HJR

38

STATE OF ALASKA
THE LEGISLATURE

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JUNEAU, ALASKA 99811
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May, 1988

Copies of minutes listed below were originally included in this file. The minutes are available on the STAIRS database CMPR. In order to save space copies of minutes have not been left in the files.

Mary Van Nimwegen

HHESS 1-20-88 8:30 a.m.

Original sponsors: Koponen, Davis and Donley

IN THE HOUSE

BY THE HEALTH, EDUCATION AND SOCIAL SERVICES COMMITTEE

CS FOR HOUSE JOINT RESOLUTION NO. 38 (HESS)

IN THE LEGISLATURE OF THE STATE OF ALASKA

FIFTEENTH LEGISLATURE - SECOND SESSION

Relating to radon.

BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:

WHEREAS high concentrations of radon, a naturally occurring radioactive gas, have been found in homes around the state; and

WHEREAS radon is found in soils, rocks, and groundwater supplies, and can enter a house through various routes; and

WHEREAS a preliminary survey conducted by the Environmental Protection Agency indicated that as many as 8,000,000 or 12 percent of homes nationwide could contain dangerous levels of this cancer-causing gas, and that between 5,000 and 20,000 people each year die from lung cancer believed to be related to radon exposure; and

WHEREAS in Alaska, preliminary studies have identified high concentrations of radon in the areas adjacent to Fairbanks, Denali, and Healy; and

WHEREAS, unless regional surveys are conducted, one cannot reliably predict where high levels of indoor radon will be found because radon levels may be affected by the uranium content of nearby rock and soil, soil permeability, house construction, and other factors; and

WHEREAS the only way to determine whether a house contains a high level of radon is to test it with special equipment, because radon cannot be seen or smelled;

BE IT RESOLVED by the Alaska State Legislature that the United States and the State of Alaska should make a coordinated, joint effort to investigate and alleviate the indoor radon gas problem in Alaska; and be it

FURTHER RESOLVED that a radon information program designed to meet the

Alaska State Legislature
Representative Niilo Koponen

Pouch V
Juneau, Alaska 99811
(907) 465-4992

542 4th Avenue, Suite C
Fairbanks, Alaska 99701
(907) 456-8161

MEMORANDUM

TO: HOUSE HESS COMMITTEE MEMBERS

FROM: REPRESENTATIVE NIILO KOPONEN

RE: MINOR CHANGES IN HJR 38

DATE: JANUARY 20, 1988

The following changes that I am proposing in this new CS are simple clarifications to make this Resolution read more clarely:

LINE 14 added the word believed after lung cancer

LINE 16 clarified the sentence to read 'preliminary studies have identified high concentrations of radon in the areas adjacent to Fairbanks, Denali and Healy'. Instead of 'in Alaska, high concentrations of radon have been found in the areas surrounding Fairbanks, McKinley and Healy.'

LINE 18 is clarified to read 'there is no completely reliable method for predicting' instead of unless regional surveys are conducted, one cannot reliably predict.

LINE 26 deleted the word investigate so it just states alleviate.

Under COPIES I added Myra Munson, Commissioner of Health and Social Services and Judith M. Brady, Commissioner of Natural Resources.

POSITION PAPER/Department of Health & Social Services

Position Paper

HJR 38

"Relating to radon"

This resolution outlines problems associated with exposure to radon in homes and makes reference to the fact that high concentrations of radon gas have been found in areas surrounding Fairbanks and Healy. The resolution calls for a joint effort on the part of the U.S. government and the State of Alaska to alleviate the indoor radon gas problem in Alaska and also calls for a radon information program designed to meet the needs of the citizens of Alaska.

HJR 38 is fully in agreement with and is supportive of efforts presently being carried out by the Department of Health and Social Services in its monitoring of radon gas in Alaska homes.

The Department of Health and Social Services supports this resolution.

Recommended by: Elizabeth Ward
Elizabeth Ward, M.N.
Director
Division of Public Health

Date: January 19, 1988

Approved by: Myra M. Munson
Myra M. Munson
Commissioner
Department of Health and Social Services

Date: Jan 19, 1988

5-1448B

Original sponsors: Koponen, Davis and Donley

IN THE HOUSE

BY THE HEALTH, EDUCATION AND SOCIAL SERVICES COMMITTEE

CS FOR HOUSE JOINT RESOLUTION NO. 38 (HESS)

IN THE LEGISLATURE OF THE STATE OF ALASKA

FIFTEENTH LEGISLATURE - SECOND SESSION

Relating to radon.

BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:

WHEREAS high concentrations of radon, a naturally occurring radioactive gas, have been found in homes around the state; and

WHEREAS radon is found in soils, rocks, and groundwater supplies, and can enter a house through various routes; and

WHEREAS a preliminary survey conducted by the Environmental Protection Agency indicated that as many as 8,000,000 or 12 percent of homes nationwide could contain dangerous levels of this cancer-causing gas, and that between 5,000 and 20,000 people each year die from lung cancer believed to be related to radon exposure; and

WHEREAS in Alaska, preliminary studies have identified high concentrations of radon in the areas adjacent to Fairbanks, Denali, and Healy; and

WHEREAS, unless regional surveys are conducted, one cannot reliably predict where high levels of indoor radon will be found because radon levels may be affected by the uranium content of nearby rock and soil, soil permeability, house construction, and other factors; and

WHEREAS the only way to determine whether a house contains a high level of radon is to test it with special equipment, because radon cannot be seen or smelled;

BE IT RESOLVED by the Alaska State Legislature that the United States and the State of Alaska should make a coordinated, joint effort to investigate and alleviate the indoor radon gas problem in Alaska; and be it

FURTHER RESOLVED that a radon information program designed to meet the needs of the citizens of our state should be developed and implemented.

COPIES of this resolution shall be sent to Lee M. Thomas, administrator of the Environmental Protection Agency; to the Honorable Ted Stevens and the Honorable Frank Murkowski, U.S. Senators, and the Honorable Don Young, U.S. Representative, members of the Alaska delegation in Congress; to Governor Steve Cowper; to Dennis Kelso, Commissioner of Environmental Conservation; to Myra Munson, Commissioner of Health and Social Services; and to Judith M. Brady, Commissioner of Natural Resources.

needs of the citizens of our state should be developed and implemented.

COPIES of this resolution shall be sent to the Honorable John S. Herrington, Secretary of Energy; to the Honorable Otis R. Bowen, Secretary of Health and Human Services; to Lee M. Thomas, administrator of the Environmental Protection Agency; to the Honorable Ted Stevens and the Honorable Frank Murkowski, U.S. Senators, and the Honorable Don Young, U.S. Representative, members of the Alaska delegation in Congress; to Governor Steve Cowper; to Dennis Kelso, Commissioner of Environmental Conservation; to Myra Munson, Commissioner of Health and Social Services; and to Judith M. Brady, Commissioner of Natural Resources.

HOUSE COMMITTEE REPORT

(7)

Date referred: 1/11/88 FURTHER REFERRALS:

DATE: 1-20-88

The Health, Education and Social Services Committee has considered HJR 38

Relating to Radon.

RECOMMENDS:

[✓] replace with CS HJR 38 (HESS) [✓] the same title

[ ] attached amendment(s) [ ] a new title

[✓] do pass

[ ] do not pass

[ ] no recommendation

[ ] individual recommendations

[ ] additional referral to the ________ Committee

ADOPTS: [ ] ________ letter of intent

ATTACHES NEW FISCAL NOTE(s):

[ ] fiscal impact

[✓] zero fiscal note

[ ] zero with analysis

[ ] same as previous fiscal note published ________

[ ] same as previous zero fiscal note published ________

SIGNING DO PASS:

Reed E. Bell

Joyce Hanley

Ellis

Niilo Koponen

Bill Hudson

Kay Brancaberg

Dave Donley

SIGNING OTHER RECOMMENDATIONS:

Ellis

Co-Chairman's signature

Niilo Koponen

Alaska State Legislature
Representative Niilo Koponen

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Juneau, Alaska 99811
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POSITION PAPER
HJR 38 RELATING TO RADON
JANUARY 12, 1988

Radon is a colorless, odorless gas resulting from the decay of naturally occurring radioactive elements in the earth. Rising from subsurface sources, radon enters homes where it can become a health hazard.

The U.S. Environmental Protection Agency states that nothing causes more environmental risk to the general population than radon, including toxic waste sites, gasoline combustion and industrial emissions. It is thought to be the second leading cause of lung cancer in this country, cigarette smoking being the first.

The intent of the resolution is to encourage the state and federal government to work cooperatively on Alaska's radon problem. Ten states are currently involved in a program with the EPA in conducting surveys to identify potentially high radon risk areas while 14 other states have recently requested EPA's assistance. Three other states are performing their own surveys.

The radon problem can be solved, but first we need to know where to look. The State Department of Natural Resources, Division of Geologic and Geophysical Survey, and the United States Environmental Protection Agency should participate in a study to locate the areas around the state of highest risk so that efforts to control indoor radon can be directed effectively.

A radon information program designed to meet the needs of the citizens of our state should also be developed and implemented.

Preliminary sampling in several areas of Alaska, including Fairbanks and Denali Park and Healy, have indicated levels high enough to merit concern.

The state has the responsibility to warn citizens about radon and to help people alleviate this problem, and it is essential that the legislature express its support for the necessary measures

THE ALASKA RADON PROBLEM

by Jeffrey T. Kline and Robert B. Forbes
Alaska Division of Geological and Geophysical Surveys
794 University Avenue, Suite 200
Fairbanks, Alaska 99709

Background

Radon (Rn^{222}) gas accumulation has long been known to be a serious health hazard in the uranium and phosphate mining industries, resulting in significantly elevated incidence of lung cancer in miners, but only since 1984 has it emerged as a potentially serious health problem in residences and public buildings throughout the United States.

