b. For the next two hours, the windows and exterior doors of the housing unit shall be closed. All nonvented gas appliances shall be turned off. No smoking shall be allowed;

c. Immediately after the two hour close-up period, the collection of air samples shall begin. The conditions prescribed for the close-up period shall be maintained until all samples have been collected; and

d. A housing unit equipped with a device to provide tempered outside air may be tested with the ventilation system operating at a maximum rate of one air change per hour.

3. At a minimum, a sample of air shall be taken from the kitchen and another sample shall be taken from one bedroom. Each air sample shall be taken in the center of the room, at a point which is approximately equidistant from opposing walls and at a height of 3-1/2 to 4 feet above the floor.

4. Each sample of air shall be analyzed separately.

F. Special testing conditions for use with urea formaldehyde foam insulation. In order to assure compliance with C.2., procedures in addition to those prescribed in E. must be followed with urea formaldehyde insulation. Those procedures are:

1. The level of formaldehyde in a housing unit shall be measured no more than two weeks prior to installation and shall be measured again within 30 days after the installation of the urea formaldehyde foam insulation.

2. ~~The consumer shall, at least two hours before the air samples are taken, cease any activity and remove from the unit any major source of formaldehyde which has been introduced by the consumer into the unit which may contribute to the level of formaldehyde in the air of the unit. The major sources include, but are not limited to the following: draperies, furniture made of plywood or particleboard and upholstered furniture, any of which are less than one year old, and~~

~~3.~~ If the entire roof or all exterior walls are to be insulated, the preinstallation air samples shall be taken as prescribed in E.1.-2. If only a portion of the unit is to be urea formaldehyde foam insulated the preinstallation measurement for formaldehyde shall be made in those two rooms closest to the walls where the installation is to be made. Postinstallation air samples shall be collected from the same rooms as those which were sampled prior to installation.

G. Effective date. The levels prescribed in C. shall apply 30 days after the effective date of this rule.

AR0094
6/9/82

OFFICE OF THE REVISOR OF STATUTES

Certificate of Approval of Adopted Rules

Agency: Department of Health

Rule Numbers: 7 MCAR S 1.448

Rule Title: Adopted Rule Governing Formaldehyde in Housing Units

Type of Rules: Permanent x

Temporary _____

Documents Incorporated by Reference:

National Institutes Of Occupational Safety and Health, Manual of Analytical Methods, Volume I, 2nd edition, NIOSH 77-157-A, 1977, Method Number P & CAM 125

The attached Rules are approved as to form.

Steven C. Cross
Revisor of Statutes

APPROVED AS TO LEGALITY
June 9 19 82
WARREN SPANNAUS, ATTORNEY GENERAL
BY Ted A Mondale
SPECIAL ASSISTANT ATTORNEY GENERAL

Name: Ann L. Bateson
Ann L. Bateson

Title: _____
Deputy Revisor

Phone: 296-1536

STATE OF MINNESOTA
DEPARTMENT OF STATE
FILED
JUN 10 1982
Joan Anderson Growe
Secretary of State
3:09 PM

Rule as Proposed (all new material)

7 MCAR S 1.448 Formaldehyde in housing units.

A. Applicability. This rule applies to newly constructed housing units and to installations of urea formaldehyde foam insulation. The rule establishes a maximum permissible ambient air level for formaldehyde and prescribes the methods for measuring levels of formaldehyde and the conditions under which the measurements are to be made.

B. Definitions. For the purpose of this rule, the following terms have the meanings given them.

1. "Building materials" has the meaning given it in Minn. Stat. S 325F.18, subd. 1a.

2. "Commissioner" means the Commissioner of Health.

3. "Housing unit" means one or more rooms which are intended for long-term human habitation. It includes any mobile home, single family residence, or living unit in a multi-unit structure, regardless of type of ownership, and any health care facility such as a nursing home, boarding care home, intermediate care facility, or hospital.

4. "Newly constructed" means that the housing unit has not been previously occupied and that construction of the unit was completed more than 30 days after the effective date of this rule.

APPROVED IN THE REVISOR OF STATUTES OFFICE BY:

C. Maximum permissible formaldehyde level in housing units.

1. At the time of sale of a newly constructed housing unit, the ambient indoor air of any habitable room in the unit shall not contain more than 0.4 parts of formaldehyde per million parts of air as measured according to the procedures specified in D. and E. The seller is responsible for assuring that the unit complies with this level.

2. The installation of urea formaldehyde foam insulation in a housing unit which is not newly constructed shall not cause the ambient level of formaldehyde in any habitable room in the unit to exceed 0.4 parts per million as measured according to the procedures specified in D., E. and F. The installer of urea formaldehyde foam insulation is responsible for assuring that the installation complies with this level.

D. Test method.

1. Formaldehyde shall be measured according to the National Institutes of Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Volume 1, 2nd Edition, NIOSH 77-157-A, 1977, Method Number P&CAM 125.

2. For the purpose of determining compliance with C., measurements made using an alternate analytical method are valid only if the alternate method has been approved by the commissioner. The approval shall be granted if the proponent of the alternate method can demonstrate to the satisfaction of the commissioner that the alternate method results in numerical values which have at least the same precision, reliability and accuracy as those obtained with the use of the method described in 1.

E. Testing conditions. Whenever the level of formaldehyde is to be measured, all of the conditions prescribed in 1.-4. must be met before a measurement is considered valid for the purpose of determining compliance with this rule.

1. Testing shall be carried out at an indoor temperature within the range of 70 degrees Fahrenheit to 85 degrees Fahrenheit and at ambient relative humidity. The resulting formaldehyde test levels shall be corrected to a 78 degree

APPROVED IN THE REVISOR OF STATUTES OFFICE BY:

Fahrenheit condition using the following formula:

$$C = C_o \times e^{-R(1/t - 1/t_0)}$$

Where,

C = test formaldehyde concentration level

C_o = corrected formaldehyde concentration level

e = natural log base

R = coefficient of temperature = 9799

t = actual test condition temperature in degrees Kelvin

t_0 = corrected temperature in degrees Kelvin

2. The housing unit shall be prepared for measurement as follows:

a. For two hours prior to the close-up period, the housing unit shall be aired out at a ventilation rate of at least one outdoor air change per hour, with all interior doors, cabinets, closets and drawers open for maximum air exchange;

b. For the next two hours, the windows and exterior doors of the housing unit shall be closed. All nonvented gas appliances shall be turned off. No smoking shall be allowed;

c. Immediately after the two hour close-up period, the collection of air samples shall begin. The conditions prescribed for the close-up period shall be maintained until all samples have been collected; and

d. A housing unit equipped with a device to provide tempered outside air may be tested with the ventilation system operating at a maximum rate of one air change per hour.

3. At a minimum, a sample of air shall be taken from the kitchen and another sample shall be taken from one bedroom. Each air sample shall be taken in the center of the room, at a point which is approximately equidistant from opposing walls and at a height of 3-1/2 to 4 feet above the floor.

4. Each sample of air shall be analyzed separately.

F. Special testing conditions for use with urea formaldehyde foam insulation. In order to assure compliance with C.2., procedures in addition to those prescribed in E. must be followed with urea formaldehyde insulation. Those procedures are:

APPROVED IN THE
REVISOR OF STATUTES
OFFICE BY:

1. The level of formaldehyde in a housing unit shall be measured no more than two weeks prior to installation and shall be measured again within 30 days after the installation of the urea formaldehyde foam insulation;

2. The consumer shall, at least two hours before the air samples are taken, cease any activity and remove from the unit any major source of formaldehyde which has been introduced by the consumer into the unit which may contribute to the level of formaldehyde in the air of the unit. The major sources include, but are not limited to the following: draperies, furniture made of plywood or particleboard and upholstered furniture, any of which are less than one year old; and

3. If the entire roof or all exterior walls are to be insulated, the preinstallation air samples shall be taken as prescribed in E.1.-2. If only a portion of the unit is to be urea formaldehyde foam insulated the preinstallation measurement for formaldehyde shall be made in those two rooms closest to the walls where the installation is to be made. Postinstallation air samples shall be collected from the same rooms as those which were sampled prior to installation.

G. Effective date. The levels prescribed in C. shall apply 30 days after the effective date of this rule.

APPROVED IN THE
REVISOR OF STATUTES
OFFICE BY:

OFFICE OF THE REVISOR OF STATUTES
PROPOSED RULES

Agency Department of Health

Division Environmental Health Division

Agency Contact Pauline Bouchard Phone Number 296-5331

Title: Proposed Rule Establishing Ambient Air Standards for Formaldehyde and Prescribing Measuring Techniques for Determining Whether the Standards are Met in Housing

Type of Rules: Permanent X Temporary_____

Incorporations by References: National Institutes of Occupational Safety and Health (NIOSH)

Rule Number	Material Incorporated
7 MCAR S 1.448	Manual of Analytical Methods, Volume 1, 2nd Edition, NIOSH 77-157-A, 1977, Method Number P&CAM 125.

See Additional references on back Yes____ No____

Duplication of Statutory Language.

Rule Number	Statutory Section Duplicated

The attached rules are approved as to form.

Steven C. Cross
Revisor of Statutes

Name: John C. Fuller
John C. Fuller

Title: Assistant Revisor

Phone: 296-0955

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STEVEN C. CROSS

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MINNESOTA LEGISLATURE

OFFICE OF THE REVISOR OF STATUTES

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RECEIVED
SEP 24 1981
Minn. Dept. of Health
Div. of Env. Health

September 21, 1981

Pauline Bouchard
Department of Health
Environmental Health Division
717 Delaware St. SE
Minneapolis, MN 55440

Dear Ms. Bouchard:

We are enclosing copies of your rule request relating to Proposed Rule Establishing Ambient Air Standards for Formaldehyde and Prescribing Measuring Techniques for Determining Whether the Standards are Met in Housing. The copies are ready for submission to the State Register.

If you want to make any changes, please return a copy with your instructions for redrafting.

If you have any questions, please do not hesitate to call.

Very truly yours,

John C. Fuller

John C. Fuller
Assistant Revisor

JCF/lr
Enclosure
RD94

STATE OF MINNESOTA

DEPARTMENT OF HEALTH

In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units

ORDER ADOPTING RULES

The above-entitled matter came on for hearing before Hearing Examiner Peter Erickson on the 23rd day of November, 1981, at 9:00 A.M. in the Department of Health Building, Room 105, Minneapolis, Minnesota, after proper notice required by Minnesota Statutes section 15.0412 was served upon all persons, associations, and other interested groups registered with the State Department of Health for that purpose.

After affording interested persons an opportunity to present written and oral data, statements and arguments, hearing all of the testimony, considering all of the evidence adduced and upon the records, files, and proceedings herein and applicable statutory standards or criteria, and confirming the need for and reasonableness of the above-captioned rules,

NOW, THEREFORE, IT IS ORDERED that these rules identified as 7 MCAR § 1.448 are adopted this 6 day of May, 1982, pursuant to authority vested in me by Minnesota Statutes section 325F.18.

STATE OF MINNESOTA

George R. Pettersen M.D.

George R. Pettersen, M.D.

COMMISSIONER OF HEALTH

Department of Health
Environmental Health Division

Adopted Rule Governing Formaldehyde in Housing Units

Rule as Adopted

7 MCAR S 1.448 Formaldehyde in housing units.

A. Applicability. This rule applies to newly constructed housing units containing urea formaldehyde and to installations of urea formaldehyde foam insulation. The rule establishes a maximum permissible ~~ambient~~ indoor air level for formaldehyde and prescribes the methods for measuring levels of formaldehyde and the conditions under which the measurements are to be made.

B. Definitions. For the purpose of this rule, the following terms have the meanings given them.

~~1. "Building materials" has the meaning given it in Minn. Stat. § 325F.186, subd. 1a.~~

~~2.~~ "Commissioner" means the Commissioner of Health.

~~3.~~ 2. "Housing unit" means one or more rooms which are intended for long-term human habitation. It includes any mobile home, single family residence, or living unit in a multi-unit structure, regardless of type of ownership, and any health care facility such as a nursing home, boarding care Home, intermediate care facility, or hospital.

~~4.~~ 3. "Newly constructed" means that the housing unit has not been previously occupied and that construction of the unit was completed more than 30 days after the effective date of this rule.

C. Maximum permissible formaldehyde level in housing units.

1. At the time of sale of a newly constructed housing unit, the ambient indoor air of any habitable room in the unit shall not contain more than ~~0.4~~ 0.5 parts of formaldehyde per million parts of air as measured according to the procedures specified in D. and E. The seller is responsible for assuring that the unit complies with this level.

2. The installation of urea formaldehyde foam insulation

Submitted to Atty. Gen. for review 5-19-82.

in a housing unit which is not newly constructed shall not cause the ~~ambient~~ indoor level of formaldehyde in any habitable room in the unit to exceed ~~0.4~~ the higher of 0.5 parts per million or the preinstallation level as measured according to the procedures specified in D., E. and F. The installer of urea formaldehyde foam insulation is responsible for assuring that the installation complies with this level.

D. Test method.

1. Formaldehyde shall be measured according to the National Institutes of Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Volume 1, 2nd Edition, NIOSH 77-157-A, 1977, Method Number P&CAM 125. Air samples shall be collected in a solution of one percent sodium bisulfate in distilled water.

2. For the purpose of determining compliance with C., measurements made using an alternate analytical method are valid only if the alternate method has been approved by the commissioner. The approval shall be granted if the proponent of the alternate method can demonstrate to the satisfaction of the commissioner that the alternate method results in numerical values which have at least the same precision, reliability and accuracy as those obtained with the use of the method described in 1.

E. Testing conditions. Whenever the level of formaldehyde is to be measured, all of the conditions prescribed in 1.-4. must be met before a measurement is considered valid for the purpose of determining compliance with this rule.

1. Testing shall be carried out at an indoor temperature within the range of 70 degrees Fahrenheit to 85 degrees Fahrenheit and at ambient relative humidity. The resulting formaldehyde test levels shall be corrected to a 78 degree Fahrenheit condition using the following formula:

$$C = C_0 \times e^{-R(1/t - 1/t_0)}$$

$$C = C_0 \times e^{-R(1/t - 1/t_0)}$$

Where,

C = test formaldehyde concentration level

C_o = corrected formaldehyde concentration level

e = natural log base

R = coefficient of temperature = 9799

t = actual test condition temperature in degrees Kelvin

t_0 = corrected temperature in degrees Kelvin

2. The housing unit shall be prepared for measurement as follows:

a. For two hours prior to the close-up period, the housing unit shall be aired out at a ventilation rate of at least one outdoor air change per hour, with all interior doors, cabinets, closets and drawers open for maximum air exchange;

b. For the next two hours, the windows and exterior doors of the housing unit shall be closed. All nonvented gas appliances shall be turned off. No smoking shall be allowed;

c. Immediately after the two hour close-up period, the collection of air samples shall begin. The conditions prescribed for the close-up period shall be maintained until all samples have been collected; and

d. A housing unit equipped with a device to provide tempered outside air may be tested with the ventilation system operating at a maximum rate of one air change per hour.

3. At a minimum, a sample of air shall be taken from the kitchen and another sample shall be taken from one bedroom. Each air sample shall be taken in the center of the room, at a point which is approximately equidistant from opposing walls and at a height of 3-1/2 to 4 feet above the floor.

4. Each sample of air shall be analyzed separately.

F. Special testing conditions for use with urea formaldehyde foam insulation. In order to assure compliance with C.2., procedures in addition to those prescribed in E. must be followed with urea formaldehyde insulation. Those procedures are:

1. The level of formaldehyde in a housing unit shall be measured no more than two weeks prior to installation and shall be measured again within 30 days after the installation of the urea formaldehyde foam insulation.

2. The consumer shall, at least two hours before the air samples are taken, cease any activity and remove from the unit any major source of formaldehyde which has been introduced by the consumer into the unit which may contribute to the level of formaldehyde in the air of the unit. The major sources include, but are not limited to the following: draperies, furniture made of plywood or particleboard and upholstered furniture, any of which are less than one year old; and

3. If the entire roof or all exterior walls are to be insulated, the preinstallation air samples shall be taken as prescribed in E.1.-2. If only a portion of the unit is to be urea formaldehyde foam insulated the preinstallation measurement for formaldehyde shall be made in those two rooms closest to the walls where the installation is to be made. Postinstallation air samples shall be collected from the same rooms as those which were sampled prior to installation.

G. Effective date. The levels prescribed in C. shall apply 30 days after the effective date of this rule.

Department of Health
Environmental Health Division

Notice of Intent to Solicit Outside Opinion on Rules Relating to Public Water Supplies, Swimming Pools, Water Conditioning Contractors' Bond, Children's Camps, Migrant Labor Camps, Formaldehyde, Registration of Engineers, Monitoring Wells and Groundwater Thermal Exchange Devices

Notice is hereby given, pursuant to the provisions of Minn. Stat. § 15.0412, subd. 6 (1980) that the Commissioner of Health is considering the proposal of amendments to existing rules and adoption of new rules relating to the subject matters listed below.

All interested or affected persons may submit information on these subjects. All statements of information and comment received will be introduced into the record of any rules' promulgation proceedings held relating to these subjects. Written comments regarding any of the subjects listed should be addressed to the appropriate persons named below.

Public Water Supplies: considering amendments to 7 MCAR §§ 1.141-1.145 to incorporate recent Federal safe drinking water standards.

Swimming Pools: considering amendments to 7 MCAR § 1.141.

Water Conditioning Contractors: considering amendments to 7 MCAR § 1.135 prescribing the amount of the bond to be filed with the State pursuant to Minn. Stat. § 326.601 (1980).

For comments regarding public water supplies, swimming pools or the water conditioners' bond, contact:

Richard D. Clark
Section of Water Supply and General Engineering
Minnesota Department of Health
717 S.E. Delaware Street
Minneapolis, Minnesota 55440

Children's Camps: considering amendments to 7 MCAR § 1.201 regarding the requirement for a physical examination prior to attendance.

Migrant Labor Camps: considering amendments to 7 MCAR § 1.204 regarding inspections and permits.

For comments regarding children's camps and migrant labor camps, contact:

Charles B. Schneider, Chief
Section of Environmental Field Services
Minnesota Department of Health
717 S.E. Delaware Street
Minneapolis, Minnesota 55440

Formaldehyde: considering proposal of a new rule setting a maximum permissible ambient level for formaldehyde in newly constructed residential units, contact:

Laura Oatman
Section of Health Risk Assessment
Minnesota Department of Health
717 S.E. Delaware Street
Minneapolis, Minnesota 55440

Registration of Civil Engineers: considering adoption of a new rule for engineers who drill monitoring wells.

Monitoring Wells and Groundwater Thermal Exchange Devices: considering amendments to the water well construction code, 7 MCAR §§ 1.210-1.225.

For comments regarding registration of civil engineers, monitoring wells and groundwater thermal exchange devices, contact:

Edwin Ross
Section of Water Supply and General Engineering
Minnesota Department of Health
717 S.E. Delaware Street
Minneapolis, Minnesota 55440

STATE OF MINNESOTA
DEPARTMENT OF HEALTH

In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units

ORDER FOR HEARING

IT IS ORDERED this 6th day of October, 1981, that a public hearing on the proposed rules captioned above be held in the Department of Health Building, Minneapolis, Minnesota, on November 23, 1981, commencing at 9:30 A.M., and continuing until all representatives of associations or other interested groups or persons have had an opportunity to be heard.

IT IS FURTHER ORDERED, that notice of said hearing be given to all persons who have registered their names with the State Department of Health for that purpose and be published in the State Register.

STATE OF MINNESOTA

Duane A. Johnson

for George R. Pettersen, M.D.
Commissioner of Health

NOTICE AS MAILED

STATE OF MINNESOTA
DEPARTMENT OF HEALTH
DIVISION OF ENVIRONMENTAL HEALTH

In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units

NOTICE OF HEARING

Notice is hereby given that a public hearing concerning the proposed rules captioned above will be held pursuant to Minn. Stat. § 15.0412, subd. 4(1980) in Room 105, Minnesota Department of Health Building, 717 Delaware Street Southeast, Minneapolis, Minnesota 55440, on Monday, November 23, 1981, commencing at 9:30 a.m. The proposed rules may be modified as a result of the hearing process. Therefore, if you are affected in any manner by the proposed rules you are urged to participate in the rule hearing process.

Following the agency's presentation at the hearing, all interested or affected persons will have an opportunity to ask questions and make comments. Statements may be made orally and written material may be submitted. In addition, whether or not an appearance is made at the hearing, written statements or material may be submitted to George Beck, Hearing Examiner, Office of Administrative Hearings, Room 300, 1745 University Avenue, St. Paul, Minnesota 55104, telephone: (612)296-8108, either before the hearing or within five (5) working days after the close of the hearing. The hearing examiner may, at the hearing, order that the record be kept open for a longer period not to exceed 20 calendar days. All such statements will be entered into and become part of the record. For those wishing to submit written statements or exhibits, it is requested that at least three (3) copies be furnished. In addition, it is suggested, to save time and avoid duplication, that those persons, organizations, or associations having a common viewpoint or interest in these proceedings join together where possible and present a single statement in behalf of such interests. The rule hearing procedure is governed by Minn. Stat. §§ 15.0411-15.052, and by 9 MCAR §§ 2.101-2.112 (Minnesota Code of Agency Rules). If you have any questions about the procedure, call or write to the hearing examiner.

Notice is hereby given that twenty-five (25) days prior to the hearing, a Statement of Need and Reasonableness will be available for review at the agency and at the Office of Administrative Hearings. This Statement of Need and Reasonableness will include all of the evidence which the agency intends to present at the hearing to justify both the need for and the reasonableness of the proposed rules. However, additional evidence may be submitted in response to questions raised by interested persons. You are therefore urged to both review the Statement of Need and Reasonableness before the hearing and to attend the hearing. Copies of the Statement of Need and Reasonableness may be obtained from the Office of Administrative Hearings at a minimal charge.

If adopted, the proposals would have the following effect:

1. Set a maximum permissible ambient level of 0.4 parts formaldehyde per million parts of air for newly constructed housing units and for installations of urea formaldehyde foam insulation;

2. Prescribe the use of the National Institutes of Occupational Safety and Health (N.I.O.S.H.) chromatropic acid method for analyzing levels of formaldehyde;

3. Specifies conditions under which air samples are to be collected; and

4. For newly constructed housing units, the rule sets an effective date of 30 days after the effective date prescribed in the state Administrative Procedures Act.

Statutory authority of the Commissioner of Health to promulgate the new rule is contained in Minn. Stat. § 144.495, 1980.

Copies of the proposed rule are now available and at least one free copy may be obtained by writing to Ms. Laura Oatman, Minnesota Department of Health, Division of Environmental Health, 717 Delaware Street Southeast, Minneapolis, Minnesota 55440. Additional copies will be available at the door on the date of the hearing.

Notice: Any person may request notification of the date on which the Hearing Examiner's Report will be available, after which date that agency may not take any final action on the rules for a period of five (5) working days. Any person may request notification of the date on which the hearing record has been submitted or resubmitted to the Attorney General by the agency. If you desire to be so notified, you may so indicate at the hearing. After the hearing, you may request notification by sending a written request to the hearing examiner, in the case of the Hearing Examiner's Report, or to the agency, in the case of the agency's submission or resubmission to the Attorney General. In addition, please be advised that Minn. Stat., ch. 10A requires each lobbyist to register with the State Ethical Practices Board within five days after he commences lobbying. A lobbyist is defined in Minn. Stat. § 10A.01, subd. 11 (Supp. 1979) as any individual:

(a) Engaged for pay or other consideration, or authorized by another individual or association to spend money, who spends more than five hours in any month or more than $250, not including his own travel expenses and membership dues, in any year, for the purpose of attempting to influence legislative or administrative action by communicating or urging others to communicate with public officials; or

(b) Who spends more than $250, not including his own traveling expenses and membership dues, in any year for the purpose of attempting to influence legislative or administrative action by communicating or urging others to communicate with public officials.

The statute provides certain exceptions. Questions should be directed to the Ethical Practices Board, 41 State Office Building, St. Paul, Minnesota 55155, telephone: (612) 296-5615.

Promulgation of the proposed new rule will not result in the expenditure of public monies by local government units.

STATE OF MINNESOTA

October 6, 1981

s/ Duane H. Johnson for
George R. Pettersen, M.D.
Commissioner of Health

STATE OF MINNESOTA)
)ss.
COUNTY OF HENNEPIN)

In the Matter of a Proposed
New Rule Relating to Formaldehyde, 7 MCAR § 1.448.

AFFIDAVIT
OF MAILING

Nancy Chesney, being first duly sworn, deposes and says:

That on the 20th day of October, 1981, at the City of Minneapolis, County of Hennepin, State of Minnesota, she served the attached Notice of Hearing by depositing in the United States mail at said City of Minneapolis, a true and correct copy thereof, properly enveloped, with postage prepaid, to all persons and associations at the addresses listed on the Certificate attached and made a part hereof as Exhibit A, as well as to all members of the Minnesota Legislature as of the date of mailing.

That on the 22nd day of October, 1981, she served the attached Notice of Hearing by depositing in the United States mail at said City of Minneapolis, a true and correct copy thereof, properly enveloped, with postage prepaid, to all persons and associations at the addresses listed on the Certificate attached and made a part hereof as Exhibit B.

Nancy Chesney

Subscribed and sworn to
before me this 22 day
of October, 1981.

Louise K. Kaniuk

LOUISE K. KANIUK
NOTARY PUBLIC-MINNESOTA
HENNEPIN COUNTY
My Comm. Expires Feb. 23, 1984

STATE OF MINNESOTA

COUNTY OF HENNEPIN

In the Matter of a Proposed New Rule Relating to Formaldehyde, 7 MCAR § 1.448.

CERTIFICATE

I hereby certify that the list of persons, associations, and other interested groups who have requested, pursuant to Minn. Stat. § 15.0412, subd. 4, that their names be placed on file with and maintained by the State Department of Health for the purpose of receiving notice of public hearing on proposed rules and amendments thereto on the subject captioned above, is accurate and complete as of 9:00 a.m., this 22th day of October, 1981.

Lora Erickson
Executive I

By Lora Erickson

Exhibit A

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PMB:tme/EXECUTIVE/LABELS/September 10, 1981/

Add to Insulation Hearing

Exhibit B

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Minn Dept of Health
Div of Env Hea

RAPCO FOAM INC.
22 FIFTH ST.
STAMFORD, CT. 06904
203-348-6418

Rapco Foam Inc.
Formerly Rapperswill Corporation
Chanin Building Suite 4900
122 East 42nd Street, New York, New York 10017
Telephone: (212) 986-7030

April 3, 1981

Mr. P. Smith
Information Center
Minnesota Energy Office
150 East Kellogg Blvd.
St. Paul, Mn. 55101

Dear Mr. Smith:

In response to your telephone call the other day, the following is the list of urea formaldehyde foam instulation manufacturers.

