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DOCKET NUMBER PR -20
PROPOSED RULE
(51 FR 30870)

November 14, 1989

(30)

DOCKETED USNRC

'89 NOV 15 P2:34

OFFICE OF SECRETARY DOCKETING & SERVICE BRANCH

U.S. Nuclear Regulatory Commission
Washington, DC 20555

Gentlemen:

RE:, Proposed Final Rules for Protection Against Radiation in 10 CFR Parts 19 *et seq*.

On May 11, 1989, John A. Knebel, President of the American Mining Congress (AMC), wrote to the Commission regarding proposed revisions to 10 CFR Part 20. In particluar, Mr. Knebel's letter addressed the proposed revised radon limit in Table 2 of Appendix B in 10 CFR Part 20. The revised limit would reduce the value for radon-222 allowable in unrestricted areas from 3 pCi/l to 0.1 pCi/l above background at the fence line of the restricted area.

On July 3, 1989, Mr. Eric S. Beckjord, Director, Office of Nuclear Regulatory Research replied to Mr. Knebel's letter. Mr. Beckjord's letter indicated that the Nuclear Regulatory Commission (NRC) had identified problems with demonstrating compliance with the lower radon-222 concentration limits identified in Mr. Knebel's letter. The letter went on to state that the staff would be considering a proposal to provide increased flexibility "by allowing licensees to submit site-specific air concentration limits for NRC staff approval." Further, the letter indicated that this flexibility would be in addition to provisions permitting evaluation of doses to actual individuals where located and allowing licensees to request a temporary higher dose limit as an alternate means of compliance.

AMC's concerns about the reduction of the radon limit to 0.1 pCi/l have been further heightened by materials provided by Roger Jones, Environmental Coordinator, Umetco Minerals Corporation. Mr. Jones received a letter dated August 13, 1989, from Dr. Naomi Harley of New York University Medical Center, Institute of Environmental Medicine. Dr. Harley is widely recognized and acknowledged to be one of the leading authorities in the United States and, indeed the world, on the general subject of radon and the potential health effects resulting from exposure thereto.

Dr. Harley's letter indicates that it would be "impossible on a practical basis" to detect 0.1 pCi/l above background. Her letter includes a copy of seven years of measured outdoor radon data

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taken at a sampling station in Chester, New Jersey. Measurements were made hourly for most of the seven years and the range of the hourly measurements is from 0.01 to 2.5 pCi/l with the average yearly radon ranges from 0.19 to 0.25 pCi/l. Dr. Harley makes the point that that data would indicate that at least five years of intensive continuous monitoring would be necessary prior to any milling to establish baseline values against which a milling operation's releases could be measured. Dr. Harley goes on to say that the terrain and meteorology in the west, where uranium milling is carried on, results in much larger diurnal variability than in New Jersey. The New Jersey data represent a "best case situation for outdoor radon stability" and even in the New Jersey measuring program, it would have been "difficult to evaluate the presence of a 0.01 pCi/l source above background."

Finally, Dr. Harley also indicates that the proposed NRC 10 CFR 20 radon limit is unrealistic in light of the present estimates for health effects from radon.

AMC hopes that this additional information will be useful to the Commission in determining what is an appropriate final radon concentration limit. AMC believes that this data demonstrates conclusively that the Commission's proposed limit is not "practicable." Additionally, regulating by "variance" is a practice not generally preferred under existing tenets of administrative law and from long experience licensees have developed a healthy skepticism about "flexibility" that is supposed to mitigate an unreasonable rule. Therefore, AMC respectfully requests that the Commission reconsider any proposed reduction of the radon limit to 0.1 pCi/l.

With all best wishes.

Sincerely,

James E. Gilchrist

James E. Gilchrist
Vice President

Enclosure

cc: Kenneth M. Carr, Chairman, NRC
James R. Curtiss, Commissioner, NRC
Forrest Remick, Commissioner, NRC
Thomas M. Roberts, Commissioner, NRC
William C. Parler, General Counsel, NRC
Samuel J. Chilk, Secretary, NRC
James M. Taylor, Acting Executive Director for Operations, NRC
Eric S. Beckjord, Director, Office of Nuclear Regulatory Research, NRC

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AUG 1 1989

August 13, 1989

Mr. Roger K. Jones
Environmental Coordinator
UMETCO Minerals Corporation
P.O. Box 1029
Grand Junction, CO 81502

RE: Proposed U.S. Nuclear Regulatory Commission Regulations

Dear Mr. Jones:

I am responding to your letter of August 2, 1989 asking for technical information regarding the proposed USNRC regulations requiring uranium milling facilities to comply with a restricted area boundary standard for ^{222}Rn of 0.1 pCi/L above background.