Radon is a colorless, odorless, tasteless, and exceedingly heavy (eight times as heavy as ambient air) radioactive gas with a half-life of 3.8 days[1], which is produced by the natural decay of uranium. It occurs, at least in very small quantities, nearly everywhere at the earth's surface, and at higher concentrations where geologic conditions favor its formation, concentration, and migration in soil and water.

The recent intense interest in residential radon contamination was sparked in 1984 when a nuclear power plant worker in Pennsylvania set off radiation alarms as he entered the plant. His contamination was subsequently traced to an extremely high level of naturally occurring radon which was entering his home through the foundation, and which was emanating from the soil and backfill of the surrounding area. Further checking in the area identified several other residences which had potentially dangerous levels of radon and its radioactive daughter products in the ambient air. This area, known as the Reading Prong, has since been the focus of research to determine the geologic conditions and construction practices which contribute to the accumulation of radon in dwellings, and to develop economically feasible counter measures.

Since that time, numerous areas have been identified throughout the United States where serious levels of radon occur in dwellings. EPA and public health officials postulate that radon exposure may be the leading source of human exposure to naturally occurring background radiation, and the leading cause of non-smoking related lung cancer which may account for from 5,000 to 20,000 cancer-related deaths per year in the United States.

More than 30 states throughout the U.S. have initiated programs to identify areas with high radon hazard potential, and to develop measures to deal with the complex health and legal aspects of the problem. Representatives from

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[1] Half life refers to the length of time in which half of a given number of atoms of a radio isotope undergoes spontaneous radioactive decay to form its daughter element.

most of these states were present at a radon geology workshop held at the U.S. Geological Survey national center in Reston, Virginia, last month.

Geologic Controls

The geology and geochemistry of radon is complex, and recognition of these factors is one of the most important keys in identifying areas which may have a high radon risk potential. One of the first considerations in radon screening surveys is the recognition of the geologic favorability or potential for radon production and release. A variety of geologic conditions may encourage the production and accumulation of radon. These conditions may act singly or in concert to favor the emanation and migration of the gas to the surface and into dwellings. Some of these factors include:

1. Bedrock type (all of the rock types below are common sources of uranium and its daughter products):

   a. black shales and slates
   b. phosphatic carbonate rocks
   c. hydrothermally mineralized metamorphic rocks
   d. feldspathic igneous rocks

2. Bedrock structure:

   Faults and shear zones which provide avenues or conduits for the migration of radium salts and radon bearing fluids.

3. Surficial geology:

   a. Highly permeable and well drained soils such as coarse alluvium, glacial outwash, dune sand, loess, and loamy saprolites allow easy migration of soil gas by diffusion along favorable pressure gradients.
   b. The presence or absence of permafrost may control radon migration

4. Groundwater geochemistry and hydrology:

   eH and pH conditions which may favor the mobilization or concentration or uranium and radium compounds.

State and National Radon Programs

At this time, more than 30 states throughout the U.S. have initiated programs to identify areas with high radon hazard potential and to deal with the complex health and legal aspects of the problem.

DOE and EPA have established offices for the coordination of state assistance programs.

Radon in Alaska

Local areas of high radon emission have been known in the state since the mid 1970s. The first radon anomalies were noted by government and industry geologists during the course of geologic investigations, including uranium/thorium surveys and exploration programs in Interior Alaska. The most notable of these anomalies was associated with uraniferous granitic rocks in the vicinity of Mt. Prindle and Central, Alaska, located in the Yukon-Tanana Upland northeast of Fairbanks.

Experimental work on the use of radon flux variations to predict earthquakes was conducted by Robert Forbes and Daniel Hawkins several years ago, which yielded some very interesting data on relatively high bedrock and soil radon gas emanation rates at some localities in the Fairbanks District.

High radiation levels which could have resulted from radon daughter isotope decay were noted in the vicinity of Circle Hot Springs during that same time period by exploration geologists in buildings which had been closed for an extended time prior to the field season. In 1980, DGGS commented on the radon problem potential in a proposed State land disposal area in the Central area, but no follow-up seemed to be merited at the time.

Until recently, very few radon measurements had been taken on air within dwellings in the state of Alaska. In 1985, spurred by growing public awareness of the potential hazards of radon in private residences, the Arctic Environmental Information and Data Center (in cooperation with Battelle Northwest Laboratories) conducted a small radon screening study in which nine homes and one office were tested. Elevated radon levels were found in 40% of the structures tested. One of the structures had between five and ten times normal background. The study represented a 'first cut' survey and was designed to simply determine whether or not significant radon concentrations were present at all, and whether or not additional studies were warranted (CONRIM Newsletter, Summer Edition, 1986).

Another small radon survey in the Chena Hot Springs area was initiated by Milton Wiltse of the Alaska Division of Geological and Geophysical Surveys at the request of the Division of Land and Water Management. Nine dwellings were monitored during the spring and summer months of 1986 and from February 12 to May 22, 1987. While the spring and summer radon levels were well below the 4 pCi/l EPA guidelines, winter levels exceeded the guideline in four of the nine buildings in crawl space areas and two of the nine in living space areas (M.W. Wiltse, written communication, July 1987).

In early January 1986, routine water sampling of the Haines public water supply by EPA revealed elevated radon levels. Subsequent resampling of the water by Robert Forbes confirmed that the alpha emitter in the water was dissolved radon. While the levels were not high enough to cause an imminent health danger, they are suggestive that more closely spaced sampling intervals may be warranted for the area than the routine two-year interval of EPA, as radon concentrations are known to vary widely with time. The story was reported January 16, 1986, in the Juneau Empire, and on APRN news broadcasts.

More recently, a screening survey performed by Lee Leonard of DOTPF research indicated that in a sampling of selected public buildings throughout the state, four had three-month average air radon concentration levels which slightly exceeded the 4 pCi/l EPA guideline. These buildings were located in Anchorage, Homer, Seward, and Tok. Radon surveys of public facilities to date is far from complete.

Within the last few weeks, results obtained by Shelby Leonard, Dan Hawkins, and Richard Seifert of the University of Alaska, Fairbanks, from track etch detectors selectively placed in a limited number of homes around Fairbanks showed alarmingly high ambient radon levels, with the highest being 380 pCi/l as an average value for a three month exposure period. The location of this and other monitored dwellings with significantly elevated radon levels suggests that there may be a potential correlation between upland or hillside home sites, and higher radon levels (Lee Leonard, oral communication, July 8, 1987).

A follow-up study of the Ester Dome area carried out in the past two weeks, July 6 through 17, 1987, using activated charcoal detectors, revealed additional high radon values in homes on Ester Dome, with the highest being 989 pCi/l (nearly 15 times the exposure level allowed in underground uranium mines in the U.S. and Canada). We are currently running real-time air monitoring studies at this location with a scintillation counter and lucas cell apparatus, to verify the charcoal detector values. A series of real-time measurements taken at one of the high level homes showed significantly elevated levels (in the range of 195 to 271 pCi/l). These concentrations were less than those determined from 48 hour charcoal accumulators made in previous weeks; however, the weather conditions and the duration of the real-time sampling series could easily account for major fluctuations in the apparent radon values. Such fluctuations are well documented in other studies conducted throughout the U.S.

It is the actual long-term dose rate which must be considered in health risk estimates. In order to assess the annual dose rate, it is necessary to conduct a series of integrated measurements over intervals of three months, four times a year. This kind of long-range integrated counting program should be considered in homes where short duration measurements have produced high radon values.

Another statewide screening survey is currently being conducted by Sid Heidersdorf, radiologist with the Department of Health and Social Services. To date, he has accumulated data points from nearly 200 localities, including some values which exceed 4 pCi/l.

The geologic controls which govern radon emissions from soil and rock are not fully understood, nor is the scope of the problem in the Fairbanks District or Alaska. It is clear that interior Alaska has many, if not most, of the geologic and other environmental characteristics of radon problem areas elsewhere in the U.S. In addition, other factors unique to the arctic and sub-arctic environment such as permafrost and extreme temperature inversions with very long periods of calm, stable air, may tend to obscure some of the geologic correlations used in other parts of the country, and require more extensive research into mechanisms of radon emanation and migration under arctic conditions common to Alaska. No data pertaining to the behavior of radon in permafrost terranes conditions were available at the recently attended Radon Workshop in Reston.

Strategies for Alaska

Radon is an environmental hazard which can be effectively dealt with once its presence is recognized. It can be most easily mitigated during new house construction when relatively inexpensive engineering and design modifications can essentially render a house 'radon proof.' Existing homes can generally be retrofitted with modified heating and ventilation systems and foundation sealants which usually reduce radon concentrations to acceptable levels.

These techniques have been successfully employed in areas of the eastern seaboard of the U.S. as well as Scandinavia.

The primary problem at present in Alaska and many other states is to determine the magnitude of the problem by performing careful and systematic orientation and screening surveys and correlating their results to geologic parameters. The goal of the latter is to develop a set of geologic criteria incorporating aspects of local surficial and bedrock geology by which predictions of radon potential can be made. By developing geologic models for prediction, workers in other states have been able to identify areas where the need for high density household monitoring is greatest, thereby making the most efficient use of limited funding.

The next step is to educate the public about radon, its long-term health risk, and options for mitigation.

Finally, and perhaps most difficult, is to get a handle on the etiology of long-term low-level radon exposure. It is known from studies of uranium miners that a very significantly increased risk of lung cancer exists after 5,500 hours of exposure to air containing an average radon content of 200 pCi/l. Swedish researchers conclude that a significant health risk is faced after long-term exposure to 100 pCi/l.