Advanced Foam Systems
2555 28th Street
Grand Rapids, Mi. 49508
(616)942-4780
Mr. Jack Harkness

C.P. Chemical
25 Home Street
White Plains, N.Y. 10606
(914)428-2517
Walter Hasselman or Claire Reinbergen

Celsius Corp.
P.O. Box R
Weedsport, N.Y. 13166
(315)834-6693

Permite Corp.
5729 Hart
Fort Worth, Tx. 76112
(817)429-6622
Jack McLaughlin

Rapco Foam, Inc.
22 Fifth Street
Stamford, Ct. 06905
(203)348-6418
Charles H. Stillman

Rapco Foam Inc.

April 3, 1981

Scientific Applications, Inc.
P.O. Box 211
Highway 34 West
Mt. Pleasant, Ia. 52641
(319)385-9021
Ted Roth

Insulmaster Corp.
204 Marchmont Drive
Knoxville, Tn. 37923
(615)693-4185
Leland Sayers

Tailored Chemical
Drawer 1486
Longview Station
Hickory, N.C. 28604
(704)322-6512
Jack Temple

United Chemical Resins, Inc.
3635 Engle Road
Oklahoma City, Ok. 73110
(405)733-0800
Bob Francis

W & S Enterprises Inc.
501 Meridian
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Oklahoma City, Ok. 73108
(405)949-0313
Wayne Roberson

If you need any further information we suggest you contact Mr. Josh Lanier, National Insulation Certification Institute (NICI), 400 North Capitol, Washington, D.C. 20001 (202)783-2800.

Very truly yours,

RAPCO FOAM, INC.

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The statute provides certain exceptions. Questions concerning lobbyists or their required registration should be directed to the Ethical Practices Board, 41 State Office Building, St. Paul, Minnestoa 55155, (612) 296-5615.

Fiscal Statement

The board staff estimates that there will be no cost to local bodies in the state to implement the rules for the two years immediately following their adoption within the meaning of Minn. Stat. § 15.0412, subd. 7 (1980).

Inquiries

Questions about the substance of the proposed rules and requests for copies of the notice of hearing, proposed rules, or the statement of need and reasonableness should be directed to Tom Rulland, (612) 296-2319 or Ken Kadlec, (612) 296-8253 at the Environmental Quality Board, Room 100, Capitol Square Building, 550 Cedar Street, St. Paul, Minnesota, 55101.

September 28, 1981

Robert F. Benner, Chairman
Environmental Quality Board

Department of Health
Environmental Health Division

Proposed Rules Governing Formaldehyde in Housing Units

Notice of Hearing

Notice is hereby given that a public hearing concerning the proposed rules captioned above will be held pursuant to Minn. Stat. § 15.0412, subd. 4 (1980) in Room 105, Minnesota Department of Health Building, 717 Delaware Street Southeast, Minneapolis, Minnesota 55440, on Monday, November 23, 1981, commencing at 9:30 a.m. The proposed rules may be modified as a result of the hearing process. Therefore, if you are affected in any manner by the proposed rules you are urged to participate in the rule hearing process.

Following the agency's presentation at the hearing, all interested or affected persons will have an opportunity to ask questions and make comments. Statements may be made orally and written material may be submitted. In addition, whether or not an appearance is made at the hearing, written statements or material may be submitted to George Beck, Hearing Examiner, Office of Administrative Hearings, Room 300, 1745 University Avenue, St. Paul, Minnesota 55104, telephone: (612) 296-8108, either before the hearing or within five (5) working days after the close of the hearing. The hearing examiner may, at the hearing, order that the record be kept open for a longer period not to exceed 20 calendar days. All such statements will be entered into and become part of the record. For those wishing to submit written statements or exhibits, it is requested that at least three (3) copies be furnished. In addition, it is suggested, to save time and avoid duplication, that those persons, organizations, or associations having a common viewpoint or interest in these proceedings join together where possible and present a single statement in behalf of such interests. The rule hearing procedure is governed by Minn. Stat. §§ 15.0411-15.052, and by 9 MCAR §§ 2.101-2.112 (Minnesota Code of Agency Rules). If you have any questions about the procedure, call or write to the hearing examiner.

Notice is hereby given that twenty-five (25) days prior to the hearing, a statement of need and reasonableness will be available for review at the agency and at the Office of Administrative Hearings. This statement of need and reasonableness will include all of the evidence which the agency intends to present at the hearing to justify both the need for and the reasonableness of the proposed rules. However, additional evidence may be submitted in response to questions raised by interested persons. You are therefore urged to both review the statement of need and reasonableness before the hearing and to attend the hearing. Copies of the statement of need and reasonableness may be obtained from the Office of Administrative Hearings at a minimal charge.

If adopted, the proposals would have the following effect:

1. Set a maximum permissible ambient level of 0.4 parts formaldehyde per million parts of air for newly constructed housing units and for installations of urea formaldehyde foam insulation;

2. Prescribe the use of the National Institutes of Occupational Safety and Health (N.I.O.S.H.) chromatropic acid method for analyzing levels of formaldehyde;

KEY: PROPOSED RULES SECTION — Underlining indicates additions to existing rule language. ~~Strike outs~~ indicate deletions from existing rule language. If a proposed rule is totally new, it is designated "all new material." ADOPTED RULES SECTION — Underlining indicates additions to proposed rule language. ~~Strike outs~~ indicate deletions from proposed rule language.

3. Specifies conditions under which air samples are to be collected; and

4. For newly constructed housing units, the rule sets an effective date of 30 days after the effective date prescribed in the state Administrative Procedures Act.

Statutory authority of the Commissioner of Health to promulgate the new rule is contained in Minn. Stat. § 144.495, 1980.

Copies of the proposed rule are now available and at least one free copy may be obtained by writing to Ms. Laura Oatman, Minnesota Department of Health, Division of Environmental Health, 717 Delaware Street Southeast, Minneapolis, Minnesota 55440. Additional copies will be available at the door on the date of the hearing.

Notice: Any person may request notification of the date on which the hearing examiner's report will be available, after which date that agency may not take any final action on the rules for a period of five (5) working days. Any person may request notification of the date on which the hearing record has been submitted or resubmitted to the Attorney General by the agency. If you desire to be so notified, you may so indicate at the hearing. After the hearing, you may request notification by sending a written request to the hearing examiner, in the case of the hearing examiner's report, or to the agency, in the case of the agency's submission or resubmission to the Attorney General.

In addition, please be advised that Minn. Stat. ch. 10A requires each lobbyist to register with the State Ethical Practices Board within five days after he commences lobbying. A lobbyist is defined in Minn. Stat. § 10A.01, subd. 11 (Supp. 1979) as any individual:

(a) Engaged for pay or other consideration, or authorized by another individual or association to spend money, who spends more than five hours in any month or more than $250, not including *his own* travel expenses and membership dues, in any year, for the purpose of attempting to influence legislative or administrative action by communicating or urging others to communicate with public officials; or

(b) Who spends more than $250, not including *his own* traveling expenses and membership dues, in any year for the purpose of attempting to influence legislative or administrative action by communicating or urging others to communicate with public officials.

The statute provides certain exceptions. Questions should be directed to the Ethical Practices Board, 41 State Office Building, St. Paul, Minnesota 55155, telephone: (612) 296-5615.

Promulgation of the proposed new rule will not result in the expenditure of public monies by local government units.

October 6, 1981

George R. Pettersen, M.D.
Commissioner of Health

Rule as Proposed (all new material)

7 MCAR § 1.448 Formaldehyde in housing units.

A. Applicability. This rule applies to newly constructed housing units and to installations of urea formaldehyde foam insulation. The rule establishes a maximum permissible ambient air level for formaldehyde and prescribes the methods for measuring levels of formaldehyde and the conditions under which the measurements are to be made.

B. Definitions. For the purpose of this rule, the following terms have the meanings given them.

1. "Building materials" has the meaning given it in Minn. Stat. § 325F.18, subd. 1a.

2. "Commissioner" means the Commissioner of Health.

3. "Housing unit" means one or more rooms which are intended for long-term human habitation. It includes any mobile home, single family residence, or living unit in a multi-unit structure, regardless of type of ownership, and any health care facility such as a nursing home, boarding care home, intermediate care facility, or hospital.

4. "Newly constructed" means that the housing unit has not been previously occupied and that construction of the unit was completed more than 30 days after the effective date of this rule.

C. Maximum permissible formaldehyde level in housing units.

1. At the time of sale of a newly constructed housing unit, the ambient indoor air of any habitable room in the unit shall not contain more than 0.4 parts of formaldehyde per million parts of air as measured according to the procedures specified in D. and E. The seller is responsible for assuring that the unit complies with this level.

2. The installation of urea formaldehyde foam insulation in a housing unit which is not newly constructed shall not cause the ambient level of formaldehyde in any habitable room in the unit to exceed 0.4 parts per million as measured according to the procedures specified in D., E. and F. The installer of urea formaldehyde foam insulation is responsible for assuring that the installation complies with this level.

D. Test method.

1. Formaldehyde shall be measured according to the National Institute of Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Volume 1, 2nd Edition, NIOSH 77-157-A, 1977, Method Number P&CAM 125.

2. For the purpose of determining compliance with C., measurements made using an alternate analytical method are valid only if the alternate method has been approved by the commissioner. The approval shall be granted if the proponent of the alternate method can demonstrate to the satisfaction of the commissioner that the alternate method results in numerical values which have at least the same precision, reliability and accuracy as those obtained with the use of the method described in 1.

E. Testing conditions. Whenever the level of formaldehyde is to be measured, all of the conditions prescribed in 1.-4. must be met before a measurement is considered valid for the purpose of determining compliance with this rule.

1. Testing shall be carried out at an indoor temperature within the range of 70 degrees Fahrenheit to 85 degrees Fahrenheit and at ambient relative humidity. The resulting formaldehyde test levels shall be corrected to a 78 degree Fahrenheit condition using the following formula:

$$C = C_o \times e^{-R(1/t - 1/t_0)}$$

Where,

C = test formaldehyde concentration level
C_0 = corrected formaldehyde concentration level
e = natural log base
R = coefficient of temperature = 9799
t = actual test condition temperature in degrees Kelvin
t_0 = corrected temperature in degrees Kelvin

2. The housing unit shall be prepared for measurement as follows:

a. For two hours prior to the close-up period, the housing unit shall be aired out at a ventilation rate of at least one outdoor air change per hour, with all interior doors, cabinets, closets and drawers open for maximum air exchange;

b. For the next two hours, the windows and exterior doors of the housing unit shall be closed. All nonvented gas appliances shall be turned off. No smoking shall be allowed;

c. Immediately after the two hour close-up period, the collection of air samples shall begin. The conditions prescribed for the close-up period shall be maintained until all samples have been collected; and

d. A housing unit equipped with a device to provide tempered outside air may be tested with the ventilation system operating at a maximum rate of one air change per hour.

3. At a minimum, a sample of air shall be taken from the kitchen and another sample shall be taken from one bedroom. Each air sample shall be taken in the center of the room, at a point which is approximately equidistant from opposing walls and at a height of 3½ to 4 feet above the floor.

4. Each sample of air shall be analyzed separately.

F. Special testing conditions for use with urea formaldehyde foam insulation. In order to assure compliance with C.2., procedures in addition to those prescribed in E. must be followed with urea formaldehyde insulation. Those procedures are:

1. The level of formaldehyde in a housing unit shall be measured no more than two weeks prior to installation and shall be measured again within 30 days after the installation of the urea formaldehyde foam insulation;

2. The consumer shall, at least two hours before the air samples are taken, cease any activity and remove from the unit any major source of formaldehyde which has been introduced by the consumer into the unit which may contribute to the level of formaldehyde in the air of the unit. The major sources include, but are not limited to the following: draperies, furniture made of plywood or particleboard and upholstered furniture, any of which are less than one year old; and

3. If the entire roof or all exterior walls are to be insulated, the preinstallation air samples shall be taken as prescribed in E.1.-2. If only a portion of the unit is to be urea formaldehyde foam insulated the preinstallation measurement for formaldehyde shall be made in those two rooms closest to the walls where the installation is to be made. Postinstallation air samples shall be collected from the same rooms as those which were sampled prior to installation.

G. Effective date. The levels prescribed in C. shall apply 30 days after the effective date of this rule.

KEY: PROPOSED RULES SECTION — Underlining indicates additions to existing rule language. ~~Strike outs~~ indicate deletions from existing rule language. If a proposed rule is totally new, it is designated "all new material." ADOPTED RULES SECTION — Underlining indicates additions to proposed rule language. ~~Strike outs~~ indicate deletions from proposed rule language.

STATE OF MINNESOTA)
(ss
COUNTY OF HENNEPIN)

AFFIDAVIT OF SERVICE

Eileen A. Gaiovnik, being first duly sworn, deposes and says that on the 2nd day of March, 1982, at the City of Minneapolis, County of Hennepin, State of Minnesota, he served the attached Reports of the Chief Hearing Examiner and Hearing Examiner upon The Commissioner of Health
HLTH-82-008-PE

by handing to and leaving the same with Jeff Crawford, a stores clerk with the Department of Health

Eileen A. Gaiovnik

Subscribed and sworn to before me
this 2nd day of March, 1982.

Susan C Wojcik

SUSAN C. WOJCIK
NOTARY PUBLIC-MINNESOTA
RAMSEY COUNTY
My Commission Expires April 26, 1986

HLTH-82-008-PE

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS

FOR THE DEPARTMENT OF HEALTH

In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units.

REPORT OF THE HEARING EXAMINER

The above-entitled matter came on for hearing before Hearing Examiner Peter C. Erickson of the State Office of Administrative Hearings on November 23 and 24, 1981, in Room 105 of the Department of Health Building, Minneapolis, Minnesota.

Paul G. Zerby, Special Assistant Attorney General, 2829 University Avenue S. E., 136 University Park Plaza Building, Minneapolis, Minnesota 55414, appeared on behalf of the Minnesota Department of Health. Pauline Bouchard, Assistant to the Director, Division of Environmental Health; Laura Oatman, Public Health Engineer, and Henry Anderson, M. D., Chief, Section of Environmental and Chronic Disease Epidemiology, Wisconsin Department of Health and Human Services, testified in support of the proposed rule on behalf of the Department. The hearing continued until all interested groups or persons had had an opportunity to testify concerning the adoption of the proposed rule. Pursuant to Minn. Stat. § 15.0412, subd. 4d, the Chief Hearing Examiner ordered an extension for the completion of this Report through February 17, 1982.

The Commissioner of Health must wait at least five working days before taking any final action on the rules; during that period, this Report must be made available to all interested persons upon request.

Pursuant to the provisions of Minn. Stat. § 15.0412, subd. 4d (1980), this Report has been submitted to the Chief Hearing Examiner for his approval. If the Chief Hearing Examiner approves the findings of this Report, he will advise the Commissioner of actions which will correct the defects and the Commissioner may not adopt the rule until the Chief Hearing Examiner determines that the defects have been corrected. However, in those instances where the Chief Hearing Examiner identifies defects which relate to the issues of need or reasonableness, the Commissioner may either adopt the Hearing Examiner's recommendations to cure the defects or, in the alternative, if the Commissioner does not elect to adopt the recommendations, he may submit the proposed rule to the Legislative Commission to Review Administrative Rules for the Commission's advice and comment. Provisions relating to this submission to the Commission may be found in Minn. Stat. § 15.0412, subd. 4d (1980).

If the Commissioner elects to adopt the recommendations of the Hearing Examiner and makes no other changes and the Chief Hearing Examiner determines that the defects have been corrected, then the Commissioner shall submit the rule to the Attorney General for review of form and legality. If the Commissioner makes changes in the rule other than those recommended by the Hearing Examiner, then he shall submit the rule, with the complete record, to the Chief Hearing Examiner for a review of the changes before adopting it and submitting

it to the Attorney General. Procedures relating to this subsequent review by the Chief Hearing Examiner are set forth in Minn. Stat. § 15.0412, subd. 4e (1980).

When the Commissioner submits the rule to the Attorney General, he shall give notice on the day of submission to all persons who requested that they be informed of the submission to the Attorney General.

Based upon all the testimony, exhibits and written comments, the Hearing Examiner makes the following:

FINDINGS OF FACT

1. On October 6, 1981, the Department filed the following documents with the Chief Hearing Examiner:

(a) A copy of the proposed rules.
(b) The Order for Hearing.
(c) The Notice of Hearing proposed to be issued.
(d) A Statement of the number of persons expected to attend the hearing and estimated length of the Agency's presentation.

2. On October 19, 1981, a Notice of Hearing and a copy of the proposed rules were published at 6 State Register 667.

3. On October 20 and 22, 1981, the Department mailed the Notice of Hearing to all persons and associations who had registered their names with the Department for the purpose of receiving such notice.

4. On October 28, 1981, the Department filed the following documents:

(a) The Notice of Hearing as mailed.
(b) The Agency's certification that its mailing list was accurate and complete.
(c) The Affidavit of Mailing the Notice to all persons on the Agency's list.
(d) The Statement of Need and Reasonableness.
(e) The names of Department personnel who will represent the Agency at the hearing together with the names of any other witnesses solicited by the Agency to appear on its behalf.
(f) A copy of the State Register containing the proposed rules.
(g) An Affidavit of Additional Notice.
(h) All materials received following publication of a temporary rule at 4 State Register 1963 (June 23, 1980) .
(i) The Petition requesting a rule hearing.

The documents were available for inspection at the Office of Administrative Hearings from the date of filing to the date of the hearing.

5. The record remained open through December 14, 1981 for the receipt of written comments and statements, the period having been extended by order of the Hearing Examiner to 20 calendar days following the hearing.

6. Statutory authority to promulgate the proposed rule is contained in Minn. Stat. § 144.495 (1980). That section reads as follows:

> 144.495 FORMALDEHYDE RULES.
> Within 30 days after April 24, 1980 the commissioner of health shall determine if a significant health problem is presented by the use of building materials that emit formaldehyde gases. If he determines that such a problem exists he shall promulgate rules pursuant to chapter 15, including emergency rules, establishing standards governing the sale of building materials and housing units that contain products made with urea formaldehyde.

On May 22, 1980, the Commissioner of Health determined that the use of building materials which emit formaldehyde vapors can be a "significant health problem" under certain circumstances. Temporary rules (cited above) were promulgated, published and approved by the Attorney General. They were

to take effect on December 15, 1980, however, a temporary restraining order was issued on December 8, 1980 by Hennepin County District Court barring enforcement. (D.Ct. File No. 773142). This restraining order was not appealed and remains in effect regarding the temporary rules.

7. During the 1981 legislative session, amendments were made to Minn. Stat. § 325F.18 which further define the language "building materials that emit formaldehyde gases." That definitional amendment was incorporated by reference into the proposed rule and reads as follows:

> Subd. 1a. For the purposes of this section "building materials" means any urea formaldehyde-containing material used in the construcion or insulation of a housing unit, but does not include:
>
> (1) draperies, carpeting, furniture and furnishings not normally permanently affixed to a housing unit; and
>
> (2) noncellular insulation. (1981 Laws, Ch. 245, § 1)

Minn. Stat. § 3253F.18 (1980) requires that after January 1, 1981, written warnings be given to consumers prior to the sale of building materials or the sale or lease of housing units containing urea formaldehyde. Subdivision 4 of that section provides that:

> The "manufacturer of a product or builder of a housing unit that contains materials made with urea formaldehyde shall pay the reasonable cost of repair or relocation if the consumer can document that the housing unit contains a significant ambient air level of formaldehyde and, in addition, has documented medical records of illness related to formaldehyde and a statement from a physician that the consumer must vacate the premises."

8. Subsequent to the hearing on this matter, the Department amended the proposed rule to more clearly delineate the scope of the rule and erase confusion which resulted from the use of the word "ambient". Those amendments read as follows:

> 7 MCAR § 1.448.A. Applicability. This rule applies to newly constructed housing units <u>containing urea formaldehyde</u> and to installations of urea formaldehyde foam insulation. The rule establishes a maximum permissible ~~ambient~~ <u>indoor</u> air level for formaldehyde and prescribes the methods for measuring levels of formaldehyde and the conditions under which the measurements are to be made.
>
> B. Definitions. For the purpose of this rule, the following terms have the meanings given them.
>
> ~~1. "Building materials" has the meaning given it in Minn. Stat. § 325F.18, subd. 1a.~~
>
> 2. "Commissioner" means the Commissioner of Health.
>
> <u>2.</u> ~~3.~~ "Housing unit" means one or more rooms which are intended for long-term human habitation. It includes any mobile home, single-family residence, or living unit in a multi-unit structure, regardless of type of ownership, and any health care facility such as a nursing home, boarding care home, intermediate care facility, or hospital.
>
> <u>3.</u> ~~4.~~ "Newly constructed" means that the housing unit has not been previously occupied and that construction of the unit was completed more tha 30 days after the effective date of this rule.
>
> C. Maximum permissible formaldehyde level in housing units.

1. At the time of sale of a newly constructed housing unit, the ~~ambient~~ indoor air of any habitable room in the unit shall not contain more than 0.4 parts of formaldehyde per million parts of air as measured according to the procedures specified in D. and E. The seller is responsible for assuring that the unit complies with this level.

2. The installation of urea formaldehyde foam insulation in a housing unit which is not newly constructed shall not cause the ~~ambient~~ indoor air level of formaldehyde in any habitable room in the unit to exceed 0.4 parts per million as measured according to the procedures specified in D., E. and F. The installer of urea formaldehyde foam insulation is responsible for assuring that the installation complies with this level.

The Hearing Examiner finds that these amendments do not constitute a substantial change in the rule as published and are both needed and reasonable.

9. Formaldehyde is a colorless gas with a distinctive smell. It is an important industrial chemical with a multitude of commercial uses and is found throughout the environment. In outdoor air, formaldehyde can originate from many sources such as incinerators, photochemical smog and engine exhaust. Near industrial outlets or in areas of heavy smog, atmospheric levels of formaldehyde range from less than 0.005 parts per million (ppm) to 0.15 ppm. Cigarette smoke contains as much as 40 ppm of formaldehyde by volume.

Because formaldehyde is highly soluble in water, it is usually sold as a water solution containing 37% formaldehyde by weight and referred to as formalin. Formalin is the standard commercial product. Approximately 2/3 of all commercially produced formaldehyde is used to produce synthetic resins such as urea and phenol formaldehyde resins which are used as adhesives when manufacturing particle board and hardwood plywood.

Most particle board and hardwood plywood which is used as building materials contain urea formaldehyde resins which constitute up to 10% of the dry weight of the board. The urea formaldehyde resin in the finished product is a complex mixture of components in a state of flux. Consequently, formaldehyde gas is emitted into the air space surrounding the board or panelling. This emission process is commonly referred to as "off-gassing".

Formaldehyde off-gassing occurs at a faster rate when the particle board or plywood is new, and decreases over time. Additionally, off-gassing is more rapid in higher temperatures and higher humidity. Increased ventilation will dissipate the formaldehyde off-gassing at a faster rate.

There are many other sources of formaldehyde in an indoor environment. These include exhaust fumes from cooking or heating devices, air fresheners, cigarette smoke, and furnishings such as carpet, drapery, and upholstered furniture. Formaldehyde off-gassing from household furnishings occurs at a much lower level than the off-gassing from particle board or plywood and dissipates much sooner.

Urea formaldehyde foam insulation (UFFI) is a product which is currently being marketed and installed in home walls and ceilings as a barrier against the cold. This material also off-gasses formaldehyde into the living quarters of the home in which it is installed. Factors of newness of the material, temperature and humidity levels, and ventilation also affect the rate of off-gassing. See, Statement of Need and Reasonableness.

10. Persons exposed to low levels of formaldehyde (between .3 ppm and 3.0 ppm) may experience irritation of the eyes, nose, and other areas of the upper respiratory tract. Other reported symptoms have included headaches, tearing, coughing, sneezing, diarrhea, and vomiting. See, Statement of Need and Reasonableness. A small segment of the population (less than .1%) experiences acute physical symptoms after continuous exposure to very low levels of formaldehyde (less than .3 ppm) which oftentimes require medical care and/or hospitalization. No threshhold limit value (TLV) has been found relating formaldehyde exposure with physical symptoms for the general populace.

11. Presently, federal occupational safety and health regulations set a maximum 8-hour time weighted average of 3 ppm of formaldehyde concentration in work settings. The regulation allows an acceptable ceiling concentration of 5 ppm with an acceptable maximum peak above the ceiling at 10 ppm for 30 minutes. 29 C.F.R. 1910.1000(b) (Table Z-2). The National Institute of Occupational Safety and Health (NIOSH) has recommended that the maximum level of formaldehyde exposure be reduced to 1.0 ppm for any 30-minute sampling period. The American Conference of Governmental Industrial Hygienists has recommended that the eight-hour time weighted average be reduced to 2 ppm.

12. The State of Wisconsin recently enacted a rule similar to that now being proposed in Minnesota which set a maximum indoor formaldehyde level at .4 ppm for all new mobile homes designed, manufactured, distributed, sold or offered for sale in Wisconsin. Enforcement of this rule has recently been enjoined and the matter remains in litigation in the Wisconsin state courts. The State of Massachusetts has recently enacted a ban on the installation of urea formaldehyde foam insulation. Several European countries have recommended levels for maximum formaldehyde levels at .12 ppm or below; however, these levels are recommended goals only and are not enforced as legal standards.

13. The basis for the proposed Minnesota rule which sets a maximum indoor formaldehyde concentration level of .04 ppm for all newly constructed housing units and installations of UFFI comes from many sources. The primary support for the standard is as follows:

A. The Schuck et al. report (1966) studied the effect of low concentrations of formaldehyde on humans by measuring eye-blinks induced by an artificial smog with intense lighting to simulate a metropolitan daytime atmosphere. The levels of formaldehyde were not actually measured but rather calculated by speculation. Other possible irritants, besides formaldehyde, were also present in the smog chamber. Schuck did arrive at the following conclusion, however:

> "The linear relationship between reported eye irritation and formaldehyde concentraion in simulated atmosphere experiments does not hold when the formaldehyde concentration is below 0.3 parts per million (ppm). Subjects may experience equal irritation at irritant concentrations differing by an order of magnitude. Thus, most subjects experienced the same irritation intensity at 0.05 ppm formaldehyde as they did at 0.5 ppm. At irritant concentrations less than 0.3 ppm, the rate of blinking determines to an important extent the intensity of eye irritation which the subject detects. The eyes of human subjects can readily detect and react to as little as 0.01 ppm formaldehyde." (p. 575)

B. The Weber-Tschopp et al. report (1977) also studied the effects of formaldehyde concentrations by measuring the blinking rate of human subjects. The study used a group of 33 individuals who were continually exposed to increasing

levels of formaldehyde for approximately 37 minutes. The levels rose from .03 ppm to 3.2 ppm. A second group of subjects was exposed to five different formaldehyde concentrations for 1.5 minutes at each level. There were eight-minute breaks with no formaldehyde exposure for the second group between each of the five levels of exposure. The authors concluded that the irritation threshold for pure formaldehyde lies in the range of one to two ppm and that discontinuous exposure to formaldehyde resulted in greater nose and throat irritation as compared to the continuously exposed subjects who experienced greater eye irritation.