There are two serious problems with the proposed radon standard. The first is that the ability to detect 0.1 pCi/L above background is impossible on a practical basis. I am enclosing a copy of 7 years of measured outdoor radon data from the USDOE Environmental Measurements Laboratory (EML) taken at their sampling station in Chester, NJ. Measurements were made hourly for most of the 7 years. As you can see, the range of hourly measurements is from 0.01 to 2.5 pCi/L and the average yearly radon ranges from 0.19 to 0.25 pCi/L. The EML data indicates that at least 5 years of intensive continuous monitoring would be necessary prior to any milling in order to establish baseline values against which the milling operation could be evaluated.

Uranium milling is generally carried out in western mountainous terrain. Mountain/valley meteorology is such that much larger diurnal variability occurs and radon concentrations are generally higher than in the east with an average of about 1.0 pCi/L. The New Jersey data thus represent a best case situation for outdoor radon stability and even here it would be difficult to evaluate the presence of a 0.1 pCi/L source above background.

The second, and more serious problem, is that the selection of 0.1 pCi/L indicates disregard for the present estimates of health effects from radon. The National Council on Radiation Protection and Measurements Report 78, for example, predicts an additional 0.2 lung cancer deaths per 1000 persons exposed to 0.1 pCi/L radon for full lifetime. Given the necessarily limited population size near mills, not one lung cancer death can be calculated for an exposure of this magnitude. Normal outdoor background over the U.S. has a range of about a factor of 10 and any new limits should be responsive to the projected health detriment in realistic environments.

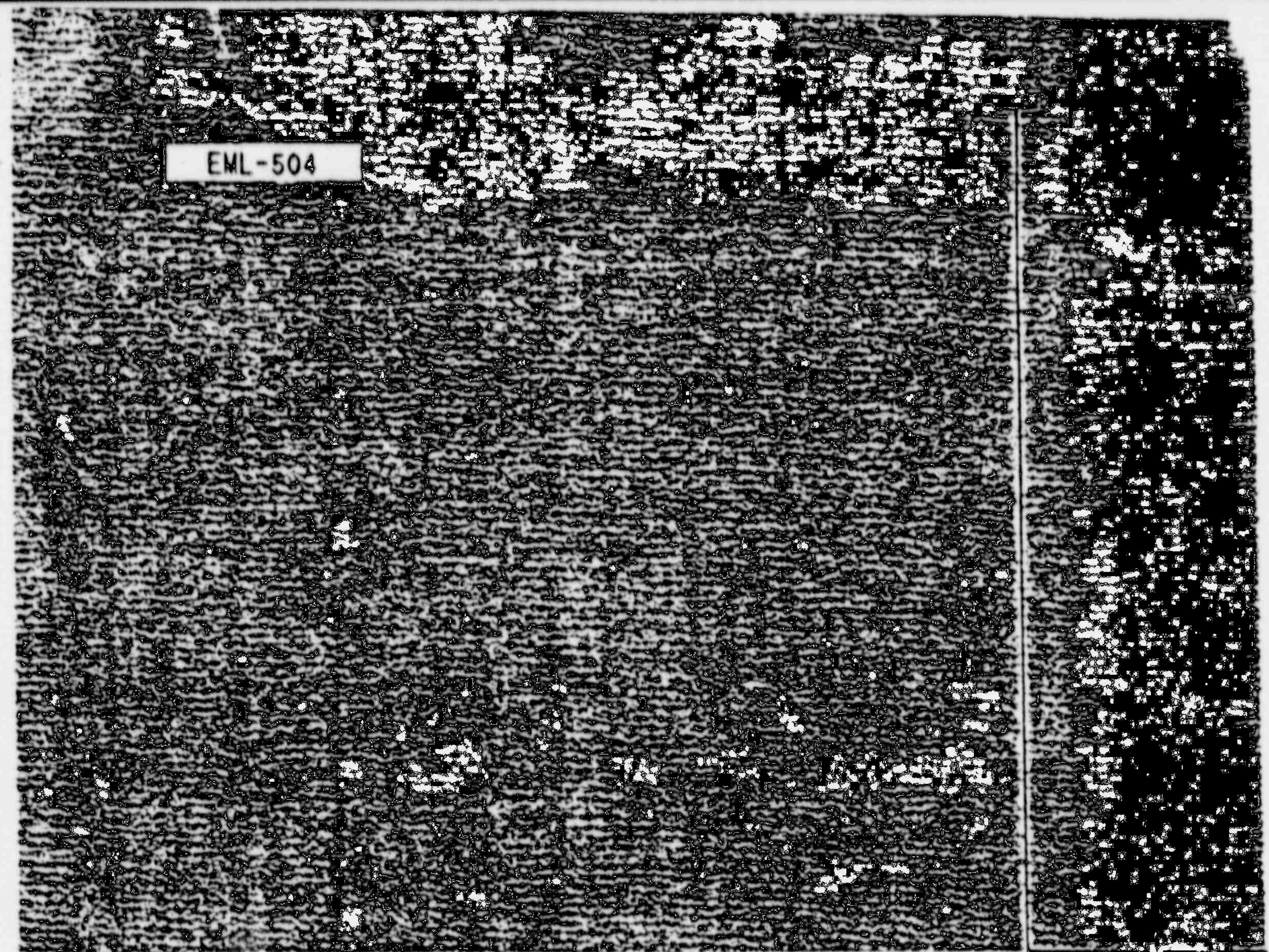
I was very pleased to learn of the environmental surveys being conducted in Uravan and would appreciate receiving any reports that are generated from this work.