Unfortunately, long-range health data at low levels of exposure (the range of 4-50 pCi/l) to radon don't exist. This is primarily because low levels have not been widely monitored prior to the last few years. Most death rate figures quoted by EPA for low-level exposure (i.e. the commonly quoted 5,000-20,000 per year) are based on the extrapolation of data from high-level studies and what is currently known about household radon levels across the country. It is imperative that a better data base be generated on all fronts in order to properly address this problem.

Currently, Alaska is one of the few states for which EPA has little or no information pertaining to radon potential or actual data from radon surveys of homes or public buildings. Limited amounts of such data have been or are currently being gathered on a small scale in local orientation surveys in selected areas of the state. As yet, we do not have a handle on the statewide potential for radon hazards. Based upon presentations and discussions at the workshop, of geologic conditions which favor radon emanation in other regions of the country, and comparing those conditions to what we know about Alaskan geology, it is clear that it would be prudent to develop a multidisciplinary screening program to determine radon hazard potential in regions of this state.

Preliminary Recommendations

1. Initiate a cooperative statewide residential radon reconnaissance program as soon as possible in an attempt to locate potential radon hot spots (other than Fairbanks).

2. Seek and hopefully acquire emergency state and federal funding to meet DGGS obligations to the radon problem until requested funds can be obtained through formal budget channels.

3. Organize and host a conference involving participating state and federal agencies, to establish an ad hoc task force which would design and implement an accelerated statewide radon investigation program.

4. Continue constrained radon investigations on re-directed funds until supplementary financing is obtained.

5. Work with State Radiologist, EPA, and DEC to establish household radon alert network in Alaska.

6. Design short- and mid-range radon investigation program to determine inter-relationship between local and regional geologic factors and radon anomalies.

7. Initiate screening survey of radon in drinking water in cooperation with EPA, State Radiologist, and DEC.

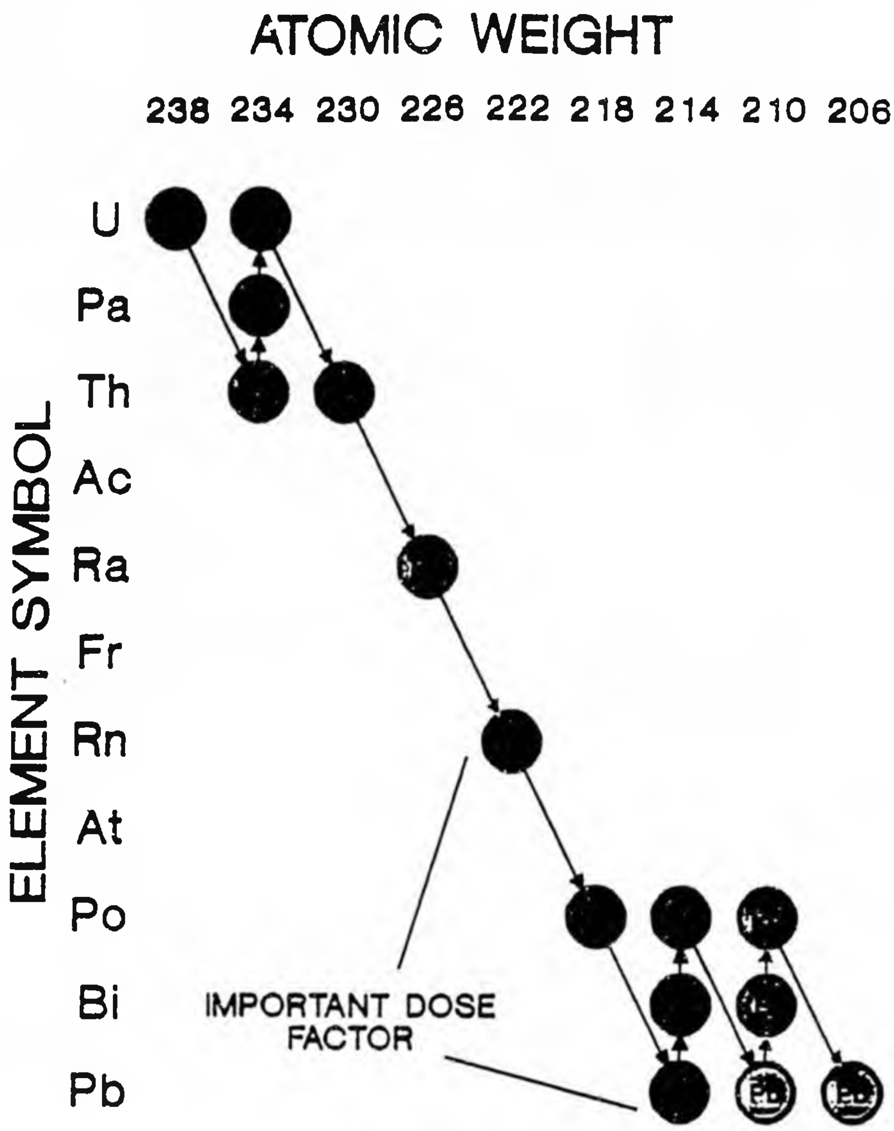
CHARCOAL DETECTOR RADON ANALYSES
FROM RESIDENCES IN THE FAIRBANKS AREA

Code #	Name	pCi/l	Comments
194602		0.3	
194604		10.7	Follow up
194605		5.7	
194606		0.7	
194608		1.0	
194609		1.7	
194610		27.4	Follow up
194611		47.1	Soil tube
194612		3.0	
194614		0.2	
194615		4.6	Follow up
194616		0.0	
194617		112.0	Remedial action
194618		13.0	Follow up
194619		0.6	
194620		1.9	
194621		66.2	Remedial action, follow up
194622		3.9	
194623		8.9	Follow up
194624		989.0	Definite remedial action
194625		0.5	
194626		3.8	
194628		2.8	
194629		1.7	
194630		0.2	
194631		13.2	Follow up
194633		3.1	
194634		6.4	Follow up
194635		4.8	
194637		17.1	Follow up
194638		4.9	Follow up
194639		15.2	Follow up
194640		0.3	
194642		?	

RADON CONCENTRATIONS
Determined by Jeff Kline

Reference #	Date	Name	Pylon Scintillation Count in pCi/l	Area
1	7/21/87		271.0	Ester Dome
2	7/22/87		8.79	Chena Ridge
3	7/22/87		113.7	
4	7/23/87		4.13	Goldstream above Okta
5	7/23/87		16.4	Hillside above Fox tailings
6	7/24/87	Gilmore Creek Tracking Station	4.1	Utilidors under main control room
7	7/25/87	Soil gas, Fox tailings	185.7	Near pipeline crossing on Goldstream Road
8	7/26/87	Soil gas, Chena Terrace	75.9	Pit near DGGS warehouse
9	7/26/87	DGGS warehouse	8.4	Bundtzen/Kline bin
10	8/11/87	(residence)	14.73*	Ester Dome
	7/25/87	Soil gas on Jones Road (organic silt)	5.2	Thawed organic silt near corner of Jones Road and Weldheim Drive
	7/25/87	Soil gas, Jones Road school bus turnaround	27.3	Pit run alluvial gravel

* Gene Wescott had a three-month track etch dosimeter reading of 380 pCi/l for three months late last winter.



Uranium (^{238}U) Decay Series

alpha decay beta decay

STATE OF ALASKA RADON SURVEY PROPOSAL

ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS
794 UNIVERSITY AVENUE
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PRINCIPAL INVESTIGATORS:

R.R. REIFENSTUHL (GEOLOGIST I)
J.T. KLINE (GEOLOGIST III)
Dr. R.B. FORBES (DIRECTOR, DGGS)
Dr. L.E. BURNS (GEOLOGIST III)

ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS (DGGS) ALASKA RADON SURVEY PROPOSAL

CONTENTS

ALASKA DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS (DGGS) ALASKA RADON SURVEY PROPOSAL

SUMMARY

This is a funding-request from the State of Alaska, Division of Geological and Geophysical Surveys (DGGS), to the U.S. Environmental Protection Agency (EPA), Office of Radiation Programs, State Radon Survey Program. The DGGS proposes a detailed, statistically valid, statewide indoor radon concentration-level survey, to be conducted during 1988 and 1989.

The DGGS funding-request to the EPA is for $100,000; the DGGS is simultaneously proposing a funding-request to the Alaska Legislature for "matching funds" ($100,000) which would be contingent on EPA-funding approval.

Objectives of the DGGS radon survey include: 1) Determination of the frequency distribution of radon levels in residential structures. 2) The definition of potentially high indoor radon concentrations in populated areas in Alaska. 3) Definition of the geologic parameters in Alaska that contribute to radon availability, and develop predictive geologic models. 4) Comparison of radon levels within the state, and comparison of Alaska radon concentrations to nationwide radon concentrations.

Elevated indoor radon concentrations have been recognized as a significant public health problem by the EPA and numerous scientific study groups worldwide. The DGGS statewide radon study will significantly contribute to understanding and dealing with the problem in Alaska. Also, as part of the EPA State Radon Survey Program, the Alaska data can be used in the nationwide radon database.

DGGS products of this study will include a map compilation of all radon-level results at 1:1,000,000 and other scales, and map-plots of radon soil-gas concentrations. Alaska will be subdivided into seven geographic regions and an appropriate number of geologic "strata". Preliminary and final reports and seminars will address radon availability parameters, statistical analysis of the radon database, definition of "hot spots", radon predictive models, mitigation suggestions, radon-proofing construction suggestions, and references for radon-related assistance programs.