C. Experiments by Ib Anderson (1979) involved 16 students who were placed in a climate-controlled chamber and exposed to varying amounts of formaldehyde. The subjects were asked to rate their discomfort to formaldehyde by using a scale created by the author. The students were exposed to levels of .25, .41, .82 and 1.64 ppm for five hours per day for four consecutive days. Anderson measured upper respiratory irritation, odor threshhold, subjective discomfort and mathematical performance. He found a reduction in nasal mucous flow at the low and high level of exposure, an odor threshhold at 1.64 ppm, and a response of slight discomfort by 15 of the 16 subjects between .8 and 1.64 ppm. There was no control group exposed to clean air for that period of time against which to gauge the effect of enclosure within the chamber, however.

D. The Wisconsin Department of Health and Human Services has investigated complaints of health problems from residents in Wisconsin homes, the majority coming from the occupants of mobile homes. In 65 complaint mobile homes, the Department found the mean formaldehyde level to be .66 ppm. In 65 randomly selected mobile homes with no complaints, the mean level was found to be .24 ppm. The most common symptoms reported by occupants of the complaint mobile homes were eye irritation, burning eyes, dry or sore throat, headache, cough, difficulty in sleeping, diarrhea, nausea and breathing difficulties. The presence of other contaminants in the complaint homes was not measured, however. Dr. Henry Anderson from Wisconsin stated that no dose-response effect could be concluded from the Wisconsin data. (Dose-response meaning that the degree of symptomatology would increase in proportion to the incrase in formaldehyde level.) He testified that only an association between levels of formaldehyde and eye irritation were shown.

E. From February, 1979 through September 30, 1981, the Minnesota Department of Health has sampled approximately 1,000 homes which registered health complaints. Mobile homes and conventional homes with and without UFFI were measured. The State found that in the mobile homes tested that were less than two years old, the average formaldehyde level was .70 ppm; for mobile homes more than two years old, the average was .25 ppm. The range of measurements for the first group was zero to 4.58 ppm; for the second, zero to 1.62 ppm. In conventional homes that had been insulated with urea formaldehyde foam insulation which was less than two years old, the average formaldehyde level was .21 ppm; for insulation more than two years old, the average level was .08 ppm. The range of measurements for the first group was zero to 6.89 ppm; for the second, zero to .33 ppm. In conventional homes with other sources of formaldehyde (for example, remodelling done with particle board or hardwood panelling), when the sources was less than two years old, the average formaldehyde level was .32 ppm; when the source was greater than two years old, the average

level was .09 ppm. The range of measurements for the first group was zero to 2.89 ppm; for the second, zero to 1.0 ppm.

This complaint study did not test the presence of other contaminants, however. Additionally, the test method used (the NIOSH chromotropic acid method which is prescribed in the proposed rule) was modified by the Department to collect less formaldehyde over a shorter period of time.[1] The method, as published by NIOSH, also contained an error in the type of solution to be used to trap the formaldehyde which may have resulted in artificially low measurements by the Health Department. The error has since been corrected.

F. In March of 1980, the National Academy of Sciences' Committee on Toxicology issued a Report on Formaldehyde (NAS, 1980), at the request of the Consumer Product Safety Commission. The Committee reviewed studies which investigated the effects of formaldehyde on humans and animals. The Report concluded that . . . "There is no evidence of a population threshold for the irritant effects of formaldehyde in humans." The Committee further stated . . . "[t]he preliminary results of an ongoing carcinogenicity study in rodents, the uncertainty about the variability of responses to formaldehyde in normal populations and hypersensitive groups, and the current inadequacy of data (which leave unresolved the no-observed-effect dose in humans) all point to the advisability of maintaining formaldehyde at the lowest practical concentration to minimize adverse effects on public health." (NAS, 1980), p. 17). (Emphasis added)

14. The Minnesota Health Department contends that the .4 ppm indoor air formaldehyde concentration maximum will provide the necessary degree of health protection to the vast majority of the public and is achievable by the construction and insulation industries. The rule requires that all newly constructed housing units, at the time of sale, shall not contain more than .4 ppm formaldehyde in any habitable room. Also, that the installation of urea formaldehyde foam insulation in a housing unit which is not newly constructed shall not cause the formaldehyde level to exceed .4 ppm in any habitable room. The rule prescribes the NIOSH chromotropic acid method as the means to test for formaldehyde levels.

15. The record contains a great number of written comments from persons whose health is claimed to have been affected by exposure to formaldehyde-emitting materials. Many of these individuals are members of a group with the acronym SUFFER (Save Us From Formaldehyde Environmental Repercussions). The letters submitted relate tragic episodes of unexplained illnesses to all members of families and forced relocations to housing without formaldehyde emitters. An example reads as follows:

> We were forced to vacate our home (after only 3 1/2 months) at levels of .18 ppm because our children were near death. One of our sons could not keep even a swallow of water down. He was starving to death because of his severe vomiting due to the formaldehyde present in our home. Our newborn son was having extreme difficulty breathing. The night we decided to vacate, his breathing was slowing to a stop (only 2-3 breaths per minutes by

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[1] The Examiner will not belabor this Report by describing the scientific methodology required to conduct a chromotropic acid test for formaldehyde concentration.

the time we left the house). We're sure he would have died if we had not moved out that night. A doctor would probably have labelled his death as being caused by SIDS (Sudden Infant Death Syndrome). That makes us wonder how many other children that have died of "crib death" were actually poisoned by formaldehyde.

* * *

We should mention that . . . the Minnesota Department of Health told us that a .18 ppm level was "low" and was probably not the cause of our poor health. We spent months trying to determine what was causing our problems. After ruling out everything else, we decided to take a chance that it was formaldehyde, despite what the Health Department told us. We ripped out all of the particle board materials in our home and replaced them with real wood. We have since moved back into our home and are now able to live in it with little difficulty. How many other people are going to be misled (possibly even die) because of a .4 ppm level? Consumers will interpret that level as safe when it is actually extremely hazardous to the health of susceptible individuals.

SUFFER strongly argues that the maximum indoor formaldehyde level should be set at a .1 ppm rather than .4 ppm. A member(s) contends:

(1) Most of the complaints followed by testing of the air resulted in about a 0.2 level.
(2) An infant death has been on record at a 0.2 ppm level.
(3) All of the scientific studies dones on formaldehyde (including the cancer study) have concluded that NO safe level of formaldehyde has been recognized.
(4) 1.6 million workers must work with formaldehyde and approximately 1/3 of these people are under health care. What will it do to them if they must go home to a 0.4 ppm in their house?
(5) Offgassing fluctuates with the temperature and humidity and test results vary with seasonal cycles. A home could test out at 0.4 ppm in December and 1.4 ppm or higher in August.

I cannot support anything but a 0.1 ppm standard, and even that is too high. I have come to the conclusion that there is no safe level and industry should use alternate substances.

16. Hugh D. Westgate, M.D., (practicing at the Minneapolis Medical Center) commented in support of the proposed standard as follows:

Since January of 1979, I have been involved with over 130 families who have had problems with formaldehyde. This involves some 385 people, and of those families, approximately 30 have moved out of their homes at my suggestion. The symptoms that we have seen have varied from severe asthma in a small child, to severe diarrhea and vomiting in infants, to severe respiratory effects with hospitalization in adults and more recently to the onset of undiagnosed convulsions while living in an atmosphere of elevated formaldehyde coming from chipboard and particle board. In our series of 385 patients, some 63% had sensory problems involving running eyes; 48% had respiratory symptoms; 34% complained of chest pain or burning in the chest; 29% of the people over two years of age had diarrhea, and 51% below the age of two had severe diarrhea, 20% of those over two years of age have had nausea and vomiting, and 47% of those less than two years of age have had nausea and vomiting. Some 37% have had difficulties with headaches, memory problems, changes in personality, and changes in sleep patterns.

In January of 1979, an infant died in a mobile home secondary to, I believe, an elevation in formaldehyde. Since that time, we have had four other children who have died in atmospheres in which the formaldehyde was elevated but a cause and effect relationship is not well documented. The formaldehyde was .22 parts per million (ppm) in the first infant's room when it died. We have had an elderly couple who bought a mobile home for retirement and who had severe respiratory distress which resulted in

hospitalization on two of four exposures to the mobile home. The levels in the mobile home were between .6ppm and 1.2ppm. In another recent case, a two-month-old premature infant died in a mobile home, and a second child, 1 1/2 years old, developed severe vomiting, diarrhea, ear infections and sore throats in that time. This child was hospitalized twice for her symptoms and these cleared without any treatment. While living with the grandparents, she became completely symptom free. A two-month--old child was brought to stay with them, and while in the home developed severe vomiting, diarrhea, a skin rash, watering eyes and lost 12 ounces. All symptoms cleared when this child was retured to a conventional home. The formaldehyde level at that time was 0.48ppm. I believe that at the present time there is sufficient evidence to link an environmental factor in mobile homes with human disease. I further feel that evidence is conclusive that formaldehyde vapor given off from building materials utilizing urea-formaldehyde bonding agents is one if not THE cause of symptoms and death in humans particularlly in the elderly, the infant, the allergic patient, people with respiratory disease and perhaps in pregnant women.

It is evident to me that by extrapolating the total vapor concentration breathed by workers during a 40-hour-work week, the maximum non-occupational exposure limit for formaldehyde should be 0.3ppm based on the present OSHA standard or much more reasonably 0.1ppm based on the suggested NIOSH standard. Industrial hygienists have indicated that a threshold limit value for non-working people should be in the range of 1/10 to 1/100 of any industrial standard. This would make a maximum level, once again based on the suggested NIOSH standard, of 0.01-0.1ppm as the maximum concentrations that should be allowed for the consumer.

Dr. Westgate concludes that .3 ppm should be the maximum level of formaldehyde concentration allowed and that no infant under the age of six months be exposed to a level greater than .1 ppm.

17. Doctors William J. Rea and Donald E. Sprague, practicing at the Environmental Health Center in Dallas, Texas, commented:

It has been my and my associates' experience that a .4 ppm of formaldehyde is definitely an unsafe level for any home construction. Why penalize people buying new homes with the threat of immune deficiency disease?

There is no safe level of formaldehyde. We have seen patients sensitized with less than a .1 ppm exposure.

Worse than the direct toxicity of formaldehyde is the havoc that it wreaks with the immune system. These people sensitize to their whole environment. Their lives are irreversibly affected. They literally become allergic to every chemical and food which they come in contact with.

Life in the twentieth century with all its chemical pollution becomes intolerable for them.

There must be a better way to construct houses. In Waco, Texas, the Redmen Mobile Home Company is now producing homes without formaldehyde. Surely, it's not too much to ask of the rest of the housing construction industry.

18. In a 1981 report issued by the National Research Council, the authors summarized the results of studies on human exposure to formaldehyde as follows:

In another attempt to estimate the susceptible population (particularly in relation to eye, nose, and throat sensitivity), information on a small number of healthy young adults exposed to formaldehyde at various concentrations for short periods was considered. At 1.5-3.0 ppm, more than 30% of the subjects tested reported mild to moderate eye, nose, and throat (ENT) irritation symptoms, and 10-20% had strong reactions. When test subjects were exposed at 0.5-1.5 ppm, slight or mild ENT irritation was

noted in more than 30%, but 10-20% still had more marked reactions. Approximately 20% of the subjects had slight ENT irritation in response to formaldehyde at 0.25-0.5 ppm. Finally, at the lowest concentration tested, less than 0.25 ppm, some exposed subjects ("less than 20 percent") still reported minimal to slight ENT discomfort. These data might be interpreted as suggesting that there are subjects, perhaps 10-20% of those tested, who are more responsive and may react acutely to formaldehyde at very low concentrations.

Data on the proportion of the population susceptible to the irritant effects of formaldehyde seem to be consistent. The estimated prevalence of airway hyperreactivity (based on methacholine challenge testing) in the general population is 10-12%, and about 10-20% of the subjects in the study just described showed excessive ENT sensitivity. We may get further information from mobile-home surveys from which environmental and clinical data are available. No measurements of other airborne contaminants were made, so the importance of other substances in the household environment is not known. Irritation symptoms were reported by 30-50% of subjects when formaldehyde concentrations were greater than 0.5 ppm. When the concentration was less than 0.5 ppm, irritation symptoms were reported in fewer than 30% of subjects. Finally, in a more controlled study in which irritation symptoms were investigated, mild irritation responses (doubling of blinking rate) occurred in 11% subjects tested at 0.5 ppm.

In summary, fewer than 20% but perhaps more than 10% of the general population may be susceptible to formaldehyde and may react acutely at very low concentrations, particularly if they are above 1.5 ppm. People report mild ENT discomfort and other symptoms at less than 0.5 ppm , with some noting symptoms at as low as 0.25 ppm. Low-concentration formaldehyde exposures may produce ENT symptoms and possibly lower-airway complaints. In some susceptible persons, an "allergic" reaction to formaldehyde may occur at very low concentrations, causing brochoconstriction and asthmatic symptoms. This particular type of reaction to formaldehyde appears to be uncommon; its exact prevalence cannot now be estimated. pp. 205-206.

18. In a July, 1980, 256-page report done by Professional Consultants in Occupational Health, Inc. (J. M. Berger, Ph.D., M.D.; S. H. Lamm, M.D.) for the Manufactured Housing Institute, all of the studies on the effects of formaldehyde on humans were critically analyzed. The authors concluded that none of the studies have proved that formaldehyde is the cause of any adverse health effects at levels below 3 ppm. In a November, 1981 report aimed specifically at this Minnesota rulemaking proceeding, the above authors made the following conclusions:

Formaldehyde has yet to be shown, after 75 years of experience, to cause adverse health effects in humans at trace levels, i.e. below 3.0 parts per million (ppm). None of the quasi-scientific or scientific literature offered showed otherwise, and the 1981 Report of the National Research Council verified that no substantial evidence to the contrary was available.

There does not appear [to be] a significant risk to humans for cancer from formaldehyde exposures in any type of dwelling, insulated or manufactured or conventional; and the U.S. EPA has verified this in a quantitative cancer risk assessment.

There is a very real risk of altering indoor air quality by sealing up dwellings even tighter. Attempts to conserve energy at any cost appear over-aggressively pursued at the cost of a subjective sense of healthy air. Excessively decreased indoor air turnover is not compatible with ideal indoor air since hundreds of contaminants, substances, conditions and vapors accumulate in such "plastic bag" dwellings, or over-insulated dwellings. Formaldehyde, because it is readily measured, had merely become a proxy for these.

Setting an arbitrary standard of 0.4 ppm of formaldehyde will do virtually nothing to improve indoor air in energy-tight housing, but it may result in preventing thousands of this generation from enjoying ownership in affordable housing. A more reasonable solution is to reverse the unjustified obsession for sealed environments and to provide options for either ventilation increases or minimums, or to rely on various grades of building materials or give the public the choice of how ideal their indoor air should be at various cost steps (product standards).

Results of a survey on over 1000 "complaint" households in both manufactured, insulated and other forms of housing showed: (1) that for most of the population, regardless of housing, symptoms were not distinguishable from background noise, i.e. ordinary incidences and prevalences of common symptoms; (2) that there were fewer symptoms on comparable grounds in conventional housing insulated with UFFI that houses insulated in other ways or not insulated at all; (3) that the excesses of symptoms were seen in households with increased smoker density, an indication of lifestyle contamination of indoor air; (4) and the correlation was extremely strong between symptoms and smoking.

Results of a smaller survey, done in stages in Wisconsin, verified that many symptoms termed "formaldehyde syndrome" were, on closer testing, more strongly statistically associated with aging (growing older), sex, or smoking -- except for "burning eyes " (in contrast to Minnesota and elsewhere where eye irritation was not in excess) or its concomitant, "watery eyes". However, the Wisconsin Health Department admitted it had not appropriately excluded spousal or other smoker effects to account for this apparent anomaly in Wisconsin studies, nor in fact other probable causes, such as food odors, bleaches, detergents, aerosols, high humidity, sinusitis, medications, thyroid and other hormonal alterations, or a host of indoor contaminants (phenol, benzaldehyde, acrolein, acetaldehyde etc.), in energy-tight manufactured housing.

The levels proposed by the standard (0.4ppm) are so extremely low and close to the limits 0.1 ppm, in the best analytical hands, that accuracy, precision and reproducibility for ordinary purposes would be somewhat less than desirable. In the hands of Minnesota's state analytical lab, doing hundreds of these determinations with over three years of experience, blanks alone ranged from 0.2 to 0.67 ppm in their often corrected determinations. Widespread testing for this level in controversies would not necessarily result in agreement, but could result in unrewarding litigation over unverifiable determinations, in the ranges adjacent to zero or undetectable.

Manufactured housing is unknown in Europe where affordable housing means mortgages requiring three generations to pay. "Standards" in Europe are actually ideals or recommendations based on buildings using special grades of particleboard too costly to build with for U.S. requirements in the below $50,000 a home range. The indoor air quality issue in Europe (where housing in general is not as energy-tight as in U.S. manufactured housing) did not appear comparable to our own. It makes little sense to adopt their recommendations without their entire housing codes and building materials.

* * *

"Formaldehyde" has for other subsets of scientists become a rallying point for conflicting philosophic views, like those of the saccharin controversy. Large epidemiological studies on formaldehyde workers did not show meaningfully significant excesses of tumors or organic diseases at significant exposures.

The State of Minnesota, and its invited proponent of formaldehyde regulation from Wisconsin, did not produce, exept by tertiary or

secondary reference, a shred of substantial evidence that at exposures ranging from 0.4 to 3.0 ppm, humans would have adverse health effects from formaldehyde exposures. The oft-quoted tertiary and secondary references may not have even been published, or were never peer-reviewed, or were uncontrolled, or dealt with formalin (not formaldehyde) or showed the opposite of what Wisconsin believed. The two "best studies" offered by Wisconsin were an uncontrolled typewritten report from a regulator in Denmark, and a Ph.D thesis about air in a German chemistry lab containing mixed vapors of formaldehyde, methanol (wood alcohol) and a variety of impurities, not available for scientific peer review in the U. S.

The symptoms "burning eyes" and odor awareness were analyzed in over 1,000 homes in the Minnesota Survey. In manufactured housing, these symptoms did not appear related to formaldehyde, but artifactually introduced by smoking populations at levels below about 2.0 ppm. Similar effects were seen in UFFI complaint homes.

19. The Formaldehyde Institute asserts that there is no scientific evidence to support a .4 ppm standard. Joel R. Bender, Ph.D., M.D., on behalf of the Institute, commented:

> In summary, evidence from the exposure studies strongly indicates the existence of sensory irritation at levels of formaldehyde from 0.8 to 1.2 ppm. Concentrations from 0.4 to 0.7 ppm formaldehyde indicate the presence of some sensory irritation in certain subjects, but evidence is not as strong as in the higher levels. At this time, the evidence for sensory irritation at lower levels is inconclusive and requires further substantiation with appropriately designed and controlled studies.

Legal representatives of the Formaldehyde Institute draw the following conclusion:

> . . . we submit that a reasoned review of the responsible scientific literature supports the conclusion expressed previously by the Formaldehyde Institute that formaldehyde, although known to be an irritant, does not affect any but the most highly sensitized individuals at levels below 0.8 ppm. Accordingly, regulation at a level of 0.4 ppm is simply unwarranted.

20. Both the Manufactured Housing Institute and the Formaldehyde Institute, along with many other comments in the record, insist that the only practical approach to the formaldehyde problem, if one exists, is to impose product standards rather than an indoor air standard. This would include a maximum off-gassing level for all particle board and hardwood panelling and a standard for the correct application and off-gassing of urea formaldehyde foam insulation. The reasons advanced for product standards are the following:

1. There are insufficient testing facilities within the State of Minnesota to conduct the required test on each newly constructed residential unit.

2. The test is not adequately reproducible. The results vary with many variables including temperature, humidity, ventilation, the choice of rooms to be tested, the presence of other indoor air pollutants, and atmospheric conditions such as wind velocity and direction, the presence of rain or standing water, the extent of cloud cover, and the position and intensity of the sun. The draft rule does not account for many of these variables and specifies only a permissible range for others.

3. The Department of Housing and Urban Development (HUD) is drafting formaldehyde regulations based upon a product standard which will be incompatible with and will preempt the proposed ambient air standard.

4. The test measures formaldehyde emitted from sources other than building materials containing urea formaldehyde, contrary to the claimed statutory authority.

5. The test conditions for the air sampling can be difficult, and at some times of the year impossible, to achieve. Even when achievable, the test conditions often require an unrealistic or abnormal living situation.

6. The ambient air test must be conducted on each residential unit because the many variables which affect it do not permit reliable "spot checking".

7. The ambient air test cannot be conducted until after the residential unit is constructed, at which time it may be economically infeasible to modify a unit which does not meet the 0.4 ppm standard.

8. The ambient air standard does not apply and cannot easily be applied to remodeling or and additions to currently existing residential units.

21. The Formaldehyde Institute has drafted and submitted to the Consumer Product Safety Commission an installation and product standard for UFFI. This standard has been endorsed by UFFI manufacturers in the United States. Clyde Frank, Ph.D., and Keith Long, Ph.D., Institute of Agricultural Medicine, University of Iowa, contend that this standard will reduce formaldehyde emissions from properly installed urea formaldehyde foam insulation to approximately ambient levels.

In a study which compared formaldehyde levels in conventional homes which contained UFFI to homes which did not, it was found that the mean level in the first group was .12 ppm as compared to a .03 ppm level in the second. At the time the measurements were taken, the mean outdoor ambient formaldehyde level was .02 ppm. Studies have shown that properly mixed and installed UFFI will add negligible amounts to the already existing formaldehyde level in a conventional home.

22. The Insulation Contractors Association Northwest argues that the cost of the two testing procedures would approximate the cost of the UFFI installation itself. With the added inconvenience of requiring the homeowner to remove drapery and furniture and eliminate formaldehyde producing activities prior to testing, the rule would effectively ban the use of UFFI in Minnesota.

23. Both the National Particleboard Association and the Hardwood Plywood Manufacturers Association are proposing product standards which limit the amount of formaldehyde gas that can be emitted from the wood products. The Formaldehyde Institute states that the particle board standard was due to go into effect by way of voluntary industry compliance on January 1, 1982. The plywood standard is currently being circulated for approval among the Association members.

The actual ambient or indoor air level of formaldehyde is dependent, however, not only on the amount of gas given off by each board but also on the amount of board present in a room ("loading") or rooms adjacent.

24. In order to comply with a .4 ppm standard in newly constructed housing units where building materials containing urea formaldehyde are presently being

used, several alternatives are available.[2] First, plywood and particleboard can be sealed or fumigated with ammonia to lessen the escape of formaldehyde gas. These methods would require a substantial investment in equipment, space and people for essentially untested techniques. Second, use of phenol formaldehyde resins instead of urea formaldehyde resins can eliminate emissions by as much as 95% short-term, and 75% long-term. This woud increase the cost of particleboard by 50 to 100% and plywood from 10 to 20%. Third, substitute materials can be used which contain little or no formaldehyde resins. These substitutes may result in necessary structural modifications to the housing unit, at substantially higher costs. See, Scoping Level Estimates of Selected Costs and Other Economic Effects of Potential Regulations Limiting Formaldehyde Exposure (December 10, 1980).

Estimates as to the actual cost per unit of compliance with a .4 ppm formaldehyde level vary greatly. (These estimates were for manufactured housing and not conventional homes.) The Minnesota Health Department contends that the added cost to the consumer of a housing unit which complies with a .5 ppm standard is between $217 and $690. The Department has no cost figures for the proposed .4 ppm standard but does not think the cost would be significantly more. The Formaldehyde Institute and the Wisconsin Department of Health and Human Services both agree that the cost to the consumer will be in the neighborhood of $2,500 to $3,000, excluding the cost of testing. Walter Benning, president of the Manufactured Housing Institute (MHI), stated that the manufactured housing industry in Minnesota will not be able to meet the .4 ppm standard at this time. He asserts that compliance costs will have a disastrous effect on the ability of low income Minnesotans to purchase affordable housing, i.e., a manufactured home.

25. The NIOSH chromotropic acid test will cost the tester between $200 and $400 per test, depending in part on the proximity of laboratories and technicians trained in the NIOSH method. The publication describing the method claims that it is precise between .1 ppm and 2 ppm within five percent. Kenneth Trautman, Industrial Environmental Hygiene consultant, testified on behalf of the Manufactured Housing Institute that at the level of .4 ppm, analytical error in the NIOSH test would range from 10 to 200%.

The rule requires that, for new housing units, air samples be taken from at least the kitchen and a bedroom after an airing and a close-up period. For UFFI, the level of formaldehyde must be measured within two weeks prior to installation and again within 30 days after installation. Additionally, the homeowner must remove all sources of formaldehyde from the house before the samples are taken. These include draperies and furniture which are less than two years old.

Testing must be done at an indoor temperature between 70 and 85 degrees Fahrenheit, and then is corrected by formula to a 78-degree condition. Ambient humidity and a maximum level of one air change per hour provided by a

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[2] This would apply primarily to manufactured housing (mobile homes) and townhouse and condominium-type units in which plywood or particleboard are a major component of walls, ceilings, counters and cabinets. "Regular" conventional housing may not be so affected. In all conventional housing units, construction is usually slower paced and out-of-doors, allowing for greater ventilation and dissipation of formaldehyde off-gassing.

built-in ventilation system are also prescribed. No smoking is allowed. No correction is made, however, for the outdoor, ambient formaldehyde level.

26. At the present time, the only laboratories equipped to process the NIOSH chromotropic tests are located in the metropolitan area. Samples taken in out-state Minnesota will experience a delay before being analyzed. There is no estimate as to the degree of error this delay may cause. Serious questions have arisen concerning the ability of Minnesota laboratory facilities to handle the large number of chromotropic tests which must be performed if this rule were to go into effect.

The test procedure stated in the rule requires that all doors and windows be shut, thus minimizing outside ventilation. However, the rule requires that the temperature be adjusted to a 78-degree emission level. The Manufactured Housing Institute argues that adjustment to 78 degrees, after measurement with all doors and windows closed, is inconsistent with true life living conditions. In addition, ambient humidity may be markedly higher in the summer months, making measured formaldehyde levels higher if all other factors are constant.[3] Ventilation is required to be maintained at the same level during testing as during the airing period (at least one air change per hour). If an air exchange device is provided in the housing unit, a maximum rate of one air change per hour is also allowed. The record shows that adequate, or increased, ventilation is the most important factor in eliminating household contaminants from all sources, including urea formaldehyde.