Sincerely,

Naomi Harley

Naomi H. Harley, Ph.D.
Research Professor

EML-504



Environmental Measurements Laboratory

1985-86 BIENNIAL REPORT OF THE EML REGIONAL BASELINE STATION AT CHESTER, NJ

October 1988

DEPARTMENT OF ENERGY
NEW YORK, N. Y. 10014

RADON-222 MEASUREMENTS AT CHESTER, NJ THROUGH JULY 1986

Isabel M. Fisenne

The Environmental Measurements Laboratory (EML) has completed 9 y of continuous hourly ^{222}Rn measurements at the Chester, NJ Regional Baseline Station. The annual data for first 7 y have been reported previously (Harley, 1978, 1979; Fisenne, 1980-1985).

OPERATION

The Instrumentation Division designed, operates, and maintains the continuous radon measurement system. For the mid-1984 to mid-1985 period, the unit operated 82% of the time. From mid-1985 to mid-1986 the unit was operational 43% of the time. The principle of operation (Thomas and LeClare, 1970), the physical description, the data acquisition system, and the formula for the calculation of the radon concentration have been described for the Chester unit (Negro, 1979).

The detection parameters for the unit have remained unchanged for 9 y:

Background - 12 to 24 counts h^{-1}

Progeny product recovery - 75%

Efficiency - 2.5 total counts $pCi^{-1}\ m^{-3}$

Lower limit of detection - ~ 10 pCi m^{-3} at 95% confidence level

RESULTS

The 1984-1985 four-week average radon concentrations for 13 time periods are summarized in Table 1, while those for 1985-1986 are shown in Table 2. The 9 y mean diurnal and seasonal variations in radon concentrations are listed in Tables 3 and 4 and are plotted in Figure 1. The detailed daily 3-h averages are listed in Tables 5 and 6.

The range of values for the individual hourly measurements, for the 3-h periods, for the means of the 3-h data for the 4-week periods are shown below for the 7 y of measurements. These data show the smoothing effect resulting from averaging data over different time periods.

	Range ($pCi\ ^{222}Rn\ m^{-3}$)		
Time Period	Hourly Measurements	3-h Averages	4-week Averages
1977 - 1978	30 - 1900	30 - 1400	70 - 560
1978 - 1979	30 - 1400	30 - 1000	80 - 500
1979 - 1980	20 - 1200	30 - 1200	70 - 430
1980 - 1981	10 - 2100	40 - 1700	90 - 500
1981 - 1982	10 - 1500	30 - 1300	70 - 470
1982 - 1983	10 - 2280	30 - 1500	70 - 530
1983 - 1984	10 - 2200	10 - 1700	60 - 490
1984 - 1985	10 - 1700	10 - 1300	90 - 420
1985 - 1986	20 - 2450	20 - 1000	70 - 550

The arithmetic mean and median radon concentrations for the 9 y of operation are tabulated below.