The statewide radon survey will preferentially sample the larger population centers and selected outlying villages. Measurement methods will be predominantly the standard charcoal detectors (several thousand) and the track-etch devices. These home-detectors will comprise approximately 85 percent of the radon concentration data to be collected and represent the main aspect of this study. In addition, "real-time" radon gas sampling of selected houses, building and soil gas will be included. Gamma-ray spectrometry, and geochemistry of rock and soil samples will also be employed. The main focus of these associated radon sampling techniques will be to supplement the main survey and to define high radon-producing zones. These techniques will concentrate on the several larger Alaska population centers (for example: Anchorage, Fairbanks, Juneau, "MatSu" Valley and the Kenai Peninsula), and along the main Alaska highways.

Random sampling design will be EPA's "probability-based sample home" type. Data collection methods will be by the telephone and mail survey combination. As mentioned above, the home-deployed detector in the probability-based sample home will account for approximately 85 percent of financial resources of the radon survey. Some probability-based sample homes that are inexpensively accessible by Alaska highways will be studied by additional radon-survey methods. Outlying sample homes will receive this detailed, "in-person" survey work as funds permit.

Data collected by the DGGS radon survey will be continuously updated and stored in a comprehensive computer database on a DGGS computer. The database will include fields for all radon program-critical data. During the data analyses phase of the project statistical evaluation of all data fields is possible. Consequently, analysis of variance, multivariate methods and a variety of correlations are possible.

Two of the co-principal investigators of this proposal have been studying and sampling radon-producing geology in Alaska during 1987. These DGGS-geologists have a firm background in radon sampling and are continuing their assessment of geologic influences that affect elevated radon concentrations in homes.

1) OBJECTIVES

Objectives of the DGGS radon survey include:
1) Determination of the frequency distribution of radon levels in residential structures.
2) The definition of geographic areas in Alaska with the potential for high indoor radon concentrations.
3) Definition of the geologic parameters that contribute to radon availability, and develop predictive geologic models.
4) Comparison of radon levels within the state, and comparison of Alaska radon concentrations to nationwide radon concentrations.

In addition, multivariate statistics will test various hypotheses testing the possible correlation of a variety of radon-survey data. Correlation-testing will include the relationship of radon concentrations with: specific bedrock types, soil types, gamma ray spectrometry, north-facing slopes, south-facing slopes, building construction, uranium rock geochemistry, and radon soil-gas concentrations.

To achieve these objectives the survey plan calls for some measurements to be made in all geographic regions of Alaska. These seven geographic regions are commonly used for a variety of data portrayal and are the: 1) northern, 2) westcentral, 3) eastcentral, 4) southcentral, 5) southwestern, 6) southeastern, and 7) Alaska Peninsula and Kodiak regions (figure 1). Radon survey products (outlined below) will refer to the seven regions to aid report users. The number of samples in each region will be a function of that regions population and the total number of radon detectors to be used for the entire state survey. The deployment of these detectors will be via the telephone-and-mail survey method, discussed in the Random Sampling Design section. All survey activities will use the Fairbanks DGGS office as their headquarters. Alaska will be also subdivided into geologic terranes or geologic sample "strata" (EPA State Radon Survey Program terminology). The geologic strata will be defined by regional lithologic similarities.

2) PRODUCTS

DGGS reports will include a map-compilation of all radon-level results at 1:1,000,000 and at the U.S. Geological Survey 1:250,000-quadrangle scale where data are abundant enough. Map-plots of radon soil-gas concentrations will be produced at a scale based on extent and sample density of each survey. The final report will be of the standard DGGS-publication quality. This report will thoroughly address all aspects of the survey methods, data retrieval, data reduction, statistical treatment, and conclusions and recommendations. All raw-data will be included. Other topics to be covered are: radon availability parameters, statistical analysis of most of the radon database fields, definition of "hot spots", possible radon predictive models, mitigation suggestions, radon-proofing construction suggestions, and references for radon-related assistance programs.

A radon bibliography of statewide and possibly nationwide literature will be produced and published by the DGGS.

Radon-level contour maps, in picocuries per liter, are possible in selected special areas of high density data. These contour plots may be important in both soil-gas surveys and for indoor radon concentration surveys. Contour values will be based on statistical results.

Preliminary results could be released through the DGGS Public Data File system and seminars. (Confidentiality of names and addresses is critical, and these data cannot be released; see section 6 "Confidentiality of Measurement Results".)

3) RADON SURVEY DATA MEASUREMENT METHODS

3.A) Charcoal detectors and Track etch devices

Charcoal detectors and Track etch devices will be the most numerous and important types of radon concentration detection devices deployed in the Alaskan DGGS radon survey. The exact number of charcoal (and, or track etch) devices to be deployed is not established, but should be in the several-thousand range. Currently, the cost to the DGGS for these detection units is also unknown. From the EPA radon survey guidelines it is unclear whether the devices will be EPA-supplied. In any case, 80 percent of the detection devices will be deployed in the main phase of the survey, 10 percent reserved for follow-up work (see Section 10), 5 percent as duplicates, and 5 percent as blanks (radon-detection material not exposed). Radon detection devices will be deployed in "probability-based sample homes" in the lowest livable area of the home (preferably in the winter season). Supplementary radon-survey work will employ the methods listed below. These supplementary methods will be used only in selected survey-project homes or as part of special treatment of a selected area.

3.B) Real-time radon gas sampling

Real-time radon gas sampling will be using a Pylon model AB-5 unit (Pylon Electronic Development Company, Ottawa, Ontario, Canada). The DGGS currently owns one of these instruments with eight type 300 Lucus Cells. This radon and thoron gas measuring system is a portable microprocessor-based data acquisition instrument. It can operate in continuous, quasi-continuous, grab-sample or ratemeter modes. Our experience shows highly reproducible results. This unit is useful for home testing and in conjunction with the USGS-designed soil probe.

3.C) Gamma-ray spectrometry

Gamma-ray spectrometry surveys will be employed in conjunction with real-time home radon testing, soil sampling and as part of an Alaska highway system carborne survey. The DGGS currently uses a Scintrex "GAD-6" stabilized, four channel spectrometer which has a large (360 cubic centimeters), external, thallium-enriched sodium iodide crystal. The spectrometer will be used to determine the potassium (K), uranium (U), thorium (Th), and total count (TC) values for bedrock, and delineation of high uranium source areas. Due to the high sensitivity of this spectrometer, laboratory analyses for uranium of small rock, silt or soil samples is possible down to a few parts per million.

3.D) Geochemical Analyses

Geochemical analyses on rock samples and soil samples from selected radon survey sites will yield information on the elemental abundance on a variety of radon source material. Some samples will include major oxide analysis, and elemental analysis will be by XRF and INAA methods. Statistical correlations between elemental uranium and thorium abundance, measured-radon, and gamma-ray spectrometry can be performed. Statistical correlations between elemental uranium with selected other elements, for example rubidium and strontium will be performed. The potential correlations are important because, locally, such rock geochemistry is already available. These existing data allow for radon-concentration inferences based on geochemistry data alone.

4) RANDOM SAMPLING DESIGN: SELECTION OF HOMES

4.A Sampling subdivision: Region and Strata

The Alaska radon-survey plan calls for the 1,524,671 square kilometer-area of the state to be subdivided into seven geographic regions (listed above). These regions are commonly used for a variety of data portrayal, and radon-survey products will refer to the regions to aid the report user. Home-deployed radon detectors are to be used in all regions of the state. The radon survey will preferentially concentrate on population centers within each region, and the number of detectors within a region is a function of the total detectors available for the state survey.

U.S. Geological Survey 1:250,000-scale quadrangles will also be used for location information (figure 2). The quadrangles are well established and useful for organization of large datasets. All sample stations will be appropriately coded with the unique two letter quadrangle code (for example, Fairbanks Quadrangle = FB).

Alaska will be also subdivided into geologic sampling "strata" (EPA State Radon Survey Program terminology). Geologic strata subdivisions will undoubtedly crosscut the geographic regions but this should not present a major problem in data gathering or portrayal. The geologic strata will be defined by regional lithologic similarities and the characteristics expected to yield elevated indoor radon levels.

4.B "Probability-based sample home"

The "probability-based sample home" is one which has a known and non-zero probability of being selected. Houses for this survey will be selected on the basis of representative sampling, population centers and probable radon-producing geology. Radon survey data that has been completed to date by the DGGS will not be included in the survey dataset, but may be useful in determination of local, anomalously high zones. The "random sample" integrity of the proposed survey data is critical to the quality and applicability of the survey results.

4.C Random sample: EPA-provided phone list

To provide a "probability-based sample home" for the radon survey a phone list for sample home selection will be provided by the EPA. This method of obtaining sample sites yields an unbiased sample base, and allows for radon concentration data from Alaska to be useful in nationwide comparisons. The EPA will secure the phonelist from local utilities for use in the geographic regions listed above.

4.D Geologic regions of high radon potential

Geologic regions of high radon potential will receive a larger proportion of detectors than other regions. These high radon-potential regions will be targeted after a thorough review of the probability of radon-producing geologic characteristics by project geologists. The DGGS radon-concentration data available to date will also be considered in defining these geologic regions. Areas that may be considered for such treatment are the Fairbanks-area hillside "uplands" and dredge tailing areas, as these areas have already yielded high concentrations.

To more accurately gage potentially high radon areas a highway traverse of the main Alaska highways (Parks, Glenn, (Dalton?) and Richardson) would generate a large amount of data cheaply. These traverses would be an appropriate preliminary part of the state survey. An additional useful dataset to consider in defining high radon area is the Alaska NURE (National Uranium Resource Evaluation) data. The compilation, assessment and interpretation, as related to radon production would be highly valuable for outlining potentially high radon areas.