The NIOSH test measures the level of formaldehyde in the air and cannot distinguish between that emitted from urea formaldehyde emitters and that emitted from other sources. Consequently, although the rule only regulates formaldehyde levels from building materials containing urea formaldehyde and urea formaldehyde foam insulation, any other source may skew the test result. In newly constructed housing units, other formaldehyde emitters should not be present. The UFFI testing procedure states that all other sources of formaldehyde must be removed from the house prior to testing, however.

27. The rule mandates that no habitable room in a housing unit shall contain more than a .4 ppm formaldehyde level (whether the unit is newly constructed or is insulated with urea formaldehyde foam). However, only air tests in the kitchen and one bedroom are required. MHI questions potential liability for the housing seller or UFFI installer if a "habitable" room other than one initially tested should result in a level over .4 ppm. MHI contends that the rule really requires that all rooms of a housing unit must be tested to avoid liability.

The rule does not speak to the type of testing which must done if a home buyer or insulation consumer desires to contest the level of formaldehyde found or has health problems which he/she attribute to excess levels of formaldehyde. If .39 ppm is within the law and .41 ppm is in violation, test variables already discussed may be the focal point of argument and litigation.

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[3] Although the record shows that formaldehyde emission increases with higher humidity, no formula has been scientifically devised to correct for this factor.

28. The following legal arguments were raised by MHI, the Formaldehyde Institute and indirectly, by other persons who gave oral testimony or submitted written comments:

A. The Rule exceeds the statutory authority of the Commissioner of Health.

(1) The statute does not authorize a sales ban.

The consequences of failing to meet the .4 ppm standard for manufactured housing is that the unit(s) cannot be sold. MHI argues that the Health Department is authorized only to establish standards governing the sale of building materials and housing units that contain products made with urea formaldehyde. Minn. Stat. § 144.495. The effect of the proposed rule would be a sales ban, rather than a regulation of the sale of urea formaldehyde-containing products. MHI argues that such a bar is inconsistent with the warning requirements enacted by the Legislature. Minn. Stat. § 325F.18.

Although compliance with .4 ppm standard may require new technology which will add to the cost of housing units, the record shows that there are several methods now available which could be implemented immediately to avoid a "ban" on the sale of manufactured housing. Proponents of product standards contend that that is the only way to be assured that formaldehyde levels would be within acceptable limits and avoid a ban on sales. However, the Health Department has chosen to take the alternative approach to regulation, that is, to set a maximum air standard. The record does not show that imposition of this standard will result in a ban on the sale of housing units. Methods to reduce formaldehyde emissions can be employed before, during or after the construction of a housing unit. The Examiner does not find that the proposed rule goes beyond statutory authority because it would ban the sale of housing units.

Regarding urea formaldehyde foam insulation, the Examiner has already made a finding that the effect of the proposed rule would essentially make the sale of UFFI impractical and economically unfeasible to the consumer. This "ban" will be discussed, infra, in the finding dealing with issues of reasonableness.

(2) The prerequisite finding of a significant health problem has not been properly made.

MHI argues that, at most, the Health Department, and the Commissioner, has shown that formaldehyde gas presents insignificant health effects to humans. Absent the existence of the type of significant health problems envisioned by the Legislature, the Department has no authority to promulgate the rule herein. Additionally, MHI contends that the Commissioner's determination that a "significant health problem" exists falls within the definition of a rule and should have been promulgated as such.

"Rule" is defined in Minn. Stat. § 15.0411, subd. 3, as "every agency statement of general applicability and future effect . . . made to implement or make specific the law enforced by it . . ." In Minn. Stat. § 144.495, the Legislature, quite simply, provided that before the Commissioner could promulgate any rules regulating products containing urea formaldehyde, he must find reasons for the rule promulgation, i.e., that a "significant health problem is presented by the use of building materials that emit formaldehyde gases."

This Finding, at least regarding this rule proposal, is not an "agency statement of general applicability and future effect." It has no effect whatsoever on the rule proposal which must be shown by the agency to be needed, reasonable and within prescribed statutory authority.[4]

The Legislature left it within the discretion of the Commissioner of Health, imposing no objective criteria, to determine whether or not a "significant health problem" did exist. This determination was merely a procedural step which had to be followed prior to the promulgation of the rules now at issue. Because that determination has no substantive effect on this proceeding, the Hearing Examiner has no reason to question or substitute his judgment for that of the Commissioner of Health on this issue. The Commissioner must still bear the burden of establishing the "need for" the proposed rule at hearing, which may be met by showing that a "significant health problem" exists.

(3) The proposed rule goes beyond the regulation of urea formaldehyde.

Because the NIOSH chromotropic acid test measures formaldehyde emitted from all sources, and the statute only allows for the regulation of building materials containing urea formaldehyde, MHI argues that the proposed rule goes beyond statutory authority. Typical household items, including paper products, textiles, personal hygiene products, carpeting, draperies and furniture are made with urea, phenol and melamine formaldehyde resins. The formaldehyde emitted from each of these resins reads the same when measured by the chromotropic method, however.

The proposed rule requires that newly constructed housing units be tested at some before or at the time of sale. At this point, formaldehyde emitters introduced by occupants should not be present. The background outdoor ambient formaldehyde level is also negligible when compared to a standard of .4 ppm. Regarding new housing units, the Examiner does not find statutory authority lacking because all formaldehyde emissions are measured by the NIOSH test does not differentiate between formaldehyde emitters.[5]

Testing prior and subsequent to the installation of UFFI in conventional homes, homes which the Hearing Examiner assumes will be occupied and lived in, will necesssrily result in measuring formaldehyde from all sources not easily removable from the premises. This will include carpet and all particleboard and hardwood plywood that was either put in the house when it was constructed or added to later as a part of a remodelling project. Consequently, a UFFI installer may be foreclosed from selling his product because of the level of formaldehyde emissions already present in the house regardless of how little the foam may contribute to the level. This is not what the Legislature

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[4] The Examiner has no reason to address the issue of whether the finding of a "significant health problem" should have been promulgated as a rule because of the fact that it triggers the effectiveness of Minn. Stat. § 325F.18.

[5] At some time in the future, if industry chooses either by requirement of law or on its own prerogative to lessen formaldehyde emissions from particleboard and hardwood plywood by using phenol formaldehyde resins, the Legislature will have to re-evaluate the statutory framework which permits only regulation of products which contain urea formaldehyde.

intended and would result in a rule which is in excess of statutory authority. This issue will be further discussed in terms of reasonableness, infra.

B. The proposed rule has been pre-empted by the Federal Government.

MHI argues that pursuant to the Housing and Community Development Act of 1974, 42 U.S.C. § 5401 et seq., the Department of Housing and Urban Development (HUD) is investigating and will propose product standards for formaldehyde emitters in mobile homes. State regulation will then be pre-empted. MHI contends that rather than an indoor air standard, Minnesota should be considering the adoption of product standards to ease the transition when federal regulations become effective.

The Hearing Examiner is not aware, however, that any federal regulations have been adopted which pre-empt any area covered by the rule at issue herein. If that should happen, the Health Department, the Building Code Division, and the Legislature will have to act accordingly. At present, there is no pre-emption by the Federal Government, and the State of Minnesota is free to act for the purpose of safeguarding the health and prosperity of its citizenry as it deems appropriate.

C. Minn. Stat. § 327.32, subd. 5, prohibits the Commissioner of Health from adopting an air standard for mobile homes.

The mobile home building code (amended by Minn. Laws 1981, Ch. 365, to be entitled "Manufactured Home Building Code"), Minn. Stat. § 327.31 et seq. (1980), sets forth the construction standards for mobile homes. Subdivision 5 of Minn. Stat. § 327.32 provides:

> No mobile home which bears a seal as provided herein shall be required by any agency or political subdivision of this state to comply with any other building, plumbing, heating, or electrical code or any construction standards other than the code as defined in sections 327.31 to 327.34 nor be subject to any other state or local building inspection, except as the commissioner shall, by rule, provide in the case of alterations.

The proposed rule herein may be viewed as a construction standard for the mobile home industry. Even so, legislative authority to promulgate the proposed rule was enacted subsequent to the above general provision and should be construed as an exception to it. Minn. Stat. § 645.26, subds. 1, 4 (1980). The Hearing Examiner cannot find that the proposed rule is in violation of the manufactured home building code.

D. MHI raises other constitutional considerations, arguing on several grounds, that the proposed rule is not constitutionally valid. The Hearing Examiner has no authority to decide constitutional issues which may invalidate a statute or rule, however. These arguments are more appropriately raised in the judicial forum.

29. Minn. Stat. § 15.0412, subd. 4c, provides that the agency must make an "affirmative presentation of facts establishing the need for and reasonableness of the rule proposed for adoption. . . ." These issues will be discussed separately.

A. The Hearing Examiner finds that the Department has made an affirmative presentation of facts establishing the need for regulation of the level of formaldehyde gas people are exposed to in their homes. No one involved in these proceedings would not agree that at some level, formaldehyde gas becomes at least annoying to most persons, and does pose significant health risks if

exposure is continuous at high levels. The Federal Occupational Safety and Health Administration saw fit to set a maximum exposure level at 3 ppm for an eight-hour time weighted average. Surely, possible 24-hour per day exposure in one's own home deserves no less protection. Some Minnesota homes tested as part of the complaint study were found to contain more than the 3 ppm limit allowed by OSHA. This included both manufactured housing and houses insulated with urea formaldehyde foam insulation. The critical issue is what is a reasonable level of regulation when considering the risk to human health and the costs associated with compliance by industry.

B. The Hearing Examiner finds that the Department has not demonstrated that the proposed rule is reasonable as it relates to the regulation of UFFI. As was stated in previous findings, the effect of the rule will be to essentially ban the sale of urea formaldehyde foam insulation because of the extra costs associated with testing and the inconvenience to consumers imposed by the testing requirements. This is an unreasonable result which was not intended by the Legislature. Can Manufacturers Institute, Inc. v. State, 289 N.W.2d 416 (Minn. 1979); Wallace v. Commissioner, 289 Minn. 220, 184 N.W.2d 588 (1971). An administrative body may not use rule promulgation to change or add to the law. Holland v. State, 115 N.W.2d 161 (Iowa 1962). The Legislature authorized the Commissioner of Health to regulate the sale of UFFI, not to effectively ban its sale by unreasonable restriction.

The record shows that correctly mixed and installed urea formaldehyde foam will not add significantly to the formaldehyde level already present in the home. Product standards have been devised which will accomplish this goal. Adoption of a product standard by the Minnesota Department of Health regarding the installation of UFFI will correct the defect noted in this Finding. This type of standard will also not result in the foreclosure of UFFI installation because of emitters already present in the structure of the home. See, Finding 28A.

C. The Hearing Examiner finds that the Department of Health has not established the reasonableness of a .4 ppm standard by an affirmative presentation of facts in the record. The Department contends that the .4 ppm standard will provide the necessary degree of health protection to the vast majority of the public. There is nothing in the record, however, to justify the selection of a .4 ppm standard rather than .1, .3, or .6 other than the fact that the lesser concentration that exists, the less chance there is that any effects may be felt. Even that assumption is questionable, however, based upon the wide disparity of study results. No threshold limit value has been found for formaldehyde and the health effects it is supposed to produce. Industry compliance at this level would result in a substantial cost to the consuming public, most of whom would not need this degree of protection.

None of the human exposure studies relied upon by the Health Department show a causal relationship, or a dose-response effect for formaldehyde concentrations. All that was found was that at certain levels, people become aware of the presence of formaldehyde and may experience some irritation or discomfort. These effects were initially felt by subjects at levels ranging from .01 ppm to over 1.5 ppm. The Wisconsin complaint study could find no threshold level or dose-response effect. The only physical

symptom that even could be associated with the level of formaldehyde was eye irritation. The Minnesota complaint study found that in three-quarters of the complaining homes, the level of formaldehyde measured was less than the .4 ppm limit now proposed. Neither complaint study could show that the symptoms complained of were not merely regular colds, the flu or the result of energy efficiency, rather than formaldehyde related.

What is very disconcerting is the small segment of persons who claim to be severely affected by very low levels of formaldehyde. There is sufficient evidence in the record to convince the Examiner that there is a hyper-sensitive population who will react acutely to much less than the .4 ppm. level proposed. For these persons, extra precautions will have to be taken, absent a legislative decision to ban urea formaldehyde (and perhaps other emitters) from the market place.

Because the studies yield such varied results and none can pinpoint what minimum level of formaldehyde exposure is detrimental to a person's health, or even will result in irritational awareness, the proposed level of .4 ppm is like picking a number out of a hat. That is not to say, however, that some level of regulation is not warranted.

After a review of the materials submitted in this matter, the Examiner finds that the record will support the reasonableness of a .8 ppm maximum formaldehyde level for newly-constructed housing units. Substitution of this level for .4 ppm will correct the defect noted herein. At the .8 ppm level, most persons become aware of the presence of formaldehyde, either by odor or by some type of irritational response. The Formaldehyde Institute (See, Finding 19) and Dr. Bender admit that above the level of .8 ppm, the studies show the existence of sensory irritation for most people. If the level of formaldehyde exposure which is to be applied to the population at large is derived from an occupational standard (here, the OSHA standard of 3 ppm over an 8-hour day), the general rule is to reduce the level by an added factor for added hours of exposure. Using the Minnesota and U.S. Industrial Hygiene Field Operations Manual, the equivalent permissible exposure for the general populace would be slightly over .7 ppm.

As was stated previously, a .8 ppm level will not protect the hyper-sensitive population, but neither would a .4 ppm or perhaps even a .1 ppm level. Because formaldehyde emissions diminish over time, a .8 ppm maximum level will be short-lived in a new home. Reduced costs of compliance and new technology will keep manufactured housing a viable alternative for Minnesota consumers. This level can then be amended upward or downward, depending on the results of more comprehensive studies now being done, and possible legislative directives.

D. The Hearing Examiner finds that the Health Department has demonstrated the reasonableness of using the NIOSH test method, however. Certain aspects of the procedure must be revised. The chromotropic acid test has been shown to be the most reliable indicator of actual formaldehyde levels. The rule is illegally vague, however, because it does not make clear the degree of testing required to avoid liability. This vagueness constitutes a violation of a substantive provision of law. Thompson v. City of Minneapolis, 300 N.W.2d 769 (Minn. 1980). Tests in the kitchen and one

bedroom are required, however, the rule prescribes that no habitable room shall exceed the maximum concentration. Requiring every habitable room to be tested may be cost prohibitive, but mandated compliance for only two rooms could result in "loading" the others. To correct this defect, a provision could be added to the rule specifying that only the kitchen and one bedroom need to be tested for compliance if the use of products containing urea formaldehyde is consistent throughout the unit.

There is no evidence in the record to show that measurement differences which may result from humidity and ventilation variables inherent in the testing procedure will be significant. The same would apply to outdoor ambient levels of formaldehyde in most testing locations. As Ms. Bouchard suggested at the hearing, however, it may be appropriate to add a provision allowing for the reduction of an outside formaldehyde level if it can be shown to be substantial. A .8 ppm maximum level should allow enough leeway so that the effect of these variables will not mean the difference between compliance and non-compliance for the manufacturer.

Based upon the foregoing Findings of Fact, the Hearing Examiner makes the following:

CONCLUSIONS

1. That the Department of Health gave proper notice of the hearing in this matter.

2. That the Department has fulfilled the procedural requirements of Minn. Stat. § 15.0412, subd. 4-4f (1980) and all other procedural requirements of law or rule.

3. That the Department has demonstrated its statutory authority to adopt the proposed rules and has fulfilled all other substantive requirements of law or rule within the meaning of Minn. Stat. §§ 15.0412, subd. 4e and 15.052, subd. 3(4)(i) and (ii) (1980), except as noted at Finding 28A.

4. That the Department has documented the need for and reasonableness of its proposed rules with an affirmative presentation of facts in the record within the meaning of Minn. Stat. § 15.0412, subd. 4c (1980), except as noted at Finding 29.

5. That the amendments and additions to the proposed rules which were suggested by the Department after publication of the proposed rules in the State Register do not result in rules which are substantially different from the proposed rules as published in the State Register within the meaning of Minn. Stat. § 15.0412, subd. 4d (1980) and 9 MCAR §§ 2.110 A. and 2.111 (1980 Ed.).

6. That the Hearing Examiner has suggested action to correct the defects cited in Conclusion 4 as noted at Finding 29.

7. That due to Conclusion 4, this Report has been submitted to the Chief Hearing Examiner for his approval pursuant to Minn. Stat. § 15.0412, subd. 4d (1980).

8. That any Findings which might properly be termed Conclusions and any Conclusions which might properly be termed Findings are hereby adopted as such.

9. That a finding or conclusion of need and reasonableness in regard to any particular rule subsection does not preclude and should not discourage the Department of Health from further modification of the proposed rules based

upon an examination of the public comments, provided that no substantial change is made from the proposed rules as originally published, and provided that the rule finally adopted is based upon facts appearing in this rule hearing record.

Based upon the foregoing Conclusions, the Hearing Examiner makes the following:

RECOMMENDATION

It is hereby recommended that the proposed rules be adopted except where specifically otherwise noted above.

Dated this 17th day of February, 1982.

Peter C. Erickson

PETER C. ERICKSON
Hearing Examiner

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS

FOR THE DEPARTMENT OF HEALTH

IN THE MATTER OF THE PROPOSED ADOPTION OF RULES OF THE STATE COMMISSIONER OF HEALTH GOVERNING FORMALDEHYDE IN HOUSING UNITS.

REPORT OF THE CHIEF HEARING EXAMINER

The above-entitled matter came on for review by the Chief Hearing Examiner pursuant to the provisions of Minn. Stat. § 15.0412, subd. 4d (1980) which provides in part:

> If the [hearing examiner's] report contains a finding that the proposed rule is substantially different from that which was proposed at the public hearing, or that the agency has not met the requirements of section 15.0412, subdivisions 4 through 4f, it shall be submitted to the chief hearing examiner for approval. If the chief hearing examiner approves the finding of the hearing examiner, he shall advise the agency of actions which will correct the defects, and the agency shall not adopt the rule until the chief hearing examiner determines that the defects have been corrected. If the chief hearing examiner determines that the need for and reasonableness of the rule has not been established pursuant to subdivision 4, clause (c), and if the agency does not elect to follow the suggested actions of the hearing examiner to correct that defect, then the agency shall submit the proposed rule to the legislative commission to review administrative rules for the commission's advice and comment. The agency shall not proceed to adopt the rule until it has received and considered the advice of the commission; provided, that the agency is not required to delay adoption longer than 30 days after the commission's receipt of the agency's submission.

The record in this matter is extensive, including several thousnads of pages of hearing testimony, public comments, and studies prepared by the Department of Health (hereinafter "Department"), the industries to be regulated by the rules, and many others. The Chief Hearing Examiner's review of this record has not included the reading of the entire record but has included a review of much of the materials and conferences with Hearing Examiner Peter C. Erickson who heard the testimony and reviewed all of the record. The purpose for the conferences was to have the Hearing Examiner direct the Chief Hearing Examiner to those parts of the record which would aid in resolving questions in the mind of the Chief Hearing Examiner.

In addition to the record in these proceedings, two things have occurred since the close of the record in this case which have received wide coverage by the television, radio and newspaper media and which relate directly to the issues in this case. Both of these items have now become fairly common knowledge due to the very wide news coverage and consist of the type of information which prudent prersons rely upon in the course of their everyday affairs. As such, they can be taken into consideration in any discussion of the use of urea formaldehyde foam insulation (hereinafter UFFI) and building materials which emit formaldehyde gases. First, the 3M Company has developed

a disposable formaldehyde testing device which is sold at the retail level for $35.00, plus sales tax. Second, on Monday, February 22, 1982, the United States Consumer Product Safety Commission, by a vote of 4 to 1, has made final its previously-proposed ban on the use of UFFI, which ban becomes effective 130 days after its publication in the Federal Register, unless restrained or overturned by a court of law.

As will be discussed later, the 3M product may prove to be significant under these rules as an acceptable alternative testing method. However, the ban by the U. S. C.P.S.C., as it is not yet in effect and could be prevented from becoming effective for some period of time, has not been taken into consideration during the review of these rules. The rules must rise or fall on the record in this proceeding and the support for the rules contained therein.

In his report dated February 17, 1982, the Hearing Examiner found and concluded adversely to the interests of the Department in several respects. The scope of review by the Chief Hearing Examiner is limited to those points. At Finding 28 A., the Examiner has found that as the rule applies to UFFI, it goes beyond statutory authority in that it effectively prohibits the use of UFFI. At Finding 29, the Examiner has found that the rule is not reasonable as it applies to UFFI because it would essentially ban its sale, and that the Department has failed to establish the reasonableness of a .4 ppm standard. In order to correct these defects, the Examiner has advised the Department that it should adopt a product standard for UFFI and raise the air standard to .8 ppm. Finally, the Examiner, while finding the use of the NIOSH test to be reasonable, concludes that the rule is illegally vague because it only requires testing the kitchen and one bedroom while the rule mandates that no habitable room shall exceed the maximum ppm standard. The Examiner has advised that the rule must require testing in every habitable room. Each of these findings will be discussed herein.

NIOSH TEST

The rule requires the seller of a newly-constructed house to be responsible for assuring that no habitable room exceeds the ppm standard. It imposes the same responsibility on the installer of UFFI. At 7 MCAR § 1.448 E.3, the rules provide that "At a minimum" the tests are to be taken in the kitchen and one bedroom. Given the mandate that the seller or installer are responsible for compliance with the rule and the "at a minimum" language, the Chief Hearing Examiner does not agree that the rule is impermissable vague. The rule is clear! The ppm standard must be met in all habitable rooms, and the seller or installer is responsible for compliance. The fact that the rule requires only two rooms to be tested does not prevent anyone from measuring all rooms nor does it relieve the seller or installer from the responsibility for compliance.

STATUTORY AUTHORITY

Minn. Stat. § 144.495 (1980) authorizes the Commissioner of the Department of Health (hereinafter "Commissioner") to promulgate rules "establishing standards governing the sale of building materials and housing units that contain products made with urea formaldehyde". That language is prefaced by the requirement that the Commissioner determine that a significant health

problem is presented by the use of such building materials. That "condition precedent" to the promulgation of the rules is important as will be discussed later.

In effect, the Examiner has concluded that the authority to "regulate" does not include the authority to "ban", either directly or indirectly. The Chief Hearing Examiner does not agree. The power to regulate includes the power or authority to restrict, protect, control, restrain, limit and prohibit. Virginian Ry. Co. v. System Federation No. 40, Railway Employees Department of American Federation of Labor, C. CA. Va., 84 F.2d 641, 650; United States vs. Darby, 312 U.S. 100, 657, 61 S. Ct. 451, 456; Farmington River Co. v. Town Plan and Zoning Commission of Town of Farmington, 25 Conn. Sup. 125, 197 A.2d 653.

REASONABLENESS

It is clear that the Legislature desires to regulate the use of formaldehyde in buildings to be used for human habitation as a result of health hazards which can occur through the use of formaldehyde. In so doing, it delegated authority to adopt rules having the force and effect of law to the Commissioner of the Health Department rather than the Comissioner of the Department of Administration who is generally responsible for regulating building or product standards through the enforcement of the State Building Code. Thus, the Legislature intended that standards be adopted relating to not "how" something is constructed, but what results from what has been built. The Commissioner of Administration has expertise in the area of building construction and thus product standards. The Commissioner of Health has expertise in the area of human health hazards and thus air quality standards. Agency expertise is a very important factor which must be given due consideration when discussing both the authority to act and the reasonableness of the rules when the rules to be adopted are a result of policy decisions by the agency.

When making an affirmative presentation of facts establishing the reasonablenss of its rules as required by the Minnesota Administrative Procedure Act, an agency may rely on either adjudicative or legislative facts, depending on the nature of the rule to be adopted. An adjudicative fact is one which can be probed and tested through questioning and presentation of contrary evidence. They generally answer the quetions of who did what, where, when, how, why and with what motive or intent. Examples of adjudicative facts in this proceeding can be seen in the ppm readings from the tests conducted by the various interested parties involved in the hearing process. If an agency relies on adjudicative facts alone to support its position, the agency has not only the burden of "going forward" with its evidence, but it has the burden of proving that its facts are more credible than facts presented in opposition. In other words, it has the "burden of proof".

Legislative facts are generally statements of an agency's policy decision. They are general facts concerning questions of law, policy and discretion, or argument in support of a policy. These may be questioned but, if within the agency's authority and its expertise, will be given deference. When presenting its "case" using legislative facts, the agency bears a burden of "adducing a reasoned presentation supporting the reliability of its

methodology". United States v. Nova Scotia Food Products Corp., 568 F.2d 240 (2nd Cir. 1977); International Harvester Co. v. Ruckelshaus, 478 F.2d 615, 642-643 (D.C. Cir. 1973). If legislative facts are used to support a rule and the legislative fact, or policy decision, is based on adjudicative facts, the latter can be questioned to determine whether or not the policy decision is based on correct facts or data. (See also, St. Paul Area Chamber of Commerce v. Minnesota Public Service Commission, 251 N.W.2d 350, 357-7 (Minn. 1977) for discussion of adjudicative and legislative facts.)

In this case, the Legislature imposed a condition precedent to the promulgation of the rules. It required the Commissioner to make a determination that a significant health problem existed prior to taking any rulemaking action. (The Hearing Examiner discusses this determination very adequately at Findings 28 A.(2), pages 16 and 17, so it will not be discussed further here.) Once making the required determinations, the Commissioner was given wide discretion to choose the method he deemed appropriate to regulate the industry. The Commissioner chose the "air quality" method rather than the "product standard" method, which is entirely reasonable given the areas of expertise of the Health Department, as opposed to the expertise of the Department of Administration.

The "condition precedent" imposed on the Commissioner in this case is not unlike the requirement imposed on the United States Secretary of Labor prior to the adoption of OSHA standards. The Secretary must make a preliminary finding characterizing a place of employment as unsafe prior to proposing rules. The Secretary has an obligation to find that a "significant risk" is present. In Marshall v. American Petroleum Institute et al, decided by the United States Supreme Court on July 2, 1980 (see 48 LW 5022), the Court made a number of decisions relative to the Secretary's authority which appear to be equally appropriate in this proceeding.

In the A.P.I. case, the Secretary of Labor sought to establish a standard for benzene. The Supreme Court rejcted the proposed standard because it was based on findings unsupported by the administrative record and because it had not been shown that the standard was reasonably necessary or appropriate to provide safe and healthful employment. It stated that standards could not be adopted which are designed to create absolutely risk-free workplaces regardless of cost. The Secretary's rationale for lowering the permissable limit for benzene to 1 ppm was based on a series of assumptions indicating that some leukemias might result from exposure to 10 ppm and that the number of leukemia cases might be reduced by reducing the exposure level to 1ppm. The Secretary's conclusion was based not on evidence but rather on the assumption that the risk of leukemia will decrease as exposure levels decrease. The agency had not undertaken any cost-benefit analysis in arriving at its decision. The Court discussed and described the "significant risk" standard as follows:

> "...'significant risk' is not a mathematical straight-jacket. ...Some risks are plainly acceptable and others are plainly unacceptable. If, for example, the odds are one in a billion that a person will die from cancer by taking a drink of chlorinated water, the risk clearly could not be considered significant. On the other hand, if the odds are one in a thousand that regular inhalation of gasoline vapors that are two percent benzene will be fatal,

> a reasonable person might well consider the risk significant and take appropriate steps to decrease or eliminate it. ...Second, OSHA is not required to support its finding that a significant risk exists with anything approaching scientific certainty... Thus, so long as they are supported by a body of reputable scientific thought, the Agency is free to use conservative assumptions in interpreting the data with respect to carcinogens, risking error on the sie of over-protection rather than under-protection."