	$pCi\ ^{222}Rn\ m^{-3}$	
Time Period	Arithmetic Mean	Median
1977 - 1978	230	170
1978 - 1979	230	180
1979 - 1980	190	170
1980 - 1981	240	190
1981 - 1982	220	160
1982 - 1983	220	160
1983 - 1984	250	200
1984 - 1985	200	170
1985 - 1986	200	150

DISTRIBUTION OF RESULTS

For the 7-y measurement period, both the hourly data and the 3-h averages of the radon concentration were log-normally distributed.

DISCUSSION

Although meteorological parameters are measured at the Chester site, no attempt was made to correlate the measured radon concentrations with these data. In the period 1977-1981, no significant correlations were found between the 3-h radon concentrations and wind speed, wind direction, air temperature, barometric pressure or relative humidity.

The seasonal pattern of radon concentrations of a summer maximum recurred in the 1984-1986 period, but the unit was inoperable during most of the fall of 1985 in which the concentrations declined. With the addition of an 8th and 9th year of data, the radon concentration measurements indicate a diurnal maximum at essentially 0300 EST, occurring within the midnight to 0600 EST time period. A definite minimum occurs during the noon to 1500 EST period. The seasonal minimum in February is a factor of 3 lower than the August maximum. Over this 9-y period the average diurnal maximum is a factor of 2 greater than the average minimum.

The 9 y of continuous radon concentration measurements at Chester, NJ are to our knowledge the largest database of outdoor radon measurements for a single site. Besides affording the opportunity to study long-term trends in atmospheric radon concentrations, these measurements are of value to other research programs at Chester, as well as concurrent programs based in the New York City area. In addition, the continuous radon monitor has been useful as an experimental system for testing new techniques for maintaining and acquiring data from remote field sites.

ACKNOWLEDGEMENTS

The data tabulation and graphics presented in this report were prepared by Camille Marinetti of the Applied Mathematics Branch.

REFERENCES

Fisenne, I. M.
"Radon-222 Measurements at Chester"
USDOE Report EML-383, pp. 73-107 (1980)

Fisenne, I. M.
IBID
USDOE Report EML-399, pp. 213-245 (1981)

Fisenne, I. M.
IBID
USDOE Report EML-411, pp. 192-227 (1982)

Fisenne, I. M.
IBID
USDOE Report EML-422, pp. 115-149 (1984)

Fisenne, I. M.
IBID
USDOE Report EML-450, pp. 104-139 (1985)

Harley, J. H.
"Radon-222 Measurements"
USDOE Report EML-347, pp. 30-65 (1978)

Harley, J. H.
IBID
USDOE Report EML-367, pp. 39-73 (1979)

Negro, V.
"Environmental Radon Monitor"
USDOE Report EML-367, pp. 244-247 (1979)

Thomas, J. W. and P. C. LeClare
"A Study of the Two-Filter Method for Radon-222"
Health Physics, <u>18</u>, 113-122 (1970)

TABLE 1

FOUR WEEK AVERAGE RADON CONCENTRATIONS AT CHESTER, NJ

July 8, 1984 - July 6, 1986

(pCi m^{-3})

Period	Date	Time Estimated 0000 0100 0200	0300 0400 0500	0600 0700 0800	0900 1000 1100	1200 1300 1400	1500 1600 1700	1800 1900 2000	2100 2200 2300	Mean
1	Jul 8-Aug 4	260	300	210	130	120	130	250	280	210
2	Aug 5-Sep 1	220	270	140	100	100	130	270	230	180
3	Sep 2-Sep 29	350	350	200	150	150	230	300	320	270
4	Sep 30-Oct 27	390	370	340	200	180	200	420	370	320
5	Oct 28-Nov 24	210	220	210	140	130	150	200	220	190
6	Nov 25-Dec 22	280	250	250	190	170	190	230	250	230
7	Dec 23-Jan 19	190	190	180	160	130	140	160	180	170
8	Jan 20-Feb 16	160	170	170	140	130	130	150	170	150
9	Feb 17-Mar 16	140	120	120	100	90	90	100	120	110
10	Mar 17-Apr 13	150	170	130	90	90	100	130	130	120
11	Apr 14-May 11	230	250	180	120	110	120	180	200	170
12	May 12-Jun 8	300	290	170	120	110	130	280	300	210
13	Jun 9-Jul 6	330	300	180	130	120	150	290	360	230
	Mean	250	250	200	140	130	150	230	240	200