Geologic factors to be considered for definition geologic areas with potential for elevated indoor radon levels are: lithology, uranium and radium content of bedrock, grain size, porosity and permeability of surficial deposits, moisture content of soils, and fracturing, shearing, and faulting in bedrock. These data will not be available as part of the standard EPA-type, phone and mail survey, but only as part of the more detailed DGGS survey methods applied to selected probability-based-sample-homes. It should be noted that many phone-and-mail-surveyed villages and small towns in the Alaska survey will not be visited "in person" due to various logistical constraints.

5) DATA COLLECTION METHODS

5.A Telephone and mail survey combination

The telephone and mail survey combination-type survey, as outlined by the EPA State Radon Survey Information publication is the most appropriate for Alaska. Because of the great distances between population centers and the high cost of deploying survey personnel the bulk of the home detectors would be handled by telephone and mail. As noted above, many phone-and-mail-surveyed villages and small towns in the Alaska survey will not be visited "in person" due to various logistical constraints.

The EPA-provided phonelist for each of the regions listed above would be used as the random sample-generating mechanism. Using these lists the survey methodology would be: 1) An initial telephone contact would establish eligibility, and obtain housing and occupant information. 2) Eligible occupants would receive a "radon survey participant information package", consisting of a detector, placement and deployment information, and a postage-paid return envelope. 3) If necessary, a follow-up phonecall prompting the participant to return the detector would conclude the radon survey data-collection procedure. Upon DGGS-receipt of the analytical results the participant would be notified of the results.

6) CONFIDENTIALITY OF MEASUREMENT RESULTS

6.A Alaska State Radiologist's Office data: non-public information

DGGS home radon concentration data becomes the property of the Alaska State Radiologist's Office and therefore non-public information. The Alaska State Radiologist, Dr. Sidney D. Heidersdorf, is currently working with the DGGS on the limited radon survey data that we have collected. Dr. Heidersdorf, a radiological physicist, has a continuing interest in Alaska radon work and has agreed to assist us where possible. To circumvent possible problems associated with the home radon concentration values being inappropriately used, the data will become the property of the Radiologist's Office; the names and addresses of participants, in accordance with Alaska Statute, can not be released to the public.

7) RADON SURVEY PACKET INFORMATION

7.A Endorsement letters, question and answers, and EPA brochure

To introduce the Alaska radon survey to selected home-survey participants a "radon survey participant information packet" will be developed and mailed to that household. This information packet will include: 1) A letter from the survey director or the Alaska State Geologist outlining the radon survey. 2) A letter of endorsement from the Governor of Alaska. 3) A list of general questions and answers about the radon survey. 4) An EPA-provided information brochure addressing the nationwide, and statewide radon survey programs.

8) DATA MANAGEMENT

8.A DGGS computer database program

All Alaska Radon Survey data will become part of the DGGS computer database. As outlined above, only data from the EPA-funded radon survey is to be included in this database to ensure that the entire dataset is based on statistically-valid, random sampling. The DGGS Alaska radon dataset will then be consistent with EPA guidelines. The dataset will be entered into a "dbase" program. The dbase program is extremely versatile, adaptable, and well-tested, and data entered into the program can be retrieved in ASCII-string format. Access to all datafields is possible for statistical analysis. Station locations will be entered with latitude and longitude for later computer-plotting by quadrangle and geographic region (listed above). Each radon-survey station entered into the database will include the following fields:

1) Detector-specific identification code (includes geographic region and geologic strata ?), quadrangle, and house identifier,

2) pCi/L level(s), with detector type,

3) Location: geographic region, quadrangle, geologic strata, street address, and latitude and longitude,

4) Status of detector: active, received, and analyzed,

5) Date of deployment,

6) Date and time detector was capped.

7) Zip code (?),

8) Geographic region of state (northern, westcentral, east-central, southcentral, southwestern, southeastern panhandle, Alaska Peninsula and Kodiak),

9) Deployment location: living room, bedroom, den, basement,

10) Frequency of use of room,

11) House construction characteristics,

12) Bedrock type, and data on fracturing, shearing, and faulting; proximity of bedrock to building structure,

13) Bedrock cover type (loess, gravel, soil, fill, other),

14) Soil gas data: pCi/L; comments,

15) Gamma-ray spectrometry: counts per second (Total count, U, Th, K),

16) Porosity, permeability, and moisture content (estimates on 1-to-10 scale; 10 = most), and grain size of surficial deposits, and,

17) Geochemical data.

9) DATA ANALYSIS

9.A Statistics: Variance, Multivariate and Correlation analyses

Data analyses will begin after the radon detectors, soil-gas surveys, real-time radon gas surveys and related surveys are complete. However, a strict time cutoff will be established, at which time all outstanding detectors must be ignored so that the dataset can be firmly established and analyses started. Statistical analyses of radon survey data will include:

1) Inter- and intra-geographic region analysis,
2) Entire database: analysis of variance between several database subsets (database fields listed above, section 8),
3) Entire database: multivariate methods (database fields listed above),
4) Correlation of pCi/L values with: surficial cover type, porosity, permeability and moisture parameters,
5) Correlation of pCi/L values with: geologic strata, lithology, gamma-ray spectrometry, geochemistry, and house construction type, and,
6) Variance within replicate samples (5 percent of total number of detection devices).

The data analyses procedures and results will be outlined and included in the reports and conclusions of the radon study. Also, the "raw" data of the radon survey, without the names and addresses of the radon survey participants, will be listed. Detector units used as "blanks" (5 percent) will be analyzed and recorded (and treated in the statistical analyses as appropriate).

10) USE OF RESERVED DETECTORS (ten percent of total detectors)

10.A Delineation of hot spot boundaries

After analytical results from the radon survey have been returned and entered into the DGGS database, "hot spots" will be defined. Hot spot zones are to be based on the values in the highest several percent of homes sampled. To define the boundaries of the hot spots, sample homes adjacent to high-level homes of the initial survey will be selected. Deployment of detectors for these homes will probably be by the same "telephone and mail survey" combination because of the limitations due to distance, cost and time. It should be noted that hot spot sampling is not part of the initial survey and data from the two surveys can not be combined.

10.B Target specific geologic areas

Geologic areas that indicate a strong potential for elevated indoor radon levels will be more closely sampled with the reserved radon detectors. These data will help assess the correlation between a particular geologic environment and high radon concentrations. For this reason, geologic environments that are potentially influential must be part of the initial database program. The geologic parameters collected and entered in the database during the radon survey are absolutely critical if geologic controls on Alaska radon concentration are to be defined. Therefore, an exhaustive review of geologic influences on radon production is mandatory before the Alaska radon survey data collection starts.

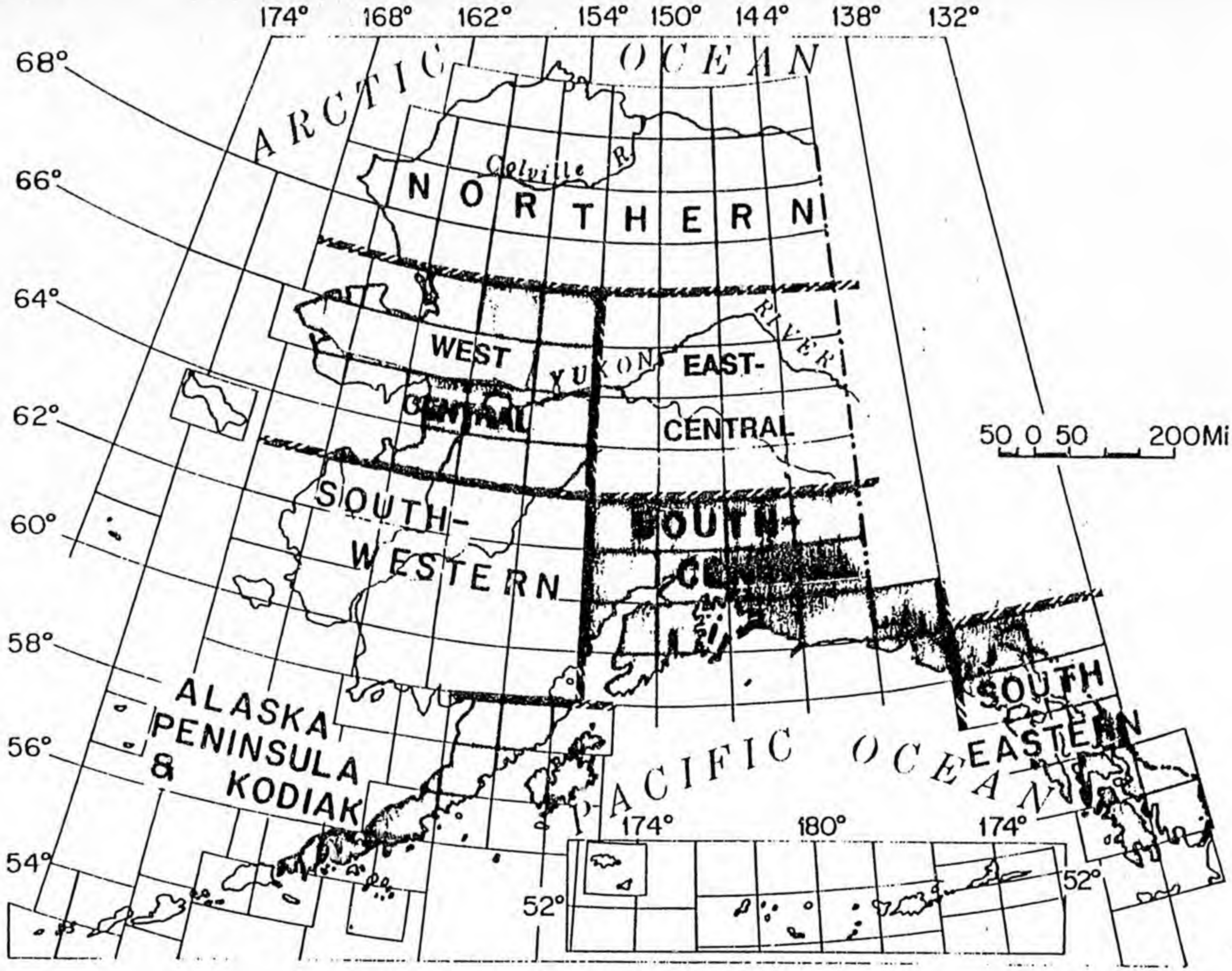


Figure 1. State of Alaska subdivided into seven geographic regions: northern, west-central, east-central, southwestern, southcentral, southeastern, and Alaska Peninsula and Kodiak.