The parallels between the A.P.I. case and this proceeding are many: both involve a requirement that a significant risk or health problem exists before taking action; both involve the establishment of an air quality standard for a chemical which could be classified as a carcinogen; both involve increased costs to industry if adopted; and both involve the exercise of agency discretion in using scientific facts to arrive at a legislative fact, the setting of the standard. However, where the Secretary failed to establish a record to support a ppm standard beyond the agency's assumption that if 10 ppm is fairly safe, 1 ppm must be safer, the Commissioner has presented much evidence in support of his proposed standard, including the potential increase in building costs occasioned by a lower standard.

"Reasonablenss" of rules is a requirement which has been present for some time. In addition to being consistent with law, regulations to be valid must be reasonable. Juster Bros. v. Christgan, 214 Minn. 108, 7 N.W.2d 501, 507 (1943); Accord, Lee v. Delmont, 228 Minn. 101, 36 N.W.2d 530, 539 (1949). An unreasonable rule is most often equated with an arbitrary rule. Hurley v. Chafee, 231 Minn. 362, 43 N.W.2d 281, 284 (1950); In re Application of Byron M. Hansen, 275 N.W.2d 790 (Minn. 1978).

An agency must have a reasonable ground or basis for the exercise of its judgement. American Trucking Associaition, Inc. v. U. S., 344 U.S. 298, 314, 97 L.Ed. 327, 73 S.Ct. 307 (1953). A rule is not unreasonable simply because a more reasonable alternative exists or a better job of drafting might have been done. (See Federal Security Administrator v. Quaker Oats Co., 318 U.S. 218, 233, 87 L.Ed. 724, 63 S.Ct. 589, 158 ALR 832 (1943), and Pitts v. Perluss, 27 Cal. Rptr. 19, 377 P.2d 83, 89, 58 Cal.2d 824 (1962) for general discussion of the "more reasonable" concept.) A rule must be rationally related to the end sought to be achieved by the statute. Sterling Secret Service Inc. v. Michigan Dept. of State Police, 20 Mich. App. 502, 174 N.W.2d 298, 304 (1969).

During the decade of the 70's, there has been a steadily increasing number of cases decided arising out of rules of federal agencies involving the establishment of air quality or other standards, the burden on the agency proposing them, and rules adopted based on legislative facts.

In Natural Resources Defense Council v. SEC, 606 F.2d 1031, 1058-59 (D.C. Cir. 1979) the court stated: "The absence of firm data did not preclude the SEC from adopting or declining to adopt rules. Rather, it shows that the SEC was required to make a quasi-legislative policy judgement." Likewise, in FCC v. National Citizens Committee for Broadcasting, 436 U.S. 775, 814 (1978), the Court said that: "Evidence is not needed to support a finding of 'judgemental' or 'predictive' facts." In that case, the Court found that the determinations "were primarily of a judgemental or predictive nature" and that therefore "complete factual support in the record for the Commission's

prediction is not possible or required." Again, the SEC was told that in reviewing self-regulatory organizations' rules, it (SEC) need not subject factual premises to careful inquiry because the rules may be based upon policy considerations and administrative expertise which cannot be reduced to specific evidentiary facts. Belenke v. SEC, 606 F.2d 193, 198 (7th Cir. 1979).

Relating directly to the question of establishing standards, in Industrial Union Department, AFL-CIO v. Hodgson, 499 F.2d 467, 474 (D.C. Cir. 1974), the Court stated: "But, in a statute like OSHA where the decision making vested in the Secretary is legislative in character, there are areas where explicit factual findings are not possible, and the act of decision is essentially a prediction based upon pure legislative judgement, as when a Congressman decides to vote for or against a bill." The Court went on to say that questions on the frontiers of scientific knowledge require decisions that depend to a greater extent upon policy judgements and less upon purely factual analysis. A similar result is seen in Ethyl Corp. v. Environmental Protection Agency, 541 F.2d 1 (D.C. Cir) cert. denied 426 U.S. 941 (1976). That case involved the requirement that lead content in gasoline be reduced for health reasons. The Court found that the EPA could base rules on an appraisal of risk that goes beyond scientific knowledge. "The Administrator may apply his expertise to draw conclusions from suspected, but not completely substantiated, relationships between facts, from trends among facts, from theoretical projections from imperfect data, from probative preliminary data not yet certifiable as 'fact' and the like."

Woven throughout all of the decisions discussed above are the additional factors that an analysis of the benefits to be achieved by the rule be somehow balanced against the increased costs usually associated with such rules, and that the policy decision made (standard adopted) be measurable and achievable.

With the foregoing discussion and judicial decisions in mind, we can move to the question of the reasonableness of the Department's proposed .4 ppm formaldehyde standard. With respect to its measurability, all of the evidence in the record indicates that formaldehyde in the air is measurable at .4 ppm and well below that level. Is there evidence of adverse human reactions to formaldehyde at .4 ppm? All of the tests conducted and studies presented in this record indicate that there are effects on humans at this level but that the amount and severity of the reactions vary from one person to another. As the Hearing Examiner found, while the scientific data cannot establish an absolute threshold limit value, there is sufficient evidence in the record to convince one that "...there is a hyper-sensitive population who will react acutely to much less than the .4 ppm level proposed." As the Examiner stated: "For these reasons, extra precautions will have to be taken, absent a legislative decision to ban urea formaldehyde (and perhaps other emitters) from the market place." (See Finding 29 C.)

On the question of the cost-benefit analysis (CBA), the Chief Hearing Examiner has followed the evolution of this concept for the past six years. Numerous articles have been written on the subject during tht time. One very significant conclusion can be drawn from those writings and the judicial decisions concerning CBA. That is, that no effective method has yet been devised nor can anyone agree on which method should be used in establishing a

dollar-value on a human life. Instead, it appears to be the consensus that each case must be viewed on its own facts and circumstances, using the same type of analysis quoted earlier from Marshall v. American Petroleum Institute, et al. The record is inconclusive on the question of the exact percentage of the population which will still be adversely affected by formaldehyde at the .4 ppm level. Assuming, arguendo, that the figure is 10%, with a population of 4 million, is it "significant" if only 400,000 people are adversely affected? If the figure is one percent, if 40,000 people are caused to incur medical expenes or lose time from their job, will it have a "significant" impact on the economy? These are the types of questions which are relevant in any cost-benefit analysis.

On the "cost" side of the issue, the Department has not produced any figures on the added cost to a consumer if the .4 ppm standard is adopted. However, the record does contain cost data for a .5 ppm standard. Cost figures were also produced by the Formaldehyde Institute and their figures were concurred in by the State of Wisconsin Department of Health and Human Services. Using the highest figure, the added cost per housing unit would be $3,000, excluding testing costs. Is this cost of $3,000 per housing unit excessive when weighed against the benefits achieved in human health?

Moving to the question of the reasonablenss of the testing method as applied to UFFI, there is no question that the NIOSH test will double (or more) the cost of the installation of foam insulation. The rules as proposed provide that an alternative analytical method shall be approved by the Commissioner if it meets the criteria as specified in the rule. This is where the newly-announced 3M Co. testing device may well come into play, as would other testing methods as they become known. As there is no evidence in this record on the reliability of the 3M Co.'s testing device, the Chief Hearing Examiner cannot draw any conclusions about the device. Should the Commissioner determine that the device is sufficiently reliable, it could be stated as such in the rule. The addition of that device, in the rule, as an alternative testing method, would not constitute a substantial change in the rule, requiring a new hearing, as long as the NIOSH test remains as the primary test, and the 3M test is listed only as one alternative, leaving the way open for other tests to be approved as alternatives.

The Hearing Examiner has discussed the problem facing UFFI installers under the rule as proposed and concluded that the rule may foreclose the sale of the product due to the level of formaldehyde already present in a house. This conclusion is supported further by the agency's own studies which have found formaldehyde levels exceeding .4 ppm and even 1.0 ppm in existing dwellings which have not had UFFI installed. The question which arises and does not appear to be answered is how could a homeowner whose house already exceeds the standard ever have UFFI installed?

CONCLUSIONS

1. The Hearing Examiner's Finding and Conclusion relating to the vagueness of the rule relating to the NIOSH testing method requiring that only the kitchen and one bedroom be tested is not approved.

2. The Hearing Examiner's Finding and Conclusion that a rule effectively banning the use of urea formaldehyde foam insulation is beyond the Department's statutory authority is not approved.

3. The Hearing Examiner's Finding and Conclusion that the establishment of a maximum allowable level of .4 ppm of formaldehyde for indoor air is not reasonable is approved. In order to correct the defect, the agency shall establish the maximum permissible indoor air level for formaldehyde at .5 ppm or higher.

4. The Hearing Examiner's Finding and Conclusion that the testing method, as it applies to the installation of UFFI in existing dwelling units, is not reasonable is approved in part, in that it would essentially require the residents of the dwelling unit to vacate the premises, including all of their furnishings which are less than one year old. In order to correct this defect, the agency must devise an alternative testing method which would not require the residents to vacate the premises, including their furnishings. A new method would have to be reviewed by the Chief Hearing Examiner to insure that it would not constitute a substantial change in the rules requiring a new hearing. An alternative which would not constitute a substantial change might allow the indoor air to be tested leaving all furnishings within the dwelling unit, allowing the installation if it would not raise the formaldehyde level beyond the ppm standard established by these rules, or the level prior to installation, whichever is higher. The establishment of a product standard, as recommended at one point by the Hearing Examiner for UFFI, would constitute a substantial change in the rules and would require a new hearing.

In order to correct the defects enumerated herein, the Department shall either take the action recommended, withdraw the defective rules, reconvene the hearing if deemed appropriate, or request the Legislative Commission to Review Administrative Rules to review the Chief Hearing Examiner's Conclusions contained herein. If the Department chooses to reconvene the rule hearing, it shall do so as if it is initiating a new rule hearing, complying with all substantive and procedural requirements imposed on the Department by law or rule.

If the Department chooses to take the action recommended by the Hearing Examiner and the Chief Hearing Examiner, it shall, prior to submitting the rules to the Attorney General for review, submit to the Chief Hearing Examiner a copy of the rules as initially published in the State Register, a copy of the rules as proposed for final adoption in the form required by the State Register for final publication, and a copy of the Department's Findings of Fact and Order Adopting Rules. The Chief Hearing Examiner will then make a determination as to whether the requirements of Minn. Stat. § 15.0412, subd. 4-4f (1980) have been met.

Should the Department make changes in the rules other than those recommended by the Hearing Examiner and the Chief Hearing Examiner, it shall also, prior to submitting the rule to the Attorney General, submit the complete record to the Chief Hearing Examiner for a review in regard to substantial changes.

Dated: March 2nd, 1982.

DUANE R. HARVES
Chief Hearing Examiner

HLTH-82-008-PE

STATE OF MINNESOTA
OFFICE OF ADMINISTRATIVE HEARINGS

FOR THE DEPARTMENT OF HEALTH

IN THE MATTER OF THE PROPOSED ADOPTION OF RULES OF THE STATE COMMISSIONER OF HEALTH GOVERNING FORMALDEHYDE IN HOUSING UNITS.

REPORT OF THE CHIEF HEARING EXAMINER

WHEREAS, hearings were held on November 23 and 24, 1981, before Peter C. Erickson, a Hearing Examiner of the State Office of Administrative Hearings, on the above-entitled matter in compliance with Minn. Stat. § 15.0412, subd. 4; and

WHEREAS, the Report of Hearing Examiner made pursuant to Minn. Stat. § 15.052, subd. 3, was issued to the Department of Health and;

WHEREAS, the Department of Health has now determined to adopt rules pursuant to Minn. Stat. § 15.0412, subd. 4-4f; and

WHEREAS, the Department of Health has submitted said rules to the Chief Hearing Examiner for review pursuant to Minn. Stat. §§ 15.0412, subd. 4e and 15.052, subd. 4, and 9 MCAR § 2.111; and

WHEREAS, the Chief Hearing Examiner finds that the final proposed rules are not substantially different from those proposed at the public hearing and that the Department of Health has cured the defects in the rules as required.

NOW, THEREFORE, upon receipt of this Order, the Department of Health has the responsibility of submitting the complete hearing record and the rules as adopted by the Department of Health to the Attorney General and to publish in the State Register, all pursuant to Minn. Stat. § 15.0412, subd. 4e and 4f.

Dated: May 17th, 1982.

Duane R. Harves

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Chief Hearing Examiner

STATE OF MINNESOTA
DEPARTMENT OF HEALTH
Division of Environmental Health

In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units

FINDINGS OF FACT AND CONCLUSIONS

The above-entitled matter came on for hearing before Hearing Examiner Peter Erickson on the 23rd day of November, 1981, at 9:00 AM in the Department of Health Building, Room 105, Minneapolis, Minnesota, after proper notice required by Minnesota Statutes §15.0412 was served upon all persons, associations, and other interested groups registered with the State Department of Health for that purpose. After affording interested persons an opportunity to present written and oral data, statements and arguments, having heard all of the testimony, having considered all of the evidence adduced upon the records, files, and proceedings herein, I hereby adopt as my own, except as noted below, the Findings and Conclusions of the Hearing Examiner, as modified by the Report of the Chief Hearing Examiner, copies of which are attached hereto and made a part hereof.

1. Finding #7. The last sentence of the finding cites subdivision 4 of Minn. Stat. section 325F.18 (1980), referring to the duty of the manufacturer of a product or builder to pay costs of repair to a consumer who has a complaint. That statutory provision bears no relationship to the proposed rule under consideration here and should be deleted from the finding.

2. Finding #13. The first sentence contains a typographical error, i.e., .04 ppm. The level which the Department of Health proposed was 0.4 ppm.

3. Finding #13E, page 7, second paragraph. The last sentence in this paragraph states that the method as published by The National Institutes of Occupational Safety and Health (NIOSH) contained an error which has since been corrected. The Department is not aware that the printed method as currently being made available by NIOSH requires addition of sodium bisulfite in the collection vessel. At the hearing, the Department testified that during the course of its sampling of complainant homes, it had learned from other laboratories doing similar testing that adding bisulfite to the collecting tube would enhance recovery. This altered collection technique has now been accepted as the appropriate method of collection by analytical labs which use the NIOSH method. Testimony in support of this change was given at the hearing. Therefore the recommended modification has been included in the rule.

4. Finding #14. In the Report, only the Department of Health is reported as testifying that the proposed 0.4 ppm level is achievable by the construction and insulation industries. (The need for the Agency to show that the proposed level is achievable is discussed elsewhere). It should be noted that there is support for this position which was provided by others, e.g., Weyerhaueser Corporation, Tacoma, Washington, (letter to Peter Erickson, dated December 11, 1981); Minnesota Multi-Housing Association, (letter to Laura Oatman, Minnesota Department of Health, dated June 18, 1981). Additional support can be inferred from the estimates of cost increase discussed below in regard to Finding #24.

5. After Finding #17, the Commissioner makes the following finding: in addition to the Department's advocating a level for formaldehyde in the range of .4 ppm or less, numerous private citizens (as cited earlier) and several physicians wrote in favor of setting a low maximum exposure level. Further, representatives of various groups also supported adoption of the .4 level. Such support came from Wick Homes, Inc., of Madison, Wisconsin, a manufacturer of manufactured homes which sells approximately 40% of all manufactured homes sold in Minnesota, the Wisconsin Department of Industry, Labor and Human Relations (letter and enclosures to Peter Erickson, dated December 15, 1981), and from Weyerhaueser, Inc., a wood products manufacturer which supplies some of the components to the manufactured housing industry (letter to Peter Erickson, dated December 11, 1981).

6. Finding #18. The Commissioner rejects all of the quoted material in Finding #18, because it contains conclusions which in some instances are completely false, and which in other instances are drawn from unstated premises. The opening paragraph of this finding refers to a November, 1981, report by Professional Consultants in Occupational Health, Inc. The record shows that this report was prepared by J.M. Berger, Ph.D., M.D., as sole author. S.H. Lamm, M.D., who was formerly associated with Professional Consultants, was not one of the authors of the report of November, 1981.

   In the second paragraph quoted from the November, 1981 Report, Professional Consultants states that the United States Environmental Protection Agency (USEPA) has verified that there does not appear to be a significant risk to humans for cancer from formaldehyde exposures, and that this fact has been verified in a quantitative cancer risk assessment. When Professional Consultants first raised this point at the hearing, the Department rebutted it both at the hearing and in post-hearing submissions, by demonstrating that the USEPA had not made a quantitative cancer risk assessment of formaldehyde. Rather, as the Department showed, the EPA decision not to launch a section

4(f) action under the Toxic Substances Control Act (P.L. (94-469) was based on a lack of information by which to assess whether or not formaldehyde was a human carcinogen. The assertion that the setting of a standard of .4 ppm would prevent thousands of this generation from enjoying ownership of affordable housing (manufactured homes) is unfounded. Nowhere in the record is it cited how many potential owners of manufactured housing would be unable to afford it by virtue of the fact that the .4 ppm level had been imposed in Minnesota.

Professional Consultants misuses data which the Department of Health had collected from complainants whose homes the State had tested, to support their conclusion that the complainants' symptoms were not attributable to formaldehyde. The State never characterized its sampling work as a survey because symptom and other personal data were not systematically collected. There was considerable Department testimony at the hearing warning that because the data had not been systematically collected, certain inferences should not be drawn from the data. Nevertheless, Professional Consultants proceeded to draw the very inferences against which the Department had warned, and to use these to support its position in opposition to the proposed level. Professional Consultants states that the complainants' symptoms were not distinguishable from "background noise" but cites no data to support their conclusion. Nor were data provided to indicate that there is a higher prevalence of symptoms in persons occupying homes not insulated with urea formaldehyde foam insulation. Similarly Professional Consultants' assertion that all of the reported symptoms could have been caused by exposure to other probable causes, such as food odors, bleaches, detergents, aerosols, sinus medication, thyroid or other hormonal alternations, is not substantiated. In a later paragraph quoted from the Report, Professional Consultants' is cited as saying that large epidemiological studies on formaldehyde workers did not show meaningfully significant excesses of tumors or organic diseases at significant exposures. That statement is contradicted elsewhere in the record where it was shown that one of the problems with determining the effects of exposure to formaldehyde has been the paucity of epidemiological studies which might show whether or not such effects were occurring. As indicated in the Department's post-hearing submission, there have been no large epidemiological studies on formaldehyde workers reported to date and to imply otherwise is misleading.

7. Finding #19. The Formaldehyde Institute has not been consistent in its proposals for what it considers acceptable as an indoor air level. In 1980, in hearings before the U.S. Consumer Product Safety Commission (CPSC), Dr. S.H. Lamm, M.D. testified on behalf of the Formaldehyde Institute, that a level of 0.5 ppm was an acceptable indoor air level

to serve as a regulatory standard. (Statement of Need and Reasonableness).

8. Finding #20. In sub-paragraph #2 the assertion is made that the NIOSH test prescribed in the rule is not adequately reproducible. In the hearing the Department and other experts stated that the test itself had been cross-validated by a number of different laboratories around the country. The questions which the opponents of the rule were raising did not go to reproducibility of the test. Rather, opponents objected to the difficulty posed by the need to use the same environmental conditions in order to arrive at similar test results. The Department is aware that environmental conditions will affect the results from any particular test. Anyone who is attempting to repeat a particular set of results, must conduct that re-test under environmental conditions which are as close as possible to those which existed when the original test was made. The fact that these environmental conditions can influence a result do not invalidate the method itself. The test is certainly reproducible, if it is done on the same materials, under very similar atmospheric conditions.

In sub-paragraph #4 the assertion is made that the test measures formaldehyde emitted from sources other than building materials containing urea formaldehyde. While this assertion is correct on its face, it does not of itself invalidate the rule. When the test is run as prescribed in the rule, on newly constructed housing which has not yet been occupied, only formaldehyde which is emitted from building materials will be available for measurement. This point was made by the Department a number of times during the course of the hearing. As to sub-paragraph #5, which attacks the air sampling conditions which are imposed in the rule, the assertion is made that the test conditions can be difficult to achieve. Every effort was made by the Department to impose a range of testing parameters which would include weather conditions which exist in Minnesota for approximately eleven months out of the year. We therefore reject the claim that the rule sets test conditions which "often require an unrealistic or abnormal living situation".

Sub-paragraph #6 argues that spot-checking would not be sufficient to allow the manufacturer to judge whether or not the units he was manufacturing were in compliance. There was no evidence in the record to indicate why the author of that statement concludes that testing of every single unit would be necessary.

In sub-paragraph #7 argument is made that it may be economically infeasible to modify a unit which exceeds the .4 ppm standard once the unit is completed. The Department in its Statement of Need and Reasonableness addressed this point by noting

that there were sealants being marketed which could be applied to building material surfaces which would effectively prevent the off-gassing of formaldehyde into the indoor air. The Formaldehyde Institute supports this conclusion in several different submissions.

9. Finding #21. The second paragraph in that finding refers to a study which compared formaldehyde levels in conventional homes which contain urea formaldehyde foam insulation (UFFI) to the levels in homes which do not have such insulation. In the record, the information underlying that statement is taken from a staff memo to the Consumer Product Safety Commission. In that memo, the staff had compiled the results of several studies done by various researchers who had compared levels of formaldehyde in foam-insulated houses versus non-foam-insulated houses. It is not clear in the memo if all of the studies had used standard sampling conditions or if UFFI insulated houses were grouped according to length of time since installation. To the extent that we know that levels are higher shortly after installation and that they attenuate over a period of time, it would be very important to know whether the levels which were being compared were measured in houses where the installation was fairly recent or whether it had occurred two or three years prior to the time the measurement was made. Another problem with citing information from that memo has to do with the fact that in the foam-insulated houses, although the mean formaldehyde level is reported as being .12 parts per million, the standard deviation is more than twice (.272 ppm) the mean. This indicates that the range of levels measured was very wide and reliance on the mean is not justified. It is highly likely that some housing units which had been foam insulated were measuring in excess of .4 ppm. The reliance on an average to convey information about a very heterogeneous sample is unwarranted in this instance. The last sentence in the second paragraph of Finding #21, takes note of the Formaldehyde Institute contention that properly mixed and installed UFFI will add negligible amounts to existing levels of formaldehyde in a conventional home. It should be pointed out, as the Chief Hearing Examiner does in his report (to be commented upon later in this document) that the Consumer Product Safety Commission, in arriving at its decision to ban UFFI, rejected the notion that installation standards for UFFI would be adequate to control the problem of excessive formaldehyde off-gassing.

10. Finding #24, last paragraph (page 14). The Wisconsin Department of Industry, Labor and Human Relations submitted a letter of support for the proposed 0.4 ppm level. Along with their letter was a Report prepared by the Wisconsin agency as justification for their proposal to set a maximum level of 0.4 ppm for new mobile homes sold in Wisconsin. In that Report, they estimated cost increases of $200-

$250, to comply with the 0.4 ppm level, based on their own calculations. The Wisconsin Report also includes cost estimates prepared jointly by the Hardwood Plywood Manufacturers' Association and the National Particleboard Association, ranging from $217-$690. The Formaldehyde Institute, in a letter to the Hearing Examiner dated December 11, 1981, states that costs to comply with the proposed 0.4 ppm level could reach $1,000. Yet elsewhere in documentation to support the position stated in its letter, the Institute agrees with the estimates put forth in the Wisconsin Report. In both the Wisconsin Report and materials submitted by the Formaldehyde Institute, the $2,500-$3,000 increase in cost refers to the estimate for complying with a level of 0.2 ppm, not the 0.4 ppm level proposed by the State of Minnesota.

11. Finding #25. The Department adopts the first two sentences of that finding. With regard to the testimony of Mr. Troutman, an environmental hygiene consultant, his testimony deserves little weight since he was not even cognizant of the measuring range of the method as reported by NIOSH. In addition, he provided no basis to support his conclusion that error could range from 10% - 200% for measurements made at the .4 ppm level.

    In the last sentence of Finding #25 the Hearing Examiner notes that the rule does not require that a correction be made for outdoor formaldehyde levels. That matter was addressed both in the Agency's Statement of Need and Reasonableness and during the course of the hearing. At the hearing, attendants were invited to submit, for the record, a recommendation as to whether or not the rule should specify that outdoor levels must be subtracted from indoor levels. No comments on that issue were forthcoming after the hearing. As noted in the Statement of Need and Reasonableness, the Agency had determined that it would not be necessary to require that outdoor levels be subtracted from indoor levels in order to arrive at the true indoor air level, since outdoor levels were known to be very low.

12. Finding #27. In the first paragraph of that Finding, the Hearing Examiner notes that the Manufactured Housing Institute (MHI) contends that the rule requires that all rooms of a housing unit must be tested to avoid liability. In that part of the rule which discusses the rooms in which measurements must be made, i.e., the kitchen and one bedroom, the rule specifies that at a minimum those are the rooms which must be measured. It is the Department's position that the rule is clear on its face. On the other hand that language does not excuse the builder from making measurements in other rooms, if the builder should have reason to believe that there may be a high level of formaldehyde emitted in a room other than the kitchen or bedroom.

The second paragraph of Finding #27 raises two different issues, each of which will be treated separately. In the first sentence of that second paragraph of Finding #27 the Hearing Examiner notes that the rule does not speak to the type of testing which must be done if a home buyer or one who has had UFFI installed desires to contest the level of formaldehyde found, or has health problems. The rule as proposed does not address this situation because the enabling legislation only authorizes the adoption of rules governing the sale of building materials and housing units. It does not authorize the adoption of rules regarding a claimant's action for damages.

In the second sentence of the second paragraph of Finding #27 the question is raised as to whether variables in the testing method itself could cause one measurement to fall within the permissible range and a second measurement to exceed the maximum provided in the rule. That issue is not unique to the method prescribed in the rule in question. All chemical analytical methods have some degree of error of reproducibility. The fact that test variables might serve as a point of argument in some action brought against an alleged a violator does not in any way impugn the level which has been proposed, nor does that argument necessitate the adoption of a different level or a different analytical tool.

13. In Finding #28, the Hearing Examiner recites a number of legal arguments which were raised by various opponents of the rule. It is unclear from the Hearing Examiner's recommendations, whether or not he was adopting these arguments. The Commissioner rejects these and adopts in their place the legal arguments made by the Chief Hearing Examiner.