TABLE 2

FOUR WEEK AVERAGE RADON CONCENTRATIONS AT CHESTER, NJ

July 7, 1986 - July 5, 1988

(pCi m^{-3})

		Time Estimated								
		0000	0300	0600	0900	1200	1500	1800	2100	
		0100	0400	0700	1000	1300	1600	1900	2200	
Period	Date	0200	0500	0800	1100	1400	1700	2000	2300	Mean
1	Jul 7-Aug 3	310	350	210	180	150	170	300	300	250
2	Aug 4-Aug 31	550	490	380	310	330	340	530	490	430
3	Sep 1-Sep 28	-	-	-	-	-	-	-	-	-
4	Sep 29-Oct 26	-	-	-	-	-	-	-	-	-
5	Oct 27-Nov 23	-	-	-	-	-	-	-	-	-
6	Nov 24-Dec 21	230	230	220	180	150	170	230	220	200
7	Dec 22-Jan 18	220	210	230	180	160	170	210	250	200
8	Jan 19-Feb 15	140	210	170	110	100	100	120	120	130
9	Feb 16-Mar 15	120	110	100	90	70	80	100	120	100
10	Mar 16-Apr 12	170	190	150	100	100	120	100	150	140
11	Apr 13-May 10	-	-	-	-	-	-	-	-	-
12	May 11-Jun 7	230	290	170	120	110	140	210	240	190
13	Jun 8-Jul 5	270	250	180	140	120	140	210	250	200
	Mean	250	200	200	150	140	160	240	240	200

- = no data

TABLE 3

RADON CONCENTRATIONS AVERAGED OVER 4-WEEK PERIODS

July 1977 - July 1986

(pCi m^{-3})

Period	Date	1977 to 1978	1978 to 1979	1979 to 1980	1980 to 1981	1981 to 1982	1982 to 1983	1983 to 1984	1984 to 1985	1985 to 1986	Mean
1	Jul-Aug*	370	330	290	350	286	300	340	210	250	300
2	Aug-Sep	350	340	240	340	330	280	350	180	430	320
3	Sep-Oct	280	290	220	340	310	350	340	270	-	300
4	Oct-Nov	230	130	200	310	280	290	290	320	-	280
5	Nov-Nov	190	300	230	300	220	270	270	190	-	250
6	Nov-Dec	240	250	190	290	210	220	-	230	-	230
7	Dec-Jan	170	180	190	230	190	170	-	170	200	190
8	Jan-Feb	180	180	120	140	120	180	-	150	130	130
9	Feb-Mar	100	120	90	130	110	120	-	110	100	110
10	Mar-Apr	140	130	110	140	130	130	-	120	140	130
11	Apr-May	160	180	150	160	210	130	140	170	-	160
12	May-Jun	210	210	200	190	210	180	160	210	190	200
13	Jun-Jul	270	280	280	-	230	270	120	230	200*	230
	Annual Mean	210	230	190	240	220	220	250	200	200	220

*See Figure 1 for the starting dates over the 9-y interval

- = no data

TABLE 4

RADON CONCENTRATIONS AVERAGED OVER EACH OF THE EIGHT 3-h INTERVALS OF THE DAY

July 1977 - July 1988 (pCi m^{-3})

Years	0000 to 0300	0300 to 0600	0600 to 0900	0900 to 1200	1200 to 1500	1500 to 1800	1800 to 2100	2100 to 2400	Mean
1977-1978	280	280	210	150	140	160	230	270	210
1978-1979	290	300	230	160	150	180	260	280	230
1979-1980	240	250	180	130	120	150	220	230	190
1980-1981	290	310	250	170	150	190	280	290	240
1981-1982	280	270	210	140	130	170	260	280	220
1982-1983	280	290	220	140	140	180	260	270	220
1983-1984	350	340	240	150	140	190	300	300	250
1984-1985	250	250	200	140	130	150	230	240	200
1985-1988	250	260	200	150	140	160	240	240	200
MEAN	280	280	220	150	140	170	250	270	220