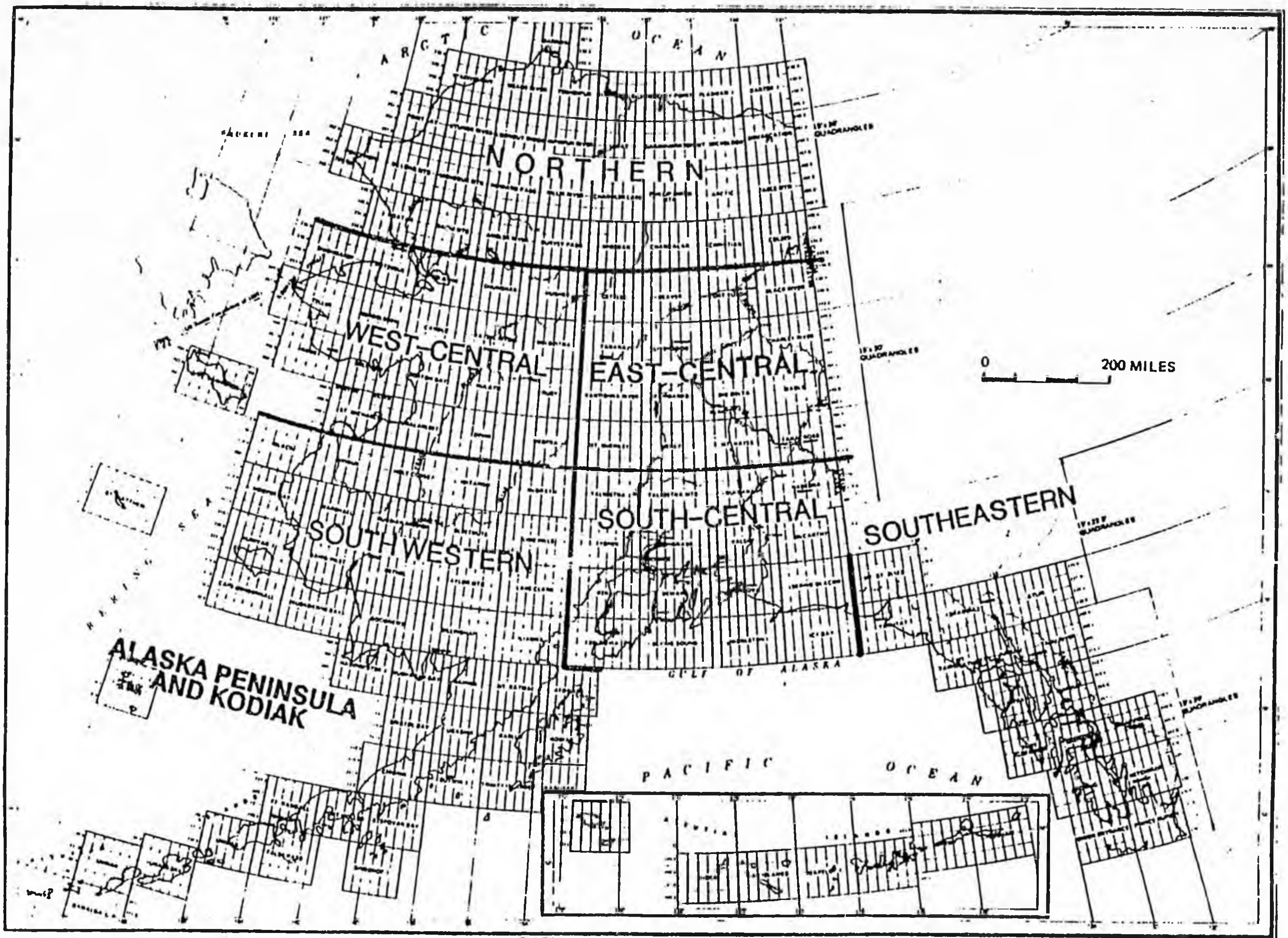


Figure 2. State of Alaska with U.S. Geological Survey 1:250,000 scale quadrangles and the seven geographic subdivisions used for the Alaska radon survey.

An Invisible Threat

Radon, a natural, odorless gas that can seep into homes and cause cancer, has emerged as the newest national health threat. But whose problem is it? Some officials believe the states are best suited to find a solution.

By Paul Doyle

On a cold day in December of 1984, Stanley Watras went in to work at the Limerick Nuclear Generating Station in Pottstown, Pa. and set off the alarms. The first assessment was that the radioactivity was from his work at the plant, but the culprit was radon, a relatively unknown substance. And it was from his home. The exposure of Watras and his wife and two children to the radioactive gas had been equivalent to smoking 140 cigarettes per day.

Until this incident, many citizens would not have believed that an odorless, colorless natural gas that seeps out of the ground and into basements and living rooms would be a major threat to public health. But according to health officials, that is exactly what causes 5,000 to 20,000 lung cancer deaths per year.

Based on the number of potential cancer deaths per year, indoor radon is the greatest environmental problem the Environmental Protection Agency (EPA) is working on—ahead of better known and much more feared dangers such as hazardous waste, toxic chemicals and dangers from air pollution.

Radon is an invisible gas produced by the natural decay of uranium in the earth's crust. It can be found in soils and rocks containing uranium such as granite, shale and phosphate. It makes its way into homes through cracks and holes in foundations, water supplies, and spaces between the soil and the house. The gas decays into radioactive particles that attach to dust and, when inhaled, lodge in the lungs.

The EPA recommends remedial action when four picocuries per liter of radon is found in the home. A picocurie is a standard measurement of radiation. Exposure to this level of radon is equivalent to smoking eight cigarettes per day or having 200 chest X-rays per year.

Richard Guimond, division director of the Office of Radiation Protection at EPA, is certain of the high risks related to radon exposure. "Often you deal with environmental pollutants and people have a tendency to sometimes disregard a lot of the information because it is based on some mice or rat test or they are at levels that are much higher than one will ever observe in the environment," he says. "The reason the radon evidence is so strong is that in addition to animal evidence, you also have human evidence from the health problems uranium miners have contracted from their exposure to radon."

Uranium miners are not allowed to be exposed to more than 20 picocuries per liter. "It is very common to find levels in homes over 20 picocuries, some have exceeded 4,000. This is why we are taking this problem very seriously," says Guimond.

According to EPA, between 4 million and 8 million homes nationally have higher than the recommended four picocuries per liter of radon. Although areas with higher levels of uranium are more likely to have a radon problem, no state is immune. According to Guimond, "Every state has some radon in it; if I were to develop a map where radon is a problem, the map would cover the entire United States."

Guimond's conclusions are supported by a recent 10-state survey conducted by EPA. The 10 states volunteered to have a random sampling of homes tested for radon. Although the study showed that radon levels vary from state to state, high levels were found in every state. For example, Alabama had the lowest number of homes with more than four picocuries per liter of radon (6 percent) but the highest single reading was 180. Colorado (39 percent), Wisconsin (27 percent) and Wyoming (26 percent) were the states with the highest number of homes over the recommended EPA levels.

Testing for radon usually is done by placing a small canister containing charcoal in the house for approximately a week. The charcoal absorbs the radon and when analyzed, provides a reading for how much radon there is in a home.