14. Finding #29. The Commissioner rejects paragraph B in its entirety because the Commissioner finds that the Department established the reasonableness of its regulation regarding installation of UFFI. In its place, the Commissioner adopts the relevant finding made by the Chief Hearing Examiner.

The Commissioner rejects paragraph C to the extent that it recommends setting the level at 0.8. The Department did establish the reasonableness of setting a level well below 0.8 ppm. The Commissioner hereby adopts the recommendation of the Chief Hearing Examiner to set the level at 0.5 ppm.

The Commissioner rejects paragraph C regarding the degree of testing required to avoid liability. The Department did establish the reasonableness of its proposal in this regard and therefore the Commissioner adopts the finding of the Chief Hearing Examiner regarding this issue. The

Commissioner adopts the Chief Hearing Examiner's finding relating to reasonableness, except as to the matter of cost of compliance (CHE Report, page 7, first full paragraph) which is modified above, in paragraph #10 of the Commissioner's findings.

Based on the foregoing Findings of Fact, the Commissioner hereby makes the following conclusions:

1. That the Department of Health gave proper notice of the hearing in this matter.

2. That the Department has fulfilled the procedural requirements of Minn. Stat. §15.0412, subd. 4-4f (1980) and all other procedural requirements of law or rule.

3. That the Department has demonstrated its statutory authority to adopt the proposed rules and has fulfilled all other substantive requirements of law or rule within the meaning of Minn. Stat. §15.0412, subd. 4e and 15.052, subd. 3(4) (i) and (ii) (1980).

4. That the Department has documented the need for and reasonableness of its proposed rules with an affirmative presentation of facts in the record within the meaning of Minn. Stat. §15.0412, subd. 4c (1980).

5. That the amendments and additions to the proposed rules which were suggested by the Department after publication of the proposed rules in the State Register do not result in rules which are substantially different from the proposed rules as published in the State Register within the meaning of Minn. Stat. §15.0412, subd. 4d (1980) and 9 MCAR 2.110 A. and 2.111 (1980 Ed.).

6. Based on evidence contained in the record regarding demonstrated health effects and industry achievability, 0.5 ppm is a reasonable level and that is the level which shall be established in the rule.

7. The testing method as it applies to the installation of UFFI in existing dwelling units, is not reasonable to the extent that it requires the residents of the dwelling unit to vacate the premises, including all their furnishings which are less than one year old. The rule would be reasonable if it allowed the indoor air to be tested leaving all furnishings within the dwelling unit and allowing the installation if it would not raise the level of formaldehyde beyond the standard established by the rule, or the level prior to installation, whichever is higher. Therefore paragraph 2 of subsection F is being stricken in its entirety.

The Commissioner, in reviewing the entire hearing record and the reports of the Hearing Examiner and Chief Hearing Examiner must base his findings and conclusions on the record which was created in accordance with applicable State law and rules. In his Report, the Chief Hearing Examiner commented on two events which occurred after the close of the record: publicity regarding the availability of a device for testing formaldehyde in air (being marketed by the 3M Company) and the ban imposed upon UFFI installations by the U.S. Consumer Product Safety Commission. With regard to availability of the testing device, the Department staff has long been aware that several devices for testing formaldehyde in air were available. It is for that reason that the rule allows for future consideration and approval of alternative methods. Since the Department has not yet been able to determine whether or not the 3M device meets the criteria imposed in the rule, the Commissioner is unable to approve its use at this time. With regard to the U.S. Consumer Product Safety Commission ban, that action was not considered by either the chief hearing examiner in his report or by the Commissioner in reaching the findings and conclusions contained herein.

STATE OF MINNESOTA

George R. Pettersen M.D.

George R. Pettersen, M.D.
Commissioner of Health

DATE: May 6, 1982

State of Minnesota
Department of Health
Division of Environmental Health

In the Matter of a Proposed
New Rule Relating to
Formaldehyde 7 MCAR § 1.448

Statement of Need
and Reasonableness

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State of Minnesota
Department of Health
Division of Environmental Health

In the Matter of a Proposed
New Rule Relating to
Formaldehyde 7 MCAR § 1.448

Statement of Need and Reasonableness

This rule, 7 MCAR § 1.448 is being proposed pursuant to legislative direction contained in Minn. Stat. § 144.495 (1980) as amended by Laws, 1981 Chap 245. That law required that the Commissioner of Health, 1) determine whether or not the presence of formaldehyde in building materials posed a significant health problem, 2) if he determined there was a problem, that he promulgate emergency (read "temporary") rules, and 3) that he promulgate permanent rules governing the sale of building materials and housing units that contain products made with urea formaldehyde.

Formaldehyde is a colorless, flammable gas with a strong, pungent odor. It can form explosive mixtures with air and oxygen. As an important industrial chemical of major commercial use, formaldehyde is found throughout the environment. In outdoor air it can originate from many sources such as incinerators, photochemical smog, and engine exhaust. Near industrial outlets or in areas of heavy smog, atmospheric levels of formaldehyde have been reported to range from less than 0.005 parts per million (ppm) to 0.15 ppm. Cigarette smoke contains as much as 40 ppm of formaldehyde by volume. The US produced about 6.4 billion pounds of aqueous formaldehyde in 1978. The US consumption of formaldehyde will likely exceed 7.5 billion pounds by 1983.

Half of the formaldehyde produced is used to produce synthetic resins such as urea and phenol formaldehyde resins.

These resins are used primarily as adhesives when making particleboard, fiberboard and plywood. Urea formaldehyde concentrates are used in various coating processes, in paper products, and in making foams for thermal insulation. The textile industry uses formaldehyde for producing creaseproof, crushproof, flame resistant and shrinkproof fabrics. Acetal resins, made from formaldehyde, are used to mold plastic parts. Formaldehyde is used in some medicines because it modifies and reduces the toxicity of viruses, venoms and irritating pollens. The use of formaldehyde in embalming fluids is now required by all state laws. The widespread use of formaldehyde is due to its high reactivity, colorless nature, purity in commercial form and low cost.

Human Health Effects

Several studies have been conducted in an attempt to evaluate the human health effects of exposure to formaldehyde. The variety of responses which have been observed are summarized in Table 1.

Formaldehyde has a characteristic odor, and the lowest odor threshold that has been reported is 0.05 ppm (Stockinger, 1968).

At lower exposure levels the most commonly reported symptoms associated with formaldehyde are irritation of the eyes, nose, and other areas of the upper respiratory tract. Other symptoms that have been reported include headaches, lacrimation, coughing, sneezing, diarrhea, and vomiting.

Table 1

Responses of Man to Various Concentrations
of Formaldehyde Vapors

Concentration		Exposure	
$\mu g/m^3$	ppm	Time	Response
12	.01		Eye irritation threshold
60	.05		Odor threshold
80	.07		Chronaximetric response threshold
98	.08		Cortical reflex threshold
156-540	.13-.45		Irritant threshold
300-6000	.25-5.0		Irritant threshold
600	.5		Odor threshold
1000	.8		Slight irritation
1080-1920	.9-1.6		Irritant threshold
1200	1.0		Odor threshold
2400-3600	2.0-3.0	8 hr	Tolerable; mild irritation of eyes, nose, and posterior pharynx
4800-6000	4.0-5.0	10-30 min	Intolerable to most people; mild lacrimation; very unpleasant
6000	5.0		Throat irritation threshold
12,000	10.0	few min	Profuse lacrimation
24,000	20.0	15-30 sec	Lacrimation
24,000	20.0	30 sec	Irritation of nose and throat
24,000	20.0	1-2 min	Sneezing
60,000-120,000	50-100	5-10 min	May cause very serious damage

Taken from Patterson, et al., (1976) and Hollowell, (1978).

Although many researchers have concluded that formaldehyde causes irritation of the eyes and upper respiratory tract, the reported concentrations at which irritation begins are different. Investigations of occupational exposures at a dress shop (Bourne and Seferian, 1959), a paper processing plant (Morrill, 1966), and a funeral home (Kerfoot and Mooney, 1975) reported eye irritation occurred at 0.13 - 0.45 ppm, 0.9 - 1.6 ppm, and 0.25 - 1.39 ppm respectively. It has been reported by Roth and Swenson (1957) that for most people the irritant threshold of formaldehyde is between 0.25 ppm and 5.0 ppm with considerable individual variation.

The lowest concentration of formaldehyde that has been reported to cause eye irritation in humans is 0.01 ppm (Shuck et al, 1966). The conclusions of their controlled exposures study include the following statement;

> "The linear relationship between reported eye irritation and formaldehyde concentration in simulated atmosphere experiments does not hold when the formaldehyde concentration is below 0.3 parts per million (ppm). Subjects may experience equal irritation at irritant concentrations differing by an order of magnitude. Thus most subjects experienced the same irritation intensity at 0.05 ppm formaldehyde as they did at 0.5 ppm. At irritant concentrations less than 0.3 ppm, the rate of blinking determines to an important extent the intensity of eye irritation which the subject detects. The eyes of human subjects can readily detect and react to as little as 0.01 ppm formaldehyde." (p. 575)

In another controlled exposure study, Weber-Tschopp, et al, 1977) exposed two groups of subjects to formaldehyde. In the first group, 33 subjects were continually exposed to formaldehyde for 37 minutes. The formaldehyde concentration rose from 0.03 to 3.2 ppm. The second group of subjects was subjected to five different formaldehyde concentrations for 1.5 minutes

per exposure level. The second group of subjects was allowed to recover for eight minutes in a well ventilated room. At the lowest exposure level, 0.03 ppm, the responses of subjects were similar to their responses in control air. Significant changes started to appear in the test subjects at 1.2 ppm. The authors concluded that "under our experimental conditions the average irritation threshold for pure HCHO [formaldehyde] lies in the range of 1 to 2 ppm." At the same exposure level, the subjects continually exposed to formaldehyde had greater eye irritation, while the subjects that had the discontinuous exposure had greater nose and throat irritation. "It appears as if the nose and throat are capable of a certain adaptation, whereas the eyes become more sensitive through the course of the experiment." (Weber-Tschopp, 1977)

In a study performed by Ib Andersen (1978), 16 healthy young adults were exposed to 0.25, 0.41, 0.82, and 1.64 ppm for five hours/day for four consecutive days. While no significant changes in pulmonary function were observed, a reduction in the nasal mucous flow of the upper third of the nose was found at all exposure levels except 0.82 ppm.

In addition, numerous researchers and regulatory agencies have accumulated information from persons with specific symptoms which they associated with varying airborne concentrations of formaldehyde in their residences.

During the February 5, 1980 hearing held by the U.S. Consumer Product Safety Commission (CPSC) in Minneapolis, the Wisconsin Department of Health and Social Services presented information

about their investigations of formaldehyde in residences. To date, the majority of complaints in Wisconsin have come from occupants of mobile homes. The mean formaldehyde level in 65 complaint mobile homes was 0.66 parts per million. In 65 randomly selected mobile homes (no complaints) the mean formaldehyde level was 0.24 ppm. The most common symptoms reported by occupants of the complaint mobile homes were eye irritation, burning eyes, dry or sore throat, headache, cough, difficulty sleeping, diarrhea, nausea, and breathing difficulties. "Of these symptoms in mobile home residents, the only ones that can be statistically correlated to formaldehyde on a dose response basis with any degree of significance are: eye irritation, P = .0606; runny nose or nasal irritation, P = .0426; and burning or stinging eyes, P = .0011. Approaching statistical significance are diarrhea, P = .1178 and wheezing, P = .1313." (Testimony of Mary Ann Woodbury, CPSC Hearing Transcript, Feb. 5, 1980).

In 1977 the Connecticut State Department of Health Services began investigating health complaints related to urea formaldehyde foam insulation (UFFI) (Sardinas et al, 1979). The formaldehyde concentrations in the 69 homes that were investigated by Connecticut ranged from 0 to 10.0 ppm. The reported symptoms included eye irritation, sore throats, coughing, nausea, stomach aches, dizziness, headaches, skin rash, and fatigue.

The Department of Environmental Health of the University of Washington has been investigating complaints of formaldehyde exposures for several years (Breysse, 1981). The Department has investigated complaints in 400 mobile homes and 200 conven-

tional homes. The data from 334 mobile homes have been reviewed and the formaldehyde levels ranged from 0.03 to 1.77 ppm. Irritation of the eyes and upper respiratory system, chronic colds, headaches, coughing, drowsiness, and nausea were the most commonly reported symptoms. Residents of conventional homes with UFFI had similar symptoms, but the levels of formaldehyde in these homes were lower than the levels in mobile homes.

Table 2 summarizes a number of studies of human exposure to low levels of formaldehyde in various settings.

Animal Carcinogenicity/Mutagencity

Evidence for the carcinogenicity of formaldehyde in animals has been reported. Preliminary data from an ongoing inhalation study of rats and mice, sponsored by the Chemical Industry Institute of Toxicology (CIIT), indicated that for exposures of 15 ppm for 6 hours/day, 5 days/week for 16 months, formaldehyde is carcinogenic in rats (Swenberg, 1980). After 24 months' exposure, rats exposed to 6 ppm and mice exposed to 15 ppm had developed nasal cancer. (CIIT, 1980).

A recent report of the New York University (NYU), Institute of Environmental Medicine supports the CIIT evidence of formaldehyde being a carcinogen in experimental animals. (Nelson, 1979)

While humans and animals may differ in their susceptibility to specific chemical compounds, any substance that produces cancer in experimental animals should be considered a cancer risk to humans. (NIOSH, 1980) Formaldehyde has also demonstrated mutagenic activity in several test systems. (Auerbach, 1977)

TABLE 2

SELECTED HUMAN EXPOSURE STUDIES:

Ranges of low-level formaldehyde concentrations

giving adverse effects

ppm	Effects	Type of Exposure	Reference
0.01-10	Diarrhea, eye and upper-respiratory tract irritations, headache, nausea, vomiting, stomach cramps.	Residential	CPSC 1980 Wisconsin Health Dept. 1981; Breysse 1981; Sardinas et al., 1979; Garry et al., 1980
0.09-5.6	Burning of eye and nose, sneezing, coughing, and headaches. 3 out of 7 suffered from asthma or sinus problems.	Occupational	Kerfoot and Mooney, 1975
0.3-2.7 Avg. 0.68 Median 0.4	Annoying odor, constant pricking of mucous membranes, disturbed sleep, thirst, heavy tearing.	Occupational	Shipkowitz, 1968
0.13-0.45	Burning and stinging of eyes, nose and throat; headaches.	Occupational	Bourne et al., 1959
0.83 ppm (about)	Loss of olfactory sense, increased upper respiratory disease, subatropic and hypertropic alterations in nose and throat ciliostasis of nasal mucosa, increase absorptive function of nasal mucosa.	Occupational (greater than 5 years to less than 10 years.	Yefremov, 1970
0.9-1.6	Itching eyes, dry and sore throat, disturbed sleep, unusual thirst upon awakening in the morning.	Occupational	Morrill, 1961
0.9-2.7	Tearing of eyes, irritation of nose and throat.	Occupational	Blejer et al., 1966
?	Chronic airway obstruction, respiratory tract and eye irritation, small decrease in pulmonary function during workday and workweek.	Occupational	Schoenberg and Mitchell, 1975
1.3-3.8	Menstrual disorders, pregancy complications, low birth weight of offspring.	Occupational	Shumilina, 1975
4 or less	Inflammation, reactions of upper respiratory tract, chronic bronchitis, conjunctivitis and skin changes.	Occupational (average 7 years)	Kratochvil, 1971
0.25-1.64	Eye irritation, dryness of the nose and throat, and reduced nasal mucus flow.	Experimental	Andersen, 1979

Although a substance cannot as yet be designated a potential carcinogen based solely on the results of mutagenicity tests, positive results in mutagenicity tests should be used as supporting evidence for identifying a potential carcinogen.

Minnesota Department of Health History:

Late in 1978, the Minnesota Department of Health (MDH) began to receive many complaints from individuals regarding health effects being attributed to formaldehyde in residential environments. (cf. Garry, et al 1980) At that time the capability of private laboratories for testing for formaldehyde in air was very scarce and the test was prohibitively expensive. The MDH environmental analytical laboratory which had been analyzing formaldehyde in occupational settings began to test complainants' homes, as a diagnostic aide to physicians, in the spring of 1979.

Results of MDH Sampling:

From February, 1979 through September 30, 1981, the MDH had sampled approximately 1,000 homes. The results of this sampling effort are summarized in Table 3.

The data in Table 3 indicate that higher levels of formaldehyde are being measured in newer homes (less than 24 months old) than in older homes. This conclusion applies to both mobile and conventionally built homes. The types of symptoms which complainants reported resemble very closely those which have been reported by the State of Wisconsin (1980) and by Breysse (1981). Although symptom information was collected from occupants of homes measured for formaldehyde in Minnesota, no attempt

Table 3

Levels of Formaldehyde Measured in Minnesota Homes***

	Type of Construction					
	Mobile Home		Conventional Construction*			
			urea formaldehyde foam insulated		Other source of formaldehyde**	
	≤24 mos.	>24 mos.	≤24 Mos.	>24 mos.	≤24 mos.	>24 mos.
average of levels in all homes measured	0.70 ppm	0.25 ppm	0.21 ppm	0.08 ppm	0.32 ppm	0.09 ppm
range of levels measured	0-4.58 ppm	0-1.62 ppm	0-6.89 ppm	0-0.33 ppm	0-2.89 ppm	0-1.0 ppm
number of homes in sample	229	207	87	61	104	280
number of homes with the average level of formaldehyde ≤0.4 ppm	71	169	78	61	81	276
number of homes with the average level of formaldehyde >0.4 ppm	158	38	9	0	23	4

*includes single and multiple family residences, such as apartment buildings and townhouses
**includes remodeling
***all measurements made using the NIOSH chromotropic acid method (NIOSH, 1977)

was made to correlate symptoms with levels measured.

Regulatory Efforts in Minnesota.

A 1980 Minnesota law required the Commissioner of Health to determine if a significant health problem is presented by the use of building materials that emit formaldehyde gases. In addition, the law required that if the Commissioner determined that such a problem existed, he should promulgate rules establishing standards governing the sale of building materials and housing units that contain products made with urea formaldehyde. Minn. Stat. § 144.495 (1980). The law took effect on April 23, 1980.

Soon after passage of the 1980 law, the MDH conducted an extensive review of the relevant medical and technical literature. In addition, the MDH had been doing some field sampling of newly constructed housing units which did not contain any identifiable formaldehyde-emitting sources other than the building materials themselves. In a few newer residences the levels of formaldehyde measured exceeded the Occupational Safety and Health Administration (OSHA) level of 3.0 ppm for occupational settings. Measurements made in residences which had been insulated with urea formaldehyde foam within the preceding 24 months also produced similar results. The results of these measurements, the numbers of complaints and types of symptoms being reported by physicians, along with information gleaned from the literature review led to the conclusion that certain building materials emit considerable quantities of formaldehyde into the ambient air of residential units.

In March of 1980, the National Academy of Sciences' Committee on Toxicology issued a Report on Formaldehyde (NAS, 1980) at the request of the Consumer Product Safety Commission. The Committee reviewed studies which investigated the effects of formaldehyde on humans and animals. The Report concluded that ..."there is no evidence of a population threshold for the irritant effects of formaldehyde in humans." The Committee further stated ..."[t]he preliminary results of an ongoing carcinogenicity study in rodents, the uncertainty about the variability of responses to formaldehyde in normal populations and hypersensitive groups, and the current inadequacy of data (which leave unresolved the no-observed-effect dose in humans) all point to the advisability of maintaining formaldehyde at the lowest practical concentration to minimize adverse effects on public health." (NAS, 1980, p.17). The Report also showed that a majority of the population suffered some health effects at levels in excess of 0.5 ppm.

In the course of its sampling program, the MDH had been finding levels in excess of 0.5 ppm with significant frequency. After having reviewed the Department's own sampling information, along with that contained in the NAS Report and particularly that Report's recommendation that formaldehyde should be kept at the lowest practical level, the Commissioner of Health concluded that the use of building materials which emit formaldehyde presents a significant health problem.

On May 22, 1980, the Commissioner of Health made that determination, and issued a statement to that effect in the form

of a press release. A copy of the press release is attached as Appendix A.

The 1980 law also authorized the Commissioner to adopt temporary rules. A temporary rule, setting a maximum permissible ambient level of 0.5 ppm of formaldehyde was formally proposed and published in the State Register, June 23, 1980 (4 S.R. 1963). According to the provisions of the Administrative Procedures Act (Minn. Stat., ch. 15 (1980)) comments were invited and received by the agency. Based on the comments received, the rule was revised and finally approved by the Attorney General. Although the rule was to take effect on December 15, 1980, the rule was never enforced because a temporary restraining order barring its enforcement was issued on December 8, 1980 in Hennepin District Court (File No. 773142).

The Department did not appeal issuance of the temporary restraining order in anticipation of the fact that the Legislature might amend the law in the 1981 session. One of the authors of the 1980 law proposed an author's amendment prescribing a maximum ambient level of 0.1 parts of formaldehyde per million parts of air (ppm). The proposed amendment was tabled in the House. The Legislature did amend the 1980 law to specifically exempt "non-cellular insulation" from inclusion within the definition of building materials. (Laws of 1981, chapter 245, section 1, subd. 1a). Since the 1980 law was not changed in terms of requiring the adoption of permanent rules governing the sale of building materials and housing units which contain materials made with urea formaldehyde, the Department has developed and

now proposes for adoption a permanent rule relating to formaldehyde. (6 SR 667, Oct. 19, 1981).

A preproposal draft of the permanent rule was sent to interested persons for comment in May, 1981. The MDH received approximately fifty comments, all of which will be entered into the permanent rule record.

Regulation of Formaldehyde Outside of Minnesota

Much attention has been paid by various governmental agencies at both the federal and state levels in the U.S. and abroad, with regard to the need to reduce human exposure to formaldehyde.

At the federal level, the U.S. Consumer Product Safety Commission (CPSC) has been interested in health effects associated with formaldehdye exposure since 1976. The Commission has taken the regulatory initiative by proposing a ban on the installation of urea formaldehyde foam insulation. (46 Fed. Reg. 11188, Feb. 5, 1981) This proposal was made after the Commission had held numerous public hearings in 1980 and had sought comments from several governmental and private organizations with expertise in environmental health. As of September 30, 1981, no further action had been taken by the Commission.

The U.S. Department of Housing and Urban Development (HUD) is responsible for setting manufactured housing standards, which include construction techniques to minimize infiltration of outside air into mobile homes. That agency has recently invited the public to comment on a number of issues associated with formaldehyde in mobile homes, including the feasibility of adopting maximum formaldehyde emission standards for materials used in

the construction of mobile homes. (46 Fed. Reg. 43466, Aug. 28, 1981).

The U.S. EPA has been reviewing the whole area of indoor air pollution for several years (Kitchens, 1976), and has worked with the U.S. Department of Energy to help set minimum ventilation standards (for energy conservation purposes) which would prevent the hazardous accumulation of indoor air pollutants. Other agencies which have demonstrated an interest in formaldehyde as it relates to human health are: Department of Health and Human Services (National Institute for Occupational Safety and Health--NIOSH), (Centers for Disease Control-- CDC), and the Department of Commerce (National Bureau of Standards).

At the state level, a variety of regulatory schemes have been undertaken. Table 4 summarizes some of the more extensive regulatory programs which have been proposed or are in effect as of September 1, 1981.

Several foreign countries have attempted to regulate levels of formaldehyde in residential environments by various means. See Table 5.

Discussion of Permanent Rule as Proposed

7 MCAR § 1.448. A. Scope. This portion of the rule describes the applicability of the rule and summarizes the significant impacts of the rule. The rule seeks to regulate the sale of housing units by setting a maximum permissible ambient level of formaldehyde in a housing unit to be sold in the state. Applicability of the rule is being restricted to newly constructed housing units because that is the type of housing in which higher

TABLE 4

State Regulatory Activities Regarding Formaldehyde
as of October 15, 1981

State	Activity	Details	Source
California	Ban in effect	State rule declares UFFI is unsafe for use as insulation. Effective September 22, 1981 the sale or installation of UFFI is prohibited. Requires warning prior to UFFI installation in those cases which are exempt from ban.	California Energy Commission Regulations for Insulating Materials, adopted December 6, 1978, as amended March 25, 1981.
	Proposed Legislation	Bill states that the Legislature finds that UFFI "has caused significant problems to consumers in California due to the product's propensity to shrink after installation, emit odors, and induce sensitization to formaldehyde." Bill also affirms existing authority of California Energy Commission to regulate UFFI.	Assembly Bill #103, as amended by Senate, September 10, 1981.
Colorado	Ban in effect	State rule bans use of UFFI in state - licensed buildings	Rules and Regulations released by Dr. Frank Taylor, Executive Director, Colorado Dept. of Health 9/30/80; and Professional Remodeling Monthly, November, 1980.
	Warning in effect	Rule requires a warning statement on UFFI installation contract for all other buildings.	
Connecticut	Ban in effect	State Law bans the installation of UFFI, effective July 1, 1981.	Public Act, No. 81-250

(table continues on next page)

TABLE 4 (con't.)

State	Activity	Details	Source
District of Columbia	Proposed ban	Decision to ban UFFI is pending before D.C. Council.	Memo to R. Younger from L. Soffer 6/12/81.
Massachusetts	Ban in effect	Regulations adopted by the Massachusetts Dept. of Public Health ban the installation of UFFI, effective November 14, 1979, and require removal by installer if homeowner's health is impaired.	Regulations concerning Hazardous Substances 105 CMR 650.
Minnesota	Warning in effect	State Law requires that written warning be given prior to the sale of building materials and sale or lease of housing units containing urea formaldehyde. The warning is required after January 1, 1981.	Minn. Stat. §325 F. 18 (1980)
	Proposed Standard	Proposed rule would ban the sale of new residential units with formaldehyde levels exceeding 0.4 ppm.	Minnesota State Register, October 19, 1981.
New York	Warning in effect	State Law requires written notice to be given to purchaser of UFFI or the owner of a building in which UFFI is installed.	New York Times, May 25, 198[illegible]
Washington	Local ban in effect	Seattle Housing Authority banned use of UFFI in low-cost housing.	Seattle Post - Intelliger, February 19, 1981.
Wisconsin	Standard in effect	State rule establishes 0.4 ppm as the maximum ambient air concentration of formaldehyde in mobile homes built after Oct. 1, 1981.	Wisconsin Administrative Code March, 1981, Chapter Ind. 14.

Table 5

Recommended or Promulgated Regulations
for Formaldehyde in Foreign Countries

Country	Regulation	Reference
Canada	Temporary Ban of Urea Formaldehyde foam insulation	December 17, 1980 news release of Canadian Ministry of Health and Welfare
Sweden, National Board of Health and Welfare	Recommend: 0.1 ppm for new housing 0.4-0.7 ppm for existing housing; <0.4 no action required even if symptoms are present; 0.4-0.7 action only if symptoms present; >0.7 unacceptable, action required even if no symptoms.	"Formaldehyde Indoor Air Standards in Sweden" presented at CPSC Technical Workshop on Formaldehyde April 9-11, 1980.
Denmark, Danish Building Research Institute	Recommend 0.12 ppm	Andersen, Indoor Climate (1979)
Netherlands, Ministers of Housing and Health	Recommend 0.10 ppm	Ibid.
West Germany, Federal Health Office	Recommend 0.10 ppm	Ibid.
Czecho-slovakia	Recommend .08 ppm	Health Aspects related to Indoor Air Quality - Report on a WHO Working Group April 3-6, 1979

levels of formaldehyde are to be found and from which the public health needs to be protected.

BUILDING MATERIALS

With regard to the sale of building materials the rule addresses only UFFI. The retention of heat is one among many purposes for which a building is constructed. To the extent that insulation enhances the heat retention properties of a building, it is considered to be a building material. The law defines building materials to include insulation. (Laws 1981, ch. 245§1, subd. 1.a).

Because there are no generally accepted product standards for the other products containing urea formaldehyde which are commonly used in housing construction (i.e., particleboard, plywood and paneling) there is no currently implementable means of regulating the sale of these materials, short of prohibiting their sale outright. The statute did not provide for the imposition of such a blanket prohibition on sales of all building materials which contain urea formaldehyde. However, the buyer of building materials is not completely without protection since the law does provide that a warning must be given whenever any materials containing urea formaldehyde are sold in the state. In the warning which must be given, the buyer of these materials is made aware that the materials he is purchasing may pose a health problem. He has the opportunity at the time of purchase to select a different kind of material, one which does not contain formaldehyde and which might have fewer health risks associated with its use in a home.

There are two other reasons why the rule addresses only formaldehyde foam insulation (UFFI) under building materials. They are the following: the amount of formaldehyde emitted into the ambient air after the installation of UFFI can be measured. No comparable method has yet been developed for measuring the amount of formaldehyde emitted by individual products such as a length of particleboard shelving or a sheet of plywood paneling. The matter of the need for product standards will be addressed at length at p. 21. A second reason for including UFFI within the scope of the rule is the fact that whole-house installations of this insulation can result in significant and measurable levels of formaldehyde in the ambient air. The Department arrived at this conclusion after having followed up on many complaints from residents who claimed to have developed a number of health problems after foam insulation had been installed in their homes. The fact that the U.S. Consumer Product Safety Commission has proposed a ban and that several states (Table 4) and Canada have adopted a ban on UFFI supported the position that UFFI should be regulated.

MAXIMUM AMBIENT LEVEL

Once the Commissioner of Health had made the determination required by the 1980 law, the MDH had to decide how it could proceed to regulate the sale of housing units constructed of materials which contain urea formaldehyde.

Having considered all of the regulatory schemes in use elsewhere, and having eliminated those which were not considered implementable, the MDH chose to impose a maximum ambient level,

as is done in Wisconsin and in industrial settings under OSHA jurisdiction. The only decision remaining to be made had to do with selection of a level.

The rule establishes a maximum permissible ambient air level for both newly constructed housing units and for installations of UFFI. Support for adopting the ambient level is derived from a number of sources and includes levels currently in use in both the U.S. and Europe and recommendations from a number of organizations and individuals.

Numerous industry spokesmen have argued repeatedly that the ambient air level was not a reasonable means by which to regulate human exposure to formaldehyde. Instead, these commentors have urged that the State adopt product standards. The proposed State rule might have included a requirement that before a building material could be sold in Minnesota, it would have to be accompanied by a certification from some independent testing body that assures that the material does not emit more than a certain quantity of formaldehyde. Representatives of the plywood and particleboard manufacturing industries have brought to our attention a number of proposed product standards. These are still in the process of being developed and reviewed prior to their being adopted by the representative associations of these various industries. As of September 30, 1981, there are no standards governing formaldehyde emissions for materials used in the construction of housing units, which have the approval of any governmental or impartial standard setting organization in the United States.

A number of different materials such as plywood and particleboard go into the construction of a housing unit, whether it is a conventional housing unit or a mobile home. Each of these materials can give off formaldehyde at different rates and for different periods of time after construction of a housing unit. Reliance upon a standard which governs only one of those materials would not have any impact on the rate of off-gassing of the other materials and therefore would not provide sufficient protection to occupants. Therefore, the use of a standard for only one of the component building materials could not be substituted for a maximum ambient air level. Only when there is a product standard for every building material which is a significant formaldehyde emitter, could the State consider allowing such standards to be substituted for the ambient level.

The purpose of this rule is to protect the health of the public by reducing the level of formaldehyde to which they are exposed. In the absence of other available regulatory means, the proposed rule seeks to limit that exposure by focusing on the healthfulness of the air as it is inhaled by the occupant of the housing unit.

7MCAR Section 1.488 B. Definitions. Certain salient terms which are used throughout the rule have been defined for the purpose of specifying exactly what those terms mean and how they are used in the rule.

1. The term "building materials" is given the meaning prescribed in the law, which reads as follows: "... any urea formaldehyde-containing material used in the construction or

insulation of a housing unit, but does not include: (1) draperies, carpeting, furniture and furnishings not normally permanently affixed to a housing unit; and (2) non-cellular insulation." (Laws 1981, chap. 245 §1). Since the Legislature adopted this definition, it is appropriate that the rule definition be consistent with that contained in the statute.

2. The term "commissioner" is defined so as to specify the meaning of the term when used through the rule, and in order to allow the use of just a single word rather than the complete phrase "commissioner of health" every time the term appears.

3. "Newly constructed" is defined because it is one of the more significant criteria by which applicability of the rule is to be determined. The definition contained herein has been written so as to clarify what the term means and how it is intended to be used. Since this definition equates "newly constructed" with the criterion that a unit has not been previously occupied, the seller of the unit need not be concerned that the level of formaldehyde in the unit has been elevated by any occupant's life style and/or furnishings. Thus the seller is sure that whatever level of formaldehyde is measured in the unit prior to sale is that which is truly attributable to the building materials only.

The second portion of the definition which relates to completion of construction more than 30 days after the effective date of the rule was added so that building contractors or manufacturers of housing units are less likely to be caught with great numbers of housing units which are just about ready for

sale, which may not be able to meet the level prescribed in the rule. Building contractors and sellers will have, in a sense, a 30-day grace period before the ambient level applies to a unit which they are attempting to sell. Within that 30-day period they would be able to make any corrections or any retrofitting that might be necessary to bring the unit within the prescribed levels by the time of sale. Many of the comments received by the Department questioned why there was not a minimum amount of time prescribed after construction but before testing. The Department did not feel that it was necessary or even helpful to specify such a minimum amount of time. The seller could use (to his advantage) whatever interval of time he thought was necessary in order for excessive quantities of formaldehyde in the unit to be off-gassed and ventilated to the outside. The lack of further restrictions within the definition gives the seller a considerable amount of flexibility while still assuring that the ultimate buyer of the unit will be protected within the terms of the rule.

4. The term "housing unit" is not defined in the law. It was necessary to specify the scope of the rule in such a way as to carry out the intent of the law, and the definition given in the rule serves that purpose. Since the health problems associated with exposure to formaldehyde are likely to be made more severe by prolonged exposure to high levels of formaldehyde, the Department felt that it was appropriate to define the term "housing unit" to include units which are intended for long-term human habitation, but to exclude places where persons are

usually only in transit, such as hotels and recreational vehicles. The remainder of the first sentence enumerates those types of housing units which the Department felt should be included within the definition of the term, in order to provide protection to the vast majority of the population.

Persons residing in health care facilities should be covered by the provision of the rule because in many instances those persons, i.e., the old or the disabled, are confined in these facilities for the remainder of their lives. By this criterion, these long-term care facilities are equivalent to residences. To the extent that these people are ill and disabled, they in particular, require protection from exposure to health endangering environmental factors such as formaldehyde.

7 MCAR § 1.448 C. Most of the recommended or promulgated residential air quality standards for formaldehyde are in the range of 0.1 to 0.5 ppm. (cf. Table 5). Table 6 lists the levels which apply in the U.S.

Table 6

Recommended or Promulgated Levels for Formaldehyde in Residential Environments in the U.S.

Responsible Authority	Level (ppm)	Applicability
State of Wisconsin	0.4 (in effect)	mobile homes
CPSC - Health Sciences	0.1 (recommended)	all residential housing
ASHRAE Ventilation standard (1980 draft)	0.1 (recommended)	all residential housing
NAS (1972)	0.1 (recommended for 90 days and 6 months)	spacecraft

In the rule being considered for adoption the MDH is proposing a maximum ambient level of 0.4 ppm. There is a considerable body of reliable information from both scientific and medical experts to warrant adoption of this level.

The MDH had proposed a level of 0.5 ppm for the temporary rule which was due to take effect on Dec. 15, 1980. At that time, there was no such residential level in effect anywhere in the U.S. The Commissioner determined then that a level of 0.5 was justifiable and supportable, based on the information contained in the NAS Report (1980). When the temporary rule was proposed in June, 1980, the affected industries had only had a few months' notice (since passage of the legislation) in which to prepare themselves for any changes in manufacturing or materials' purchasing procedures. When the rule was proposed it was not known whether or not mobile home manufacturers would have difficulty in achieving that level for units sold in Minnesota.

By now, approximately 18 months have elapsed since passage of the original law. Much information has been exchanged between the Department and representatives of various industries both in writing and through meetings. The industries which would be affected by the rule have had abundant notice that a maximum level of 0.4 ppm would be proposed by the MDH.

During the CPSC formaldehyde hearings held in Minneapolis on February 5 and 6, 1980, several physicians made statements about health effects caused by formaldehyde and the level(s) at which the effects occurred.

Hugh Westgate, M.D., a physician in private practice in Minneapolis, testified that the maximum level any human should be exposed to in a home is 0.3 ppm, and that a baby should not be kept in a home with exposure levels greater than 0.1 ppm. (CPSC Hearing Transcript)

Steven Lamm, M.D., testified at both the CPSC hearing and the Wisconsin Department of Industry, Labor, and Human Relations (DILHR) hearing held later in February, 1980. At that time, Dr. Lamm was employed by Tabershaw Occupational Medicine Associates and was testifying at the request of the Formaldehyde Institute. During the CPSC hearing Dr. Lamm stated "We prepared a report for the Rapco Foam [urea formaldehyde insulation] people in which we recommend to them that they should attempt to keep exposures below 0.5 parts per million." Later during the question period Dr. Lamm was asked about the recommended level for formaldehyde exposure. Dr. Lamm replied, "This [0.5 ppm] has been our recommendation for over a year." (Transcript, CPSC Hearing, Feb. 5, 1980) Tabershaw had made the same recommendation to the Formaldehyde Institute in January, 1979. His testimony before the Wisconsin DILHR on February 18, 1980 was similar, and he ended his testimony at this hearing by concluding:

1. No significant health hazard to the general public appears to exist from residential formaldehyde exposures of less than 1 ppm.
2. An interim standard of 0.5 ppm formaldehyde is an appropriate residential indoor standard to protect the vast majority from risks of any health hazard from formaldehyde exposure.

3. Analysis of the available data on recently reported residential cases do not alter this conclusion. (Transcript, Wisconsin Department of Industry, Labor and Human Relations Hearing, Feb. 18, 1980)

The National Academy of Sciences (NAS, 1980) Report also commented on the health effects associated with exposure to various levels of formaldehyde. Table 7 is taken from the NAS Report. This table represents,

> "... the Committee's best judgement as to a range of irritation responses associated with exposure to various concentrations of formaldehyde... Although the extent of irritancy has not been investigated in controlled human studies at concentrations below 0.25 ppm, the Committee expects that less than 20 percent of an exposed human population would react to such formaldehyde exposure with slight irritation of the eyes, nose, and throat and possibly a slight decrease in nasal-mucus flow. As yet there is no evidence of a population threshold for the irritant effects of formaldehyde in humans." (NAS, 1980, p. 17)

The Report summarized the Committee's best judgement as to how humans will react to various levels of formaldehyde. Below the level of 0.5 ppm, 20 percent of the population experiences slight to mild irritation. Above 0.5 ppm, the Committee believes that over 30 percent of the population would experience slight to mild irritation and 10 to 20 percent of the population would have mild to moderate irritation. The level of 0.5 ppm separates slight irritation from moderate irritation.

The American Society of Heating, Refrigerating, and Air-Conditioning Engineeers, Inc. (ASHRAE) has standards for natural and mechanical ventilation in buildings (ASHRAE, 1973). The purpose of the ASHRAE standards is to define "... ventilation requirements for spaces intended for human occupancy and specifies minimum and recommended ventilation air quantities for the pre-

TABLE 7**

PREDICTED IRRITATION RESPONSES OF HUMANS
EXPOSED TO AIRBORNE FORMALDEHYDE

Concentration, ppm	% of Population Giving Indicated Response	Degree of Irritation*
1.5-3.0	20	7-10
	>30	5-7
0.5-1.5	10-20	5-7
	>30	3-5
0.25-0.5	20	3-5
<0.25	<20	1-3

*Irritation Index (scale derived from clinical effects noted in the literature).

10 - Strong eye, nose, and throat irritation; great discomfort; strong odor.
7 - Moderate eye, nose, and throat irritation; discomfort.
5 - Mild eye, nose, and throat irritation; mild discomfort.
3 - Slight eye, nose, and throat irritation; slight discomfort.
1 - Minimal eye, nose, and throat irritation; minimal discomfort.
0 - No effects.

**This table is labelled Table 5 in the National Academy of Sciences Report, (1980).

servation of the occupants' health, safety, and well-being." According to Section 3.3 of ASHRAE's standards "Air shall be considered unacceptable for ventilation use in accordance with this standard if it contains any contaminant in a concentration greater than one-tenth the Threshold Limit Value (TLV) currently accepted by the American Conference of Governmental Industrial Hygienists" (ACGIH). The ACGIH recommended TLV was 3 ppm until early 1981 when it was reduced to 2 ppm. (ACGIH, 1981). In a recent draft revision of the ASHRAE standards, the recommended guideline for formaldehyde exposure indoors is 0.10 ppm (ASHRAE, Table 4, 1980).

As noted earlier, the only existing level for residential units in the U.S. is the 0.4 ppm level which applies to mobile homes, as approved by the Wisconsin legislature in 1981.

The only other level currently enforced is the the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) standard for formaldehyde which requires an 8-hour time-weighted average (TWA) concentration limit of 3 ppm, a ceiling concentration of 5 ppm for one hour, and an acceptable maximum peak above the ceiling concentration of 10 ppm for no more than a total of 30 minutes during an 8-hour shift.
(29 C.F.R. §1910.1000(b)) The OSHA level took effect in 1975.

In 1976, NIOSH recommended, based upon the irritant effects of formaldehyde, that employee exposure to formaldehyde in the occupational environment be controlled to a concentration no greater than 1.2 milligrams per cubic meter of air (1 ppm) for

any 30-minute sampling period. The carcinogenic potential of formaldehyde was not known at that time, and therefore was not considered in developing the recommmendations. (NIOSH, 1980.)

The American Conference of Governmental Industrial Hygienists has recommended that the 8-hour time weighted average be reduced from 3 ppm to 2 ppm. (ACGIH, 1981)

When deriving from occupational standards maximum exposure levels which are intended to apply to the population at large, there is a generally accepted public health rule that the occupational level should be reduced by a significant factor. According to the Minnesota and U.S. Industrial Hygiene Field Operations Manual (revised 4-30-81) Cumulative Toxicity Standards, the equivalent permissible exposure level would be 0.71 ppm, (based on the following calculation and using the 8-hour permissible exposure level of 3.0 ppm:

$$3.0 \text{ ppm} \times \frac{40 \text{ hours (work week)}}{168 \text{ hours (total hours in 1 week)}} = 0.71$$

Using the ACGIH recommended level of 2.0 ppm, 8-hour permissible exposure level, the same calculation would yield a level of .476 ppm for continuous exposure.

Occupational standards are generally derived from epidemiological or other studies of workers who, on the average range in age from 18-65 and who are healthier than the general population. (Calabrese, 1978a, chapter 10) This "healthy worker effect" would argue strongly in favor of a level considerably lower than 1.0 ppm for a population which contains infants and a significant proportion of elderly persons. Both of these groups experi-

ence breathing difficulties at a rate greater than that of the general population and require protection from respiratory system irritants. This view is supported by a number of researchers who have recently reviewed the relevant literature. (Lippmann et al., 1979; Calabrese, 1978a, 1978b)

A glance at Table 7, taken from the 1980 NAS report, indicates that adoption of a level of 0.4 ppm would provide considerable protection from the more severe irritation effects of formaldehyde to about 80% of the population.

Achievability

The level of 0.4 is achievable in newly constructed housing and with some installations of urea formaldehyde foam insulation. These assertions are based on a variety of sources. With regard to mobile homes, one Wisconsin manufacturer which produces at least 25% of the units sold in Minnesota has assured us that the units sold by their company can comply with the proposed level. (personal communication, from Wick Systems, Inc., 1980) With regard to builders of conventional housing units, little information has been made available to this department as to whether or not they could meet the 0.4 ppm level with ease. Certain builders have argued that their units posed no problem. The number of complaints received from owners of new conventional housing units is considerably smaller than the number from mobile home owners. This would tend to support the builders' assertions. If conventional home builders cannot manufacture units which emit less than .4 ppm, then they will have the choice of 1) ventilating a unit until the level is less than 0.4 ppm, 2)

sealing the exposed surfaces of the high-emitting materials or replacing them altogether, or 3) constructing the unit from materials which are known to be low formaldehyde emitters. (Hardwood Plywood Manufacturers Association, 1979). As for installations of UFFI, those industry spokesmen who have commented on our earlier proposal have informed us that such installations do not pose a problem when the components are properly mixed.

The 0.4 ppm maximum ambient level being proposed by the MDH is a reasonable level because it provides a necessary degree of health protection to the vast majority of the public, it is achievable through use of currently available technology and it is within the reliable range of measurement by the NIOSH chromotropic acid method which is one of the more commonly used methods for analysis for formaldehyde.

Based on all of the foregoing information, the maximum ambient indoor concentration of 0.4 ppm which the MDH is proposing is a reasonable level to be imposed at this time.

7MCAR Section 1.488.D. Test Method. The test method which is prescribed in the rule is taken from the National Institute for Occupational Safety and Health Manual of Analytical Methods, because this method is one which is widely used both in the occupational setting where tests for ambient formaldehyde are routinely made, and in research settings where scientists are looking at the effects of formaldehyde or are actually experimenting with development of new methods. The method has been available for several years and because numerous researchers and analytical chemists are familiar with it, the method has

gained wide acceptability in terms of reliability and accuracy. Other analytical methods were reviewed but none of them seem to have the same degree of acceptability as the NIOSH method does. In paragraph D.2., the rule provides for the opportunity to use a different test method. The Department recognized that if and when an alternate method should come into general use, one which, as prescribed in the rule, has the same precision, reliability and accuracy as the NIOSH method, that a seller should be permitted to rely on results obtained with the use of the alternate method. Since the Department is not concerned with the method per se but rather with the results which are obtainable with that method, we are willing to accept the fact that there may be other methods being developed which could have advantages over the NIOSH method and which should therefore be allowed.

Some have argued that outdoor levels of formaldehyde can cause an artificial elevation of the indoor levels if they are measured according to the procedure contained in the proposed rule. The U.S. EPA did some monitoring for <u>total aldehydes</u> at various locations in and around the City of St. Paul, Minnesota in 1975. The highest 24-hour average reading for the months of January through June, for each of four different sampling sites was .017 ppm, .014 ppm, .024 ppm and .014 ppm. Even assuming that the levels measured were composed entirely of formaldehyde (which they are not), the MDH does not believe, based on these monitoring results, that outdoor levels would contribute measurement variation which is significantly beyond that which is inherent in the method itself.

7MCAR Section 1.488. E. Testing Conditions. This part and the following part F of the rule prescribe the conditions under which a test for formaldehyde is to be carried out. The reader will note that the rule states "Whenever the level of formaldehyde is to be measured ...". The rule does not require that a measurement be made prior to the sale of a housing unit. The rule merely prescribes the conditions to be met if and when a test is to be done. The lack of an absolute requirement that every unit be measured prior to sale allows the builder or manufacturer to develop and rely upon a quality assurance program which could eliminate the need to test every unit.

It is necessary to standardize those conditions under which a test must be done in order to assure that results of tests which are made to assure compliance with the rule are comparable. There are several variables which can affect the level which is to be measured. Therefore it is necessary to specify how those variables are to be controlled in order to assure that the level which is reported can be compared to measurements made in other units and has the same meaning to each person who attempts to interpret it. Because the rate at which formaldehyde off-gasses is so dependent upon temperature, rate of ventilation, and humidity conditions within an enclosed space, it is appropriate that the conditions prescribed for the test be roughly comparable to those conditions under which a human occupant will be exposed.

Temperature and Humidity. The rule specifies that the testing has to be done within an indoor temperature range which

is generally comfortable for humans. The temperature range prescribed in the rule is on the higher end of the scale of temperatures currently used in Minnesota. The range was purposely chosen to allow for the taking of samples under summer conditions when the temperature is higher and formaldehyde off-gassing is enhanced. Since formaldehyde off-gasses at a much slower rate at lower temperatures, it is conceivable that measurements made when the temperature is only 50° would show the level to be much lower; however, since most people don't tend to keep their housing units at a temperature of 50°, it is important to have the measurement made somewhere in the range of normally accepted comfortable temperatures. The temperature range is also one which can be readily achieved at the manufacturing site. This is of particular concern to manufacturers of mobile homes where these units are constructed in enclosed buildings when the indoor working temperature may be as low as 70° in the winter time. On the other end of the scale there may be a few days during the summer when the working temperature might exceed 85° but it is likely that those days would be very few in number. The rule provides for the measurement to be made at ambient relative humidity conditions because achieving a specific level of humidity might be difficult during the very cold and dry winter months, when the humidity level would have to be artificially increased before the test is made. The conversion formula prescribed in the rule has been used reliably by a number of industry laboratories. It has also been prescribed for use in the Wisconsin rule.

Ventilation. In subpart E.2. the rule prescribes requirements for ventilation of the unit, the rate at which such ventilation shall take place and the amount of time during which the unit must be ventilated before the test air sample can be taken. As noted above, the rate of ventilation (measured in number of air changes per hour) within the housing unit can affect the measured amount of formaldehyde in a living unit. For this reason it is necessary to standardize the ventilation conditions under which a test air sample is to be collected. Construction techniques in current use result in the production of housing units which have rates of ventilation (exchange of indoor and outdoor air) which are many times lower than were achievable a few years ago. It is now not uncommon for a housing unit which is constructed for purposes of heat conservation, to have a ventilation rate which is in the range of 0.5 to 1.5 air exchanges per hour. Indeed there is a U.S. HUD standard for mobile home construction which says that a unit must be ..."constructed to limit air infiltration to the living area of home.... The goal of the infiltration control criteria is to reduce heat loss/heat gain due to infiltration as much as possible without impinging on health and comfort and within the limits of reasonable economics." (24 CFR 3280.505) Since the proposed rule addresses newly constructed housing units, the rule must also take into account the ventilation rates at which these units are intended to be occupied. Therefore the rule specifies a ventilation rate for test purposes which is within the range of the rates currently achievable for housing

units. Since the purpose of the test is to approximate living conditions to which occupants would be exposed over the long term, it is appropriate to prescribe that a ventilation rate within the range of rates possible during occupancy is the one under which the test sample will be taken. The rule requires that prior to testing, the unit be ventilated at a specified rate for a two-hour period, during which all interior doors, cabinets, closets and doors are open. This allows for maximum air exchange between surfaces which may be off-gassing formaldehyde and the ambient air. Then the rule requires that the same rate be maintained during a period when all exterior doors and windows are closed. This allows for equilibration of the off-gassing of formaldehyde with the air in the unit. At the end of the two-hour equilibration period, the test air sample(s) can be collected. The amount measured in those samples should be representative of the amount of formaldehyde present in the unit when it is maintained at that ventilation rate. Some will argue that all of the windows should be open, others argue that all of the windows should be closed. To the extent that the test is intended to measure a level of formaldehyde which might be present under normal habitable conditions, it is necessary to prescribe what we view as being those normal habitable conditions. The windows and doors are not normally open except on hot summer days. These amount to no more than three months of the year. That means that for the remaining nine months the windows and doors are probably closed except when people are entering or leaving the unit. Therefore it is appropriate

to make the measurement under conditions which are comparable to the way the unit is maintained during that nine-month period. This portion of the rule requires that all non-vented gas appliances be shut off and that smoking not be allowed. Both of these activities are known to generate measurable quantities of formaldehyde which could accumulate in the unit during the two-hour period. This accumulation would result in the measurement of a falsely high level which is composed of formaldehyde from two sources: building materials and smoking or the burning of gas. The prohibitions imposed in this portion of the rule help to assure that that level of formaldehyde which is measured is truly attributable to the building materials.

In subpart E.2.d., the rule also allows for a heat exchange device to be operated when the unit is being equilibrated prior to taking the test sample, because such a device would probably be operated under normal living conditions in the unit. Since for test purposes we are attempting to duplicate the conditions under which the unit is normally maintained, it is appropriate that this device be in operation when the test sample is taken.

Sampling. Subpart E.3 prescribes the location in a room where the sample will be taken. The first sentence specifies the minimum locations from which air test samples must be taken. If the contractor or seller has a reliable quality assurance program, it ought not be necessary to measure every single unit and the rule does not require that he do so. The rule does require that if a unit is to be measured, air in both the kitchen and one bedroom must be measured. This provision specifying

rooms to be sampled was added because many sellers asked where the sample should be taken. Experience has shown that the highest concentration of formaldehyde can be found inside closed kitchen cabinets. This might favor a requirement that the test sample be taken inside the cabinets. However, the person who spends the most amount of time in the kitchen does not spend that time inside the closed cabinet but probably spends more of the time somewhat closer to the middle of the room, or is exposed to conditions which more closely resemble those which would be present in the middle of the room. Therefore it is appropriate that the sample should be taken at a point which is representative of the conditions the occupant will usually encounter. Again the purpose of prescribing this condition is to assure that results of tests taken in different rooms can be compared with each other. The test sample is to be taken at a height of 3.5 to 4 feet above the floor to assure that the sample is being collected at that height at which many of the occupants in the house would be exposed. A test sample taken up near the ceiling or down close to the floor where very few of the occupants are inhaling would not be representative of the conditions most of the occupants would be experiencing.