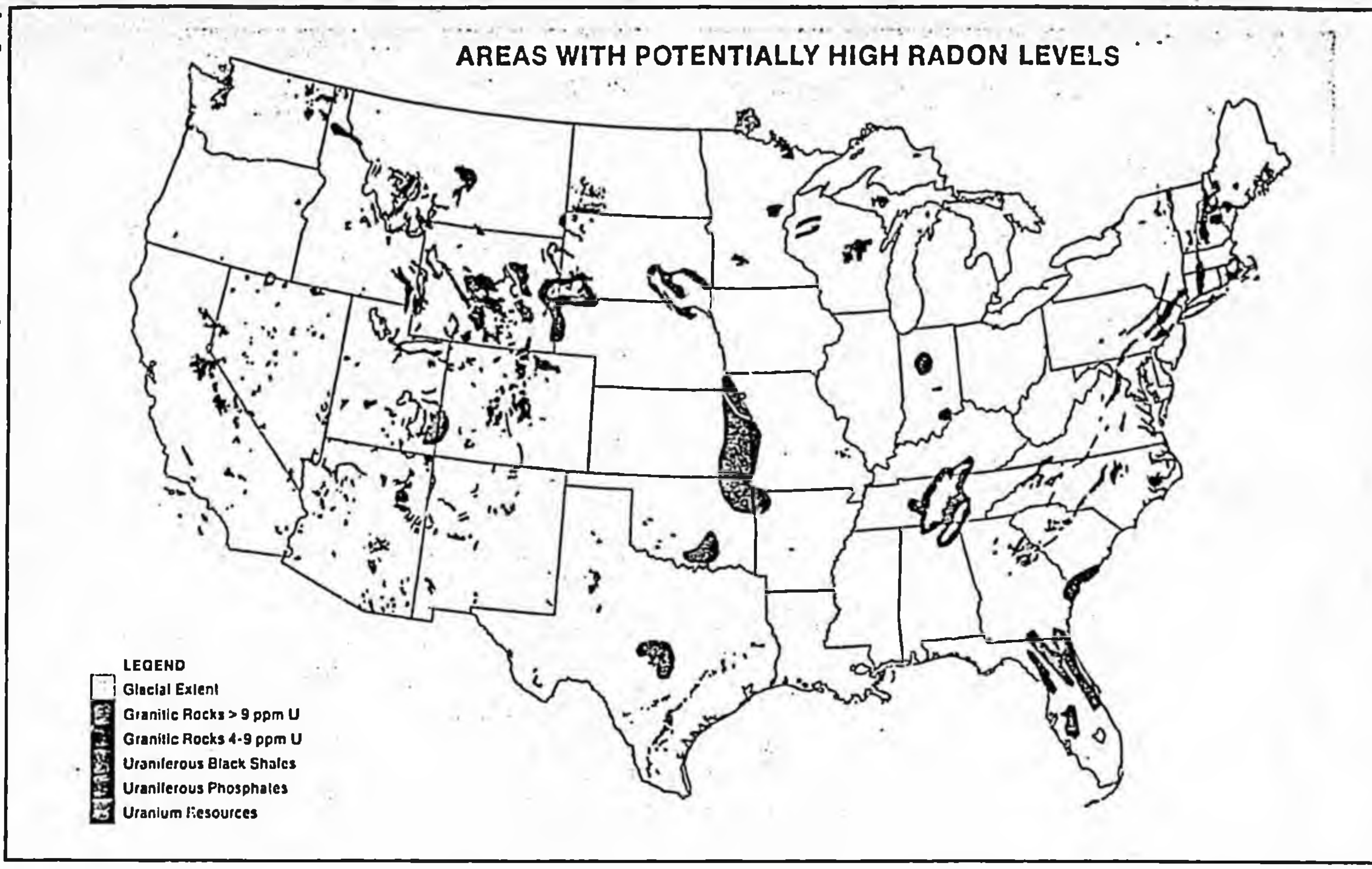
Despite the fact that the gas is invisible, Guimond points out that "homes can be fixed." Even homes discovered to have as much as 3,000 to 4,000 picocuries per liter in parts of Pennsylvania and New Jersey have been sealed and patched so they now test under the EPA minimum standard, he says.

Once radon is found, the most common mitigation techniques include the sealing of openings and cracks to prevent any of the gas from entering the house. The average cost for such remedies is less than $400.

However, unless tested, the radon levels in a particular house cannot be easily detected. Says Pennsylvania state Senator Michael O'Pake, who represents Reading, one of the highest radon areas in the country, "Unfortunately, you can't just look at a house and tell if it has high levels of radon, you do have to measure to be sure. Of two houses sitting side by side, one house may have 1,000 percent higher

Paul Doyle is a principal research analyst in the NCSL Energy, Science and Natural Resources program.

Graphic: Environmental Protection Agency



levels of radon than the one next to it because the house may be sitting on some crack or fault."

Because of this vast difference in the millions of homes affected by radon, Guimond believes the radon crisis is a state and local problem. He thinks the federal government alone cannot effectively deal with radon. "State and local agencies are better able to understand the significance of their local situation and get information and help to the local citizens," he says.

This is a feeling echoed by Donald Deieso, assistant commissioner for New Jersey's Environmental Management and Control. "Radon is the most severe health risk we are facing and we quickly realized in New Jersey that the states are going to have the prime responsibility for its regulation; no one is going to do the job for us," he says.

In most cases, legislation requiring statewide surveys is the first step in a program. Colorado, Florida, Illinois, Indiana, Ohio and Virginia are all currently conducting these diagnostic studies, which pinpoint high radon areas in a state. Many others are expected over the next year.

A few states have gone a step further, by adopting multi-million dollar comprehensive initiatives. In 1986, the New Jersey Legislature appropriated $4.2 million for a radon project. It currently ranks with Pennsylvania and New York as the most expensive in the country. All three efforts have a wide range of radon initiatives. The New Jersey legislation, which is similar to Pennsylvania's, calls for a state radon survey and an epidemiological study to determine if radon causes cancer. New Jersey state officials will be testing the homes of 1,200 lung cancer patients for radon.

Pennsylvania and New Jersey are also providing low interest loans to homeowners to assist in radon-reducing home improvements. Pennsylvania offers loans of up to $7,000 to the victims of radon at a graduated interest rate between 2 percent and 8 percent, depending on income.

States are also pursuing measures to encourage homeowners to test for radon. New York is selling and distributing radon detectors to its citizens. Pennsylvania provides home testing free of charge.

Deieso, however, warns of the dangers of a predominantly state-operated radon program. In New Jersey, "For the state alone to provide what was needed, we were looking at spending $200 million on testing and another $1 billion to $1.5 billion for mitigation measures," he says. "A radon program is not a one- or two-year mass study. Radon, like termites, is going to live forever more."

One of the key elements of a state effort, according to Deieso, is to encourage the private sector to become involved in the radon business. "The private sector is better suited for radon testing and remediation of individual homes than state operated programs, due to its ability to respond quickly and fill the demand in the market place."

With that encouragement the number of private firms offering radon testing in New Jersey has jumped from three in 1985 to 120 in 1987. In 1985 the state had no companies that would take care of a home exposed to radon; today there are 22. With this market-oriented approach, Deieso says that a home radon test can be done in three days and the mitigation work completed within two weeks. "And that is a better performance than any state agency, no matter how well funded."

But in order for such an approach to be effective, the state must oversee and regulate radon testing firms, he says. To maintain quality control over

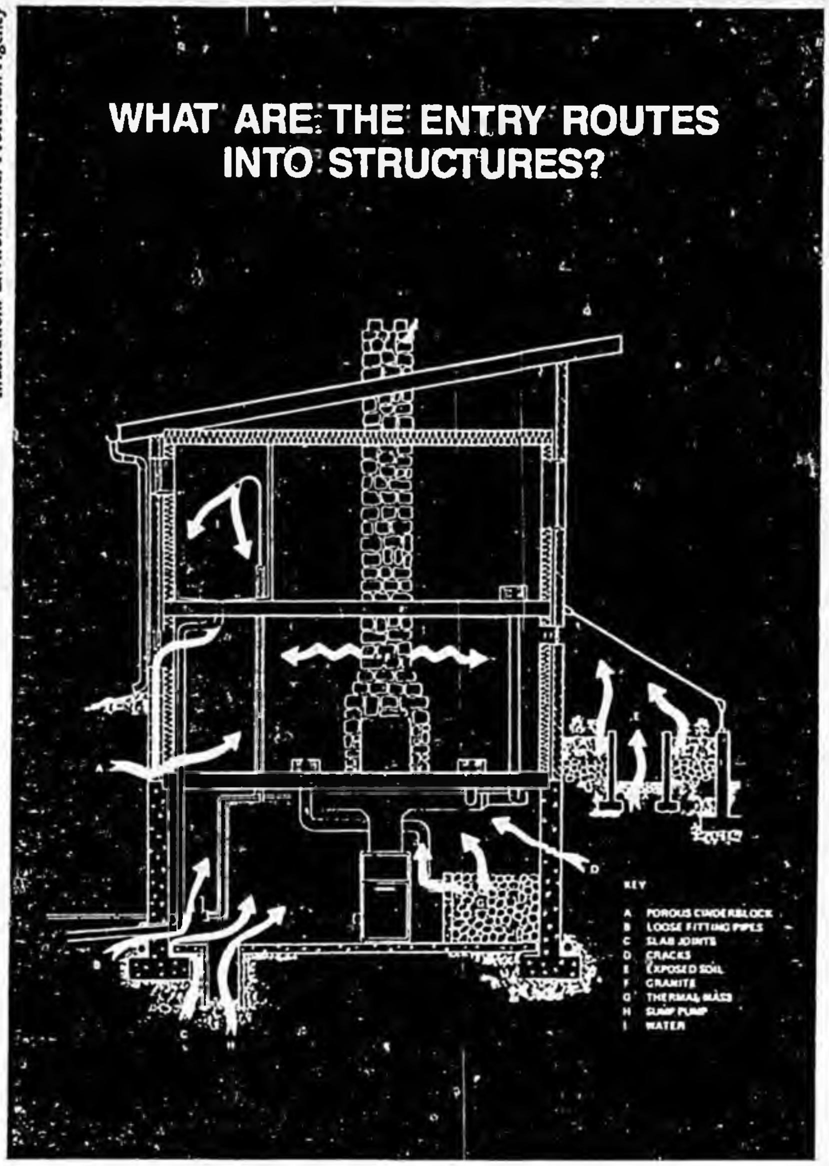


Illustration: Environmental Protection Agency

the radon testing market, New Jersey enforces strict licensing and certification standards. Since the program's inception, more than half the applicants for certification have been rejected. And to keep firms from overcharging for radon-related services, the state provides homeowners with second opinions free of charge.

States are also beefing up their efforts to inform the public of the dangers of radon. New Jersey and Pennsylvania have set up toll-free hot lines staffed by scientists to answer questions about radon. Both states have also published and distributed pamphlets and brochures to the public. New Jersey is sponsoring periodic public opinion surveys to determine the effectiveness of its program.

Despite state efforts, homeowners, for a number of reasons, don't always welcome radon information devices. In Pennsylvania, when the state went door to door offering free testing in the Reading Prong region, one of the highest radon areas in the country, only 30 percent of the homeowners agreed to test. In New Jersey, only eight people have taken advantage of the low-interest loans offered to mitigate the effects of radon.

According to Rich Guimond, part of this phenomenon boils down to perceived risks. "It's easy for someone to see a hazardous waste site down the street and be very fearful, but you don't expect a radiation problem in your 'home sweet home' and, because you can't see it, smell it or feel it, it's easy to say it's not there."

But Senator O'Pake points out that public skepticism and economic uncertainty is also a big factor in explaining people's leeriness about radon. "The public is just not sure that radon can be fixed safely and inexpensively."

Indeed, a recent survey conducted by The Eagleton Institute of Politics at Rutgers University showed that of those polled, 75 percent said that if their homes were found to have radon the real estate values would drop by more than [illegible] percent; and 25 percent said that even if the radon were removed from their homes the real estate values would still drop, with 50 percent saying the values would stay the same.

This attitude is reflected in parts of New Jersey where real estate transactions have dropped as much as 50 percent. "Real estate, not public health, has become the dominant feature for the radon program," Deieso says. In response, the state is implementing modifications to building codes to include radon mitigation features and incorporating a requirement for radon testing in home sale contracts.

In this age of tight budgets, states are hard pressed to find the money to explore the radon issue. Pending federal legislation is aimed at relieving this pressure. "Many states recognize that they have a radon problem but they lack the resources to investigate and develop needed new programs," says U.S. Senator George Mitchell of Maine, one of the bill's chief sponsors. The legislation directs the EPA to make available to the states $10 million for each of the next three years. In order to be eligible for the money, the states will have to provide 25 percent matching funds for the first year, 40 percent in the second and 50 percent in the third.

Whatever the outcome of the federal legislation, the states will have the primary responsibility for warning their citizens about radon and developing programs to alleviate its potential dangers. Says Deieso, "States will soon learn that radon is not a two-year short-term environmental problem. Like the other environmental threats we face, it is here to stay."

monitoring human
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New York-based
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We'll be watching
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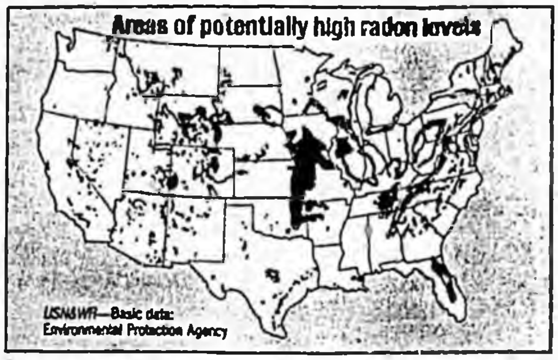
says the group's
Catherine Fitzpatrick.



...up nonconformists for extended terms in squalid psychiatric asylums. Are such practices now to cease? That's the question being asked after the Kremlin announcement last week of a new code of legal rights for mental patients.

Advocates of human rights have protested for decades their being railroaded into Soviet asylums, where they have been forced to take powerful drugs and live for years in antiquated conditions. At an early-1'th-century structure still in use near Moscow, more than a dozen people have been crammed into wards built for fewer than half that number; patients must use 70-year-old plumbing.

After years of criticism from international psychiatric groups, Mikhail Gorbachev's administration recently signaled change of some sort when the Soviet press began to complain about abuses. One article described the commitment of a 20-year-old Leningrad factory employe who had been branded a schizophrenic after criticizing her boss and her working conditions. Under the new policies, patients and their relatives are entitled to contest commitments in court. The Russian Republic, largest of the 15 Soviet republics, went so far as to make it a crime to force a healthy person into an asylum.

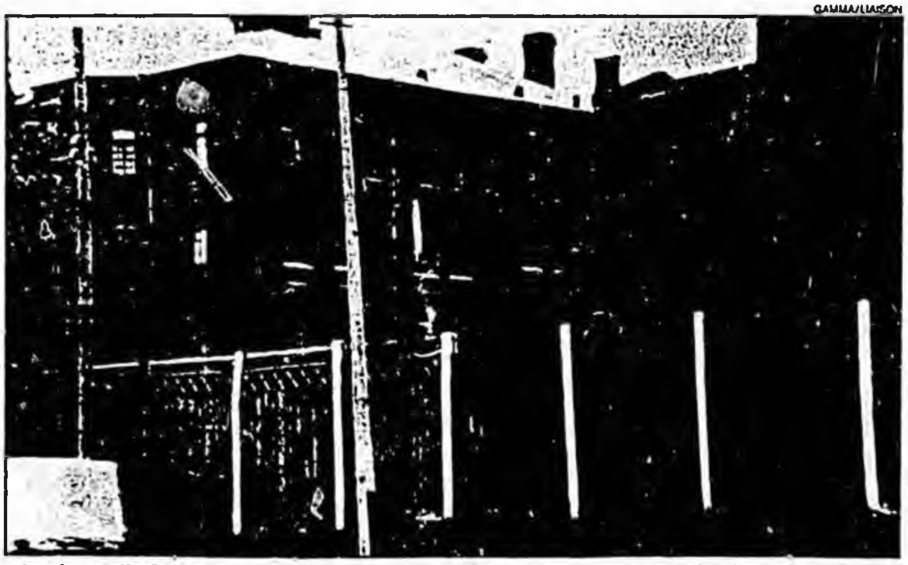
In Moscow's dissident circles, pessimism persists. "We have always had legal protection on paper, but it hasn't done any good," complains a painter who has served long stretches in asylums. "The official attitude still boils down to this: If you're different or disagree with things here, there must be something wrong with you."

HUMAN RIGHTS (CONT'D)

Gorby's curtain

As new psychiatric reforms showcase Mikhail Gorbachev's image-polishing skills, the Kremlin leader is simultaneously pursuing an emigration policy that shows his teeth of steel. After a brief period of presummit leniency, the Soviets last week began enforcing harsh 1987 laws that require a would-be émigré to be invited by a sibling, spouse, parent or child abroad. That disqualifies 90 percent of the 400,000 Jews who want out, according to the Union of Councils for Soviet Jews. Emigration peaked in 1979 at 51,000, then dropped to fewer than 1,000 yearly when détente dissolved over Afghanistan. In 1987, 200 were let go weekly, but last week the number was down again—to 79.

GAMMA/LIAISON



Leningrad's Special Psychiatric Hospital is one of 16 facilities the Soviets have used to house—and often abuse—dissidents. A new code may curb the practice

HEALTH

Lung cancer's gassy ally

Radon gas seeps into 4 to 8 million homes across the U.S., rising through the foundations from underlying soil and rock and mixing with inside air. The radioactive gas is odorless, colorless—and a cause of lung cancer. But how big a cause? Last week, a National Academy of Sciences report made possible the most authoritative answer yet.

The study's chief, Dr. Jacob Fabrikant of the University of California at Berkeley, calculated how exposure to levels of radon considered worrisome by the Environmental Protection Agency affects the odds of contracting lung cancer. His basic finding: Spending 12 hours a day in a house with excess radon boosts a person's cancer risk by about 50 percent.

Of 1,000 male nonsmokers exposed to excess radon, 16 will die of lung cancer, he estimates. That's 5 more than in a nonexposed group. Among 1,000 female nonsmokers, radon exposure ups lung-cancer deaths from 6 to 9. The statistics are much grimmer for smokers: Some 172 out of 1,000 male smokers exposed to excess radon will die of lung cancer—49 more than among nonexposed male smokers. For women smokers, radon pushes the toll from 60 to about 85.

Why radon and smoking are more lethal to men than to women is unknown. Why is radon more lethal to smokers? That, too, is not known. Some experts think smoke-damaged lungs trap the radioactive radon particles.

Homes with serious radon problems can be fixed by sealing cracks to prevent seepage and by improving ventilation. The EPA's Office of Public Affairs offers information booklets and a list of radon-detection companies. Now awaiting action in the House is a bill passed unanimously by the Senate last year that would provide $33 million to the states for radon education and pilot programs.

STATE OF ALASKA
1988 LEGISLATIVE SESSION

BILL VERSION : HJR 38
PUBLISH DATE :

FISCAL NOTE

REQUEST:

Revision Date:
Title : Relating to Radon

Sponsor : Koponen, Davis
Requestor :

Agency Affected : Health & Social Services
BRU : State Health Services

Components : Laboratory Services

EXPENDITURES/REVENUES: (Thousands of Dollars)

OPERATING	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93
PERSONAL SERVICES						
TRAVEL						
CONTRACTUAL						
SUPPLIES						
EQUIPMENT						
LAND & STRUCTURES						
GRANTS, CLAIMS						
MISCELLANEOUS						
TOTAL OPERATING	-0-	-0-	-0-	-0-	-0-	-0-

CAPITAL						

REVENUE						

FUNDING: (Thousands of Dollars)

GENERAL FUND						
FEDERAL FUNDS						
OTHER						
TOTAL						

POSITIONS:

FULL-TIME						
PART-TIME						
TEMPORARY						

ANALYSIS : (Attach a separate page if necessary)

This fiscal analysis is based upon the proposed information program. Should this program be implemented differently than currently proposed, the Department of Health and Social Services could be fiscally impacted.

Prepared by : Elizabeth Ward, Director [signature] Phone : 465-3090
Division : Public Health Date : 1/20/88

Approved by Commissioner : [signature] Date : Jan 20, 1988
Agency : Department of Health and Social Services

Distribution (by preparer):
- Legislative Finance
- Legislative Sponsor
- Requestor
- Office of Management and Budget
- Impacted Agency(ies)