7MCAR, Section 1.488.F. This part of the rule prescribes testing conditions which must be used when measurements are being made in association with the installation of UFFI. Since the rule provides that the level of .4 parts per million cannot be exceeded, both pre-and post-installation tests must be made. The requirement that the level of .4 parts per million not be

exceeded suggests that: 1) the installer has to be reasonably confident that his method of installation will not cause the ambient level of formaldehyde in the housing unit to exceed .4 parts per million, 2) and further, that there may be housing units in which the existing level of formaldehyde is close enough to .4 parts per million that UFFI should not be installed. Industry spokesmen insist that the only installations of UFFI which cause health problems (and/or levels of formaldehyde well in excess of .4 parts per million) are those which have been made improperly, or where the materials were not properly mixed. In view of this assertions and the fact that the level of formaldehyde being off-gassed is largely within the control of the installer, it should be possible to continue to install urea formaldehyde foam insulation in housing units in Minnesota.

Under subpart 1, the rule requires that a pre-installation measurement be made no more than two weeks prior to installation and that post-installation measurement be made within 30 days after installation. These time limits are imposed to assure that the climatic conditions (temperature, humidity) will be roughly comparable before and after installation so that the measurements will represent the actual amount of formaldehyde present without any influence from altered climatic conditions. The rule must prescribe a time limit after installation within which the post-installation measurement must be made. Without such a time limit it would be possible for the installer to postpone making the measurement until some date long after installation when much of the formaldehyde would have off-gassed.

Because this rule is concerned with minimizing exposure to high levels of formaldehyde, we feel that the 30-day limit is a reasonable accommodation which: 1) allows for an initial off-gassing, and 2) allows for a minimum exposure interval for the occupants of the household. It also allows for the installer to be able to select a date for retesting at the convenience of the consumer, and one on which the climatic conditions are as similar as possible to those which existed when the pre-installation test was made.

Since the rule limits itself to urea formaldehyde emitted by building materials, the Department thought that it was reasonable to require that other urea formaldehyde containing materials, which are not building materials, should be removed from the housing unit before a test sample is taken. The items which must be removed are listed in the rule and include those which have been brought to our attention as being significant formaldehyde emitters when they are relatively new.

Under subpart 3, the rule provides that air samples should be taken in those rooms which are closest to the walls or ceiling where the urea formaldehyde insulation has been installed. The levels of ambient formaldehdye in the rooms closest to those portions of the housing unit where the insulation is installed will be higher than the levels of formaldehyde in rooms which are farther removed from the insulated portions. Since the purpose of the rule is to minimize exposure to formaldehyde, it is proper that the measurements be made in those rooms which are closest to the installation where we know that the levels

will be highest. Again for the purpose of making results comparable, the rule requires that the post-installation measurements be made in the same rooms as those which were tested prior to installation.

7MCAR Section 1.488.G. This portion of the rule sets an effective date which is 30 days after the date which would be dictated by the State Administrative Procedures Act. The Department felt that it was appropriate to postpone the effective date for at least this amount of time in order to allow the housing construction industry to become cognizant of the fact that the rule is now in effect. This one-month delay will also allow the industry some time in which to change its construction practices, and set up testing facilities or make arrangements for testing through private testing laboratories. It is the Department's position that a postponement of the effective date, such as is being proposed here, would be reasonable for the purposes explained above. Another reason why this time interval is appropriate is that it allows a person who is contemplating buying a new housing unit to be able to defer his or her decision for a relatively short time after which he can purchase a housing unit which he knows has to be in compliance with the rule.

Each of the provisions in the proposed rule has been discussed in terms of its need. Either it is based on statutory requirements or it is necessary in order to provide consistency within the rule itself. The rule is reasonable in that it is the product of considerable deliberation as to the merits and

implementability of a variety of means for satisfying the legislative purpose.

Oct. 26, 1981.

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Appendix A

YOUR HEALTH

NEWS RELEASE FROM THE MINNESOTA DEPARTMENT OF HEALTH

May 22, 1980
FOR IMMEDIATE RELEASE

Contact: Pauline Bouchard
(612) 296-5331

State Health Commissioner George R. Pettersen, M.D., has declared that the use of building materials which give off formaldehyde vapor can be a "significant health problem" under certain circumstances.

In accordance with Minnesota Laws of 1980, Chapter 594, a bill on formaldehyde passed during the last session of the state legislature, Dr. Pettersen issued the following statement:

> "Persons in newly constructed or remodelled residential environments may be exposed to the formaldehyde gas released from such materials as particle board, plywood, and recently installed foam insulation. We have determined that a significant health problem is presented by the use of building materials that emit formaldehyde gases. This determination is consistent with the recent findings of the committee on Toxicology of the National Academy of Sciences that:
>
> a. The first level of response to low airborne concentrations of formaldehyde appears to be irritational effects;
>
> b. Possible revised assessments of health implications need to await the results of ongoing and planned toxicologic studies; and
>
> c. At present, with all the uncertainties and variabilities of response of humans to low

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717 DELAWARE STREET S.E., MINNEAPOLIS, MINNESOTA 55440 PHONE (612) 296-5271

airborne concentrations of formaldehyde which are attributable to building materials in residential environments, the formaldehyde should be maintained 'at the lowest practical concentration.'"

Resins manufactured with formaldehyde have been used to make building materials for several years, Dr. Pettersen said. Large amounts of the resins are used in products like plywood, particle board, insulation cloth and adhesives, and formaldehyde gases given off by these materials have been blamed for a variety of health problems.

Government officials nationwide report that they have received many complaints about the problem, Dr. Pettersen said. The reported symptoms range from eye and skin irritation to breathing difficulties, nosebleed and nausea.

Dr. Pettersen said that the Minnesota Department of Health investigated complaints about possible formaldehyde exposure in 486 homes during a 15 month period ending April 30. The air inside those homes was found to contain formaldehyde vapor in amounts ranging from undetectable to 3.29 parts per million. After conducting a similar investigation, Wisconsin proposed regulations which would limit levels of formaldehyde vapor inside new mobile homes.

Dr. Pettersen also noted that the Massachusetts Department of Health completely banned the sale of urea formaldehyde foam insulation in that state after holding public hearings on health problems allegedly caused by the insulating materials. The U.S. Consumer Products Safety Commission held a series of public hearings on the possible health effects of formaldehyde after receiving over 1600 complaints about products containing urea formaldehyde. Last December the U.S. Department of Energy proposed standards for making and installing urea formaldehyde foam insulation.

Dr. Pettersen said that, as soon as possible, he plans to issue temporary rules limiting the permissible amount of formaldehyde vapor inside newly constructed dwelling units. These rules will establish a maximum limit of 0.5 parts per million for the air inside these dwelling units.

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Permanent rules will be adopted only after the state health department holds public hearings on the formaldehyde issue, sometime later this year. Dr. Pettersen said evidence presented at the hearing may justify provisions in the permanent rules which would gradually lower the permissible level of formaldehyde.

STATE OF MINNESOTA

COUNTY OF HENNEPIN

BEFORE THE MINNESOTA

COMMISSIONER OF HEALTH

In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units

STATEMENT OF COMPLIANCE WITH RULEMAKING PROCEDURES

I, Special Assistant Attorney General Paul G. Zerby, do hereby declare that I have examined the above-captioned rules and all related documents and that, based on my examination and my personal familiarity with the applicable procedures, the Administrative Act, the rules of the Office of Administrative Hearings, and the rules of the Attorney General have been followed without any exceptions.

Dated: May 19, 1982

BEFORE THE MINNESOTA

COMMISSIONER OF HEALTH

Paul G. Zerby

PAUL G. ZERBY
Special Assistant
Attorney General

STATE OF MINNESOTA

DEPARTMENT OF HEALTH

In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units	* * * *	AFFIDAVIT OF MAILING NOTICE OF SUBMISSION TO THE ATTORNEY GENERAL

STATE OF MINNESOTA)
) SS.
COUNTY OF HENNEPIN)

Nancy E. Chesney, being first duly sworn, deposes and says:

That on the 19th day of May, 1982, in the City of Minneapolis, County of Hennepin, State of Minnesota, she served the attached Notice of Submission to the Attorney General by depositing in the State of Minnesota Central Mail System for first class mailing, a copy thereof, properly enveloped, with postage prepaid, to all persons and associations who requested notice that the rules in the above-entitled matter have been submitted to the Attorney General.

Nancy E. Chesney

Subscribed and sworn to before me this 19th day of May, 1982.

Marie B. Tromiczak

MARIE B. TROMICZAK
NOTARY PUBLIC - MINNESOTA
HENNEPIN COUNTY
My Commission Expires Oct. 23, 1987

Notice of filing w/ A.G.

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In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units	* * * *	NOTICE OF SUBMISSION TO THE ATTORNEY GENERAL

Pursuant to your request and the accordance with Minnesota Statutes, section 15.0412:

PLEASE TAKE NOTICE that the above-captioned rules have been submitted to the Office of the Attorney General on this date, May 19 1982, for review as to form and legality. Pursuant to 1 MCAR § 1.206 B., the Attorney General will not approve the rules for at least ten calendar days after receipt to allow any person or association time to comment on the legality of the rules, after which that Office will complete its review. If you desire to comment on the legality of the above-captioned rules, you should direct your comments to the Office of the Attorney General, G-25 State Administration Building, 50 Sherburne Avenue, Saint Paul, Minnesota 55155, telephone (612)296-7030. Please note that the above-cited rule of the Attorney General also provides that a copy of any written comments submitted to the Attorney General must be submitted simultaneously to this agency.

If you are interested in determining what changes, if any, were made in the proposed rules after the hearing and before submission to the Attorney General, you may contact Ms. Pauline Bouchard at (612)296-5331.

Department of Health
Environmental Health Division

Adopted Rule Governing Formaldehyde in Housing Units

Rule as Adopted

7 MCAR S 1.448 Formaldehyde in housing units.

A. Applicability. This rule applies to newly constructed housing units containing urea formaldehyde and to installations of urea formaldehyde foam insulation. The rule establishes a maximum permissible ~~ambient~~ indoor air level for formaldehyde and prescribes the methods for measuring levels of formaldehyde and the conditions under which the measurements are to be made.

B. Definitions. For the purpose of this rule, the following terms have the meanings given them.

~~1. "Building materials" has the meaning given it in Minn. Stat. S 325F.18, subd. 1a.~~

2. "Commissioner" means the Commissioner of Health.

~~3.~~ 2. "Housing unit" means one or more rooms which are intended for long-term human habitation. It includes any mobile home, single family residence, or living unit in a multi-unit structure, regardless of type of ownership, and any health care facility such as a nursing home, boarding care Home, intermediate care facility, or hospital.

~~4.~~ 3. "Newly constructed" means that the housing unit has not been previously occupied and that construction of the unit was completed more than 30 days after the effective date of this rule.

C. Maximum permissible formaldehyde level in housing units.

1. At the time of sale of a newly constructed housing unit, the ambient indoor air of any habitable room in the unit shall not contain more than ~~0.4~~ 0.5 parts of formaldehyde per million parts of air as measured according to the procedures specified in D. and E. The seller is responsible for assuring that the unit complies with this level.

2. The installation of urea formaldehyde foam insulation

in a housing unit which is not newly constructed shall not cause the ~~ambient~~ indoor level of formaldehyde in any habitable room in the unit to exceed ~~0.4~~ the higher of 0.5 parts per million or the preinstallation level as measured according to the procedures specified in D., E. and F. The installer of urea formaldehyde foam insulation is responsible for assuring that the installation complies with this level.

D. Test method.

1. Formaldehyde shall be measured according to the National Institutes of Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Volume 1, 2nd Edition, NIOSH 77-157-A, 1977, Method Number P&CAM 125. Air samples shall be collected in a solution of one percent sodium bisulfate in distilled water.

2. For the purpose of determining compliance with C., measurements made using an alternate analytical method are valid only if the alternate method has been approved by the commissioner. The approval shall be granted if the proponent of the alternate method can demonstrate to the satisfaction of the commissioner that the alternate method results in numerical values which have at least the same precision, reliability and accuracy as those obtained with the use of the method described in 1.

E. Testing conditions. Whenever the level of formaldehyde is to be measured, all of the conditions prescribed in 1.-4. must be met before a measurement is considered valid for the purpose of determining compliance with this rule.

1. Testing shall be carried out at an indoor temperature within the range of 70 degrees Fahrenheit to 85 degrees Fahrenheit and at ambient relative humidity. The resulti formaldehyde test levels shall be corrected to a 78 degree Fahrenheit condition using the following formula:

$$C = C_0 \times e^{-R(1/t - 1/t_0)}$$

Where,

C = test formaldehyde concentration level

Submitted to Atty. Gen. for review 5-19-82.

C_o = corrected formaldehyde concentration level

e = natural log base

R = coefficient of temperature = 9799

t = actual test condition temperature in degrees Kelvin

t_0 = corrected temperature in degrees Kelvin

2. The housing unit shall be prepared for measurement as follows:

a. For two hours prior to the close-up period, the housing unit shall be aired out at a ventilation rate of at least one outdoor air change per hour, with all interior doors, cabinets, closets and drawers open for maximum air exchange;

b. For the next two hours, the windows and exterior doors of the housing unit shall be closed. All nonvented gas appliances shall be turned off. No smoking shall be allowed;

c. Immediately after the two hour close-up period, the collection of air samples shall begin. The conditions prescribed for the close-up period shall be maintained until all samples have been collected; and

d. A housing unit equipped with a device to provide tempered outside air may be tested with the ventilation system operating at a maximum rate of one air change per hour.

3. At a minimum, a sample of air shall be taken from the kitchen and another sample shall be taken from one bedroom. Each air sample shall be taken in the center of the room, at a point which is approximately equidistant from opposing walls and at a height of 3-1/2 to 4 feet above the floor.

4. Each sample of air shall be analyzed separately.

F. Special testing conditions for use with urea formaldehyde foam insulation. In order to assure compliance with C.2., procedures in addition to those prescribed in E. must be followed with urea formaldehyde insulation. Those procedures are:

1. The level of formaldehyde in a housing unit shall be measured no more than two weeks prior to installation and shall be measured again within 30 days after the installation of the urea formaldehyde foam insulation;.

2. The consumer shall, at least two hours before the air samples are taken, cease any activity and remove from the unit any major source of formaldehyde which has been introduced by the consumer into the unit which may contribute to the level of formaldehyde in the air of the unit. The major sources include, but are not limited to the following: draperies; furniture made of plywood or particleboard and upholstered furniture, any of which are less than one year old; and

3. If the entire roof or all exterior walls are to be insulated, the preinstallation air samples shall be taken as prescribed in E.1.-2. If only a portion of the unit is to be urea formaldehyde foam insulated the preinstallation measurement for formaldehyde shall be made in those two rooms closest to the walls where the installation is to be made. Postinstallation air samples shall be collected from the same rooms as those which were sampled prior to installation.

G. Effective date. The levels prescribed in C. shall apply 30 days after the effective date of this rule.

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June 1, 1982

HAND DELIVERED

Ms. Judith Wehrwein
Assistant Attorney General
204 Administration Building
St. Paul, Minnesota

Re: Manufactured Housing Institute
Our File No.: 13581-0000

Dear Ms. Wehrwein:

Enclosed herewith please find a copy of the submission of Manufactured Housing Institute concerning the proposed Admission of Rules by the Commissioner of Health relating to formaldehyde.

We would appreciate the opportunity of meeting with you prior to your acting on the rule to more fully explain and present the issues at hand. If you can arrange such a meeting, please contact the undersigned or John Love of our office.

Thank you for your cooperation in this matter.

Very truly yours,

ROBINS, ZELLE, LARSON & KAPLAN

Stephen H. Cohen

SHC:sb
Enclosure
cc: Ms. Pauline M. Bouchard

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BY MESSENGER

St. Paul
June 3, 1982

Office of the Attorney General
G-25 State Administration Building
50 Sherburne Avenue
St. Paul, Minnesota 55155

RECEIVED
JUN 03 1982
ATTORNEY GENERAL
ADMINISTRATIVE AGENCIES

Re: In the Matter of the Proposed Adoption of Rules of the State Commissioner of Health Governing Formaldehyde in Housing Units

Dear Sir:

This letter is intended to comment on the legality of 7 MCAR §1.448 governing Formaldehyde in Housing Units. On behalf of our client, Blandin Wood Products Company of Grand Rapids, Minnesota ("Blandin"), we submit to you our position that 7 MCAR §1.448 clearly exceeds the authority granted by the Minnesota legislature to the Commissioner of Health.

Chapter 594, Section 1 of Laws 1980 grants to the Commissioner the authority to promulgate rules "pursuant to Chapter 15, including emergency rules, establishing standards governing the sale of building materials and housing units that contain products made with urea formaldehyde." (emphasis added).

7 MCAR §1.448(A) states: "The rule establishes a maximum permissible indoor air level for formaldehyde and prescribes the methods for measuring levels of formaldehyde and the conditions under which the measurements are to be made." (emphasis added). 7 MCAR §1.448(C) is entitled "maximum permissible formaldehyde level in housing units" (emphasis added). Subpart 1 states: "At the time of sale of a newly constructed housing unit, the ambient indoor air of any habitable room in the unit shall not contain more than 0.5 parts of formaldehyde per million parts of air as measured according to the procedures specified in D. and E." (emphasis added).

OPPENHEIMER WOLFF
FOSTER SHEPARD
AND
DONNELLY

The Rule, as drafted, does not limit its scope to only urea formaldehyde, as intended and specified by the legislature, but appears to cover other types of formaldehyde, including phenol formaldehyde as well. The Commissioner has clearly exceeded his statutory authority in promulgating a rule with this scope of coverage.

On August 5, 1980 we notified you of the same problem with Proposed Temporary Rule 7 MCAR §1.234. We also enclosed a letter from Blandin to the Department of Health which set forth the background of phenol formaldehyde usage by Blandin and the legislative history relating to Chapter 594 of Laws 1980. To our knowledge, there are neither any studies which demonstrate that the use of phenol formaldehyde resins in manufacturing waferboard panels to be harmful nor was there any evidence to this effect introduced at the hearings on this Rule.

It is our position that the Rule promulgated pursuant to Section 1 of Chapter 594, Laws 1980 should be restricted to urea formaldehyde only.

By bringing this specific matter to your attention, we are not commenting on any other aspect of the Rule at this time and reserve the right to do so at a later time.

Very truly yours,

OPPENHEIMER, WOLFF, FOSTER, SHEPARD AND DONNELLY

By- Mark S. Olson

Mark S. Olson

MSO:gk

cc: Ms. Pauline Bouchard
W. John Licke, Esq.

Dept. resp. to JSA
Nov. 12
p. 2+3

p. 21 of Agency Response Dec. 14 1981
Permanent File

SF-00006-01

STATE OF MINNESOTA

Office Memorandum

D copy

DEPARTMENT HEALTH

TO : Jerry S. Anderson
Special Assistant Attorney General
Department of Administration

DATE: Nov. 12, 1980

FROM : Roger L. DeRoos, Ph.D., Director
Division of Environmental Health

PHONE: 612/296-5320

SUBJECT: Proposed Adoption of Temporary Rule Relating to Formaldehyde.

The temporary rule relating to formaldehyde which you disapproved on October 15, 1980, has been revised and is herewith being resubmitted for review. In accordance with your request, we are submitting as an attachment a new Order of Adoption of rule, including the revised rule being adopted (original plus two copies).

The remainder of this memo constitutes the agency's statement in support of the rule being submitted for review. Every issue raised in your memorandum of October 15, 1980, regarding the earlier version is addressed below in the order in which you raised them.

Most of the substantial changes to which you objected have been eliminated from the revised version.

1. The revised rule being adopted applies to newly constructed residential units only, and uses the same language as that in the rule as proposed.

2. The inclusion of urea formaldehyde foam insulation within the definition of building materials and all references to foam insulation made elsewhere in the earlier version of the rule have been deleted from the revised version.

3. In your memo of October 15, you noted that the rule was not specific to the matter of urea formaldehyde. In subsection B.1. of the revised version, the term formaldehyde is qualified by the phrase "[that] which is attributable to building materials." In section A., the term "building materials" is defined as material containing urea formaldehyde. The net effect of reading the definition of "building materials" into subsection B.1. is that the sentence means "... 0.5 ppm of formaldehyde which is attributable to ..." materials containing urea formaldehyde. This language which is directly interpretable from the words of the rule itself, parrots the language of the last sentence of Section 1 of the law.

As to the second issue raised under #3, it is not necessary nor is it possible to say that only urea formaldehyde will be measured for the purpose of determining compliance with the 0.5 level. It is not necessary because of the characteristics of urea formaldehyde in comparison to formaldehyde released from other sources. Building materials (i.e., plywood and particle board) commonly are bonded with urea formaldehyde resins. Other formaldehyde resins, such as phenol, are used much less frequently. Phenol formaldehyde resins release free formaldehyde very rapidly immediately after curing and then release only minute amounts thereafter. On the other hand, urea formaldehyde resins do not release most of the free formaldehyde at the time of bonding but rather release it at a much slower rate, and over a much longer period of time, i.e., months or years. This is the reason why urea

formaldehyde products are troublesome and this is why the Legislature decided to restrict the legislation to require regulation of urea formaldehyde products. Phenol formaldehyde products do not pose the same risk. This point was made by Blandin Paper Products, Cloquet, Minnesota, both in committee hearings and by letter directly to you after the rule was proposed.

It is not possible to say that only formaldehyde produced from urea-resins will be measured because the analytical methods available can not distinguish formaldehyde arising from urea-resins from that released from other types of resins. But since the only source of free formaldehyde in a newly constructed residential unit will be the urea formaldehyde containing building materials, there is no need to require the use of an analytical method which measures only urea based formaldehyde.

4. The portions of the analytical method which were merely informative and not substantive have been deleted from the revised version.

5. The use of the term "normal ventilation" has been eliminated. The revised rule specifies that windows and doors be closed for one hour prior to the taking of air samples. This interval of time is sufficient to allow the concentration of formaldehyde in the air (which is influenced by temperature, humidity and ventilation rate) to approach a state of equilibrium.

6. The revised rule prescribes the location at which the air sample should be taken. See §1.234 F.2.b.

7. The provision regarding the testing conditions which a consumer would have to use for the purpose of making a complaint has been eliminated in its entirety. The revised rule is limited to procedures related to testing at the time of sale, in accordance with Section 1 of the law.

8. Subdivision G (first version) has been deleted from the rule. That portion which was labelled G.1. has been reproduced as an explanatory footnote on the first page of the rule for the purpose of informing the reader of the limited purpose of the rule. It is a purely advisory statement and neither adds to nor subtracts from the rule.

The rule as adopted is legal.

The following points are made in response to the issues regarding legality of the rule, starting near the bottom of page 2 of your memo.

1. In order to be able to promulgate a rule relating to formaldehyde, the commissioner of health was first required to determine if formaldehyde posses a significant health problem. (Laws 1980, Chap. 594 §1) The commissioner made such a determination within the 30-day interval imposed in the law and announced his decision to the public in a statement issued on May 23, 1980. The statutory provision under which these actions were taken reads as follows:

> "Within 30 days after April 24, 1980 the commissioner of health shall determine if a significant health

problem is presented by the use of building materials that emit formaldehyde gases. If he determines that such a problem exists he shall promulgate rules persuant to chapter 15, including emergency rules, establishing standards governing the sale of building materials and housing units that contain products made with urea formaldehyde." (laws, 1980, chap. 594, § 1).

The commissioner's determination was not promulgated as a rule and need not have been so promulgated for a number of reasons. The Legislature did not intend that the determination should be issued as a rule. Evidence on this point derives from two sources:

a) The Legislature demonstrates that it knows the difference between a rule and a determination of health effects by giving the commissioner authority to adopt rules, as a separate directive from that requiring the commissioner to make a determination.

b) Further evidence of intent can be gleaned from the statement that the determination must be made within 30 days of the effective date of the law. Even if the temporary rule-making procedure were required to be used, the minimum time intervals imposed in §15.0412 subd. 5 would not permit an effective determination to be made within the 30 days allowed in the law. The argument that the determination must be made according to Chapter 15 requires one to assume that the Legislature is unaware

of the time constraints imposed by the administrative procedures act and rules. Such an inference is not proper and ought not be recognized unless there is absolutely no alternative interpretation available. There is a staightforward and reasonable alternative interpretation available here and that is that the Legislature did not intend that the determination would have to be issued or adopted in the form of a rule.

Similarly, lack of notice is not a valid ground for arguing that the determination should have been issued as a rule. Very clear public notice was given, on two separate occasions, to inform the public of the commissioner's determination. Public notice was made in the first instance, by release of statement containing the commissioner's determination to approximately 520 news sources in the State, on May 22, 1980. Notice was given a second time, when the notice of the proposed rule was published in the State Register. The determination itself and the legal authority under which it was made were published in the notice. One can presume that every person who read the published rule also had to read the notice which preceded it, if only to determine how and when the rule might take effect. Even if one had not read the notice it is not necessary for one to have known about the determination in order to be able to read or understand the effect of the rule being proposed.

Based on the foregoing reasons, it is clear that the Legislature did not intend, nor does state law require that the determination required by Section 1 of the 1980 formaldehyde law had to be promulgated as a rule.

2. The specific portion of the rule which raised an equal protection problem for mobile home manufacturers has been eliminated. See § 1.234 B.1.

3. With regard to retroactive effect of the rule in terms of applicability of the 0.5 ppm level to units which may already have been constructed, this problem has been eliminated in the revised version. See § 1.234 A.3. The definition of "newly constructed" has been slightly changed from the definition in the proposed rule in order to eliminate any possible retroactive effect of the rule upon sellers.

4. The rule does not in any way conflict with any existing federal or state standards regarding residential units. We have discussed the matter with building code staff in the Department of Administration who inspect mobile homes for compliance with U.S. H.U.D. standards. Only rates of infiltration (i.e., the rate at which outside air can leak into a unit because of loose contruction) are regulated by H.U.D. mobile home standards. No ventilation rate is prescribed. There are no other state or federal standards which would apply to construction of residential environments. We have had ongoing discussions with the Minnesota Energy Agency regarding overall indoor

air quality problems. They have assured us that the rule does not conflict with any existing or proposed federal or state standards applicable to construction or indoor air quality of residential units.

SF-00009-01

STATE OF MINNESOTA

DEPARTMENT Health

Office Memorandum

TO : Ted Martinez
Atty Gen - Admin
Rm 204 Admin

DATE: 6-7-82

FROM : P. Bouchard
Env. Health - MDH

PHONE: 5331

SUBJECT: Reply by MDH to MHI comments regarding Rule 7MCAR §1.448

Attached is a copy of our reply to MHI's objections to the Rule as Adopted. You will note that we have not addressed any of their objections which go to the legality of the law itself.

I will phone you regarding the letter from Mark Olson on behalf of Blandin paper

SF-00009-01

STATE OF MINNESOTA

DEPARTMENT Health

Office Memorandum

TO : Ted Martinez
Spec. Asst Atty General
Dept. of Administration - Rm. 205

DATE: 6-8-82

FROM : P. Bouchard

PHONE: 5331

SUBJECT: Attached — copy of document which addresses concern raised by Mark Olson on behalf of Blandin Corp - re distinction between urea + phenol formaldehyde.