TABLE 5

FREQUENCY DISTRIBUTION OF THE 3-h AVERAGE RADON CONCENTRATIONS
July 8, 1984 - July 6, 1985 (pCi m^{-3})

Concentration Range	Distribution	%	Cumulative Distribution	%
1- 25	3	0.04	3	0.04
26- 50	133	1.85	136	1.89
51- 75	557	7.74	693	9.63
76- 100	917	12.74	1610	22.37
101- 125	783	10.88	2393	33.25
126- 150	784	10.89	3177	44.15
151- 175	784	10.89	3961	55.04
176- 200	577	8.02	4538	63.06
201- 225	543	7.55	5081	70.61
226- 250	400	5.56	5481	76.17
251- 275	322	4.47	5803	80.64
276- 300	254	3.53	6057	84.17
301- 325	210	2.92	6267	87.09
326- 350	141	1.96	6408	89.05
351- 375	96	1.33	6504	90.38
376- 400	131	1.82	6635	92.20
401- 425	68	0.94	6703	93.15
426- 450	86	1.20	6789	94.34
451- 475	44	0.61	6833	94.96
476- 500	54	0.75	6887	95.71
501- 525	49	0.68	6936	96.39
526- 550	27	0.36	6963	96.76
551- 575	34	0.47	6997	97.23
576- 600	11	0.15	7008	97.39
601- 625	30	0.42	7038	97.80
626- 650	34	0.47	7072	98.28
651- 675	17	0.24	7089	98.51
676- 700	18	0.25	7107	98.76
701- 725	14	0.19	7121	98.96
726- 750	6	0.08	7127	99.04
751- 775	12	0.17	7139	99.21
776- 800	18	0.25	7157	99.46
801- 825	3	0.04	7160	99.50
826- 850	6	0.08	7166	99.58
851- 875	9	0.13	7175	99.71
901- 925	3	0.04	7178	99.75
926- 950	3	0.04	7181	99.79
976-1000	3	0.04	7184	99.83
1001-1025	3	0.04	7187	99.87
1101-1125	3	0.04	7190	99.92
1276-1300	3	0.04	7193	99.96
1301-1325	3	0.04	7196	100.00

TABLE 6

FREQUENCY DISTRIBUTION OF THE 3-h AVERAGE RADON CONCENTRATIONS

July 9, 1985 - July 5, 1986 (pCi m^{-3})

Concentration Range	Distribution	%	Cumulative Distribution	%
26- 50	80	2.14	80	2.14
51- 75	266	7.13	346	9.27
76- 100	516	13.82	862	23.09
101- 125	578	15.48	1440	38.57
126- 150	420	11.25	1860	49.83
151- 175	321	8.60	2181	58.42
176- 200	253	6.78	2434	65.20
201- 225	237	6.35	2671	71.55
226- 250	166	4.45	2337	76.00
251- 275	153	4.10	2990	80.10
276- 300	130	3.48	3120	83.58
301- 325	125	3.35	3245	86.93
326- 350	73	1.96	3318	88.88
351- 375	75	2.01	3393	90.89
376- 400	64	1.71	3457	92.61
401- 425	41	1.10	3498	93.70
426- 450	44	1.18	3542	94.88
451- 475	24	0.64	3566	95.53
476- 500	21	0.56	3587	96.09
501- 525	20	0.54	3607	96.62
526- 550	6	0.16	3613	96.79
551- 575	8	0.21	3621	97.00
576- 600	9	0.24	3630	97.24
601- 625	7	0.19	3637	97.43
626- 650	9	0.24	3646	97.67
651- 675	9	0.24	3655	97.91
676- 700	9	0.24	3664	98.15
701- 725	3	0.08	3667	98.23
726- 750	6	0.16	3673	98.39
751- 775	3	0.08	3676	98.47
776- 800	3	0.08	3679	98.55
801- 825	6	0.16	3685	98.71
826- 850	12	0.32	3697	99.04
851- 875	6	0.16	3703	99.20
876- 900	9	0.24	3712	99.44
901- 925	6	0.16	3718	99.60
1026-1050	3	0.08	3721	99.68
1051-1075	3	0.08	3724	99.76
1101-1125	3	0.08	3727	99.84
1526-1550	3	0.08	3730	99.92
1976-2000	3	0.08	3733	100.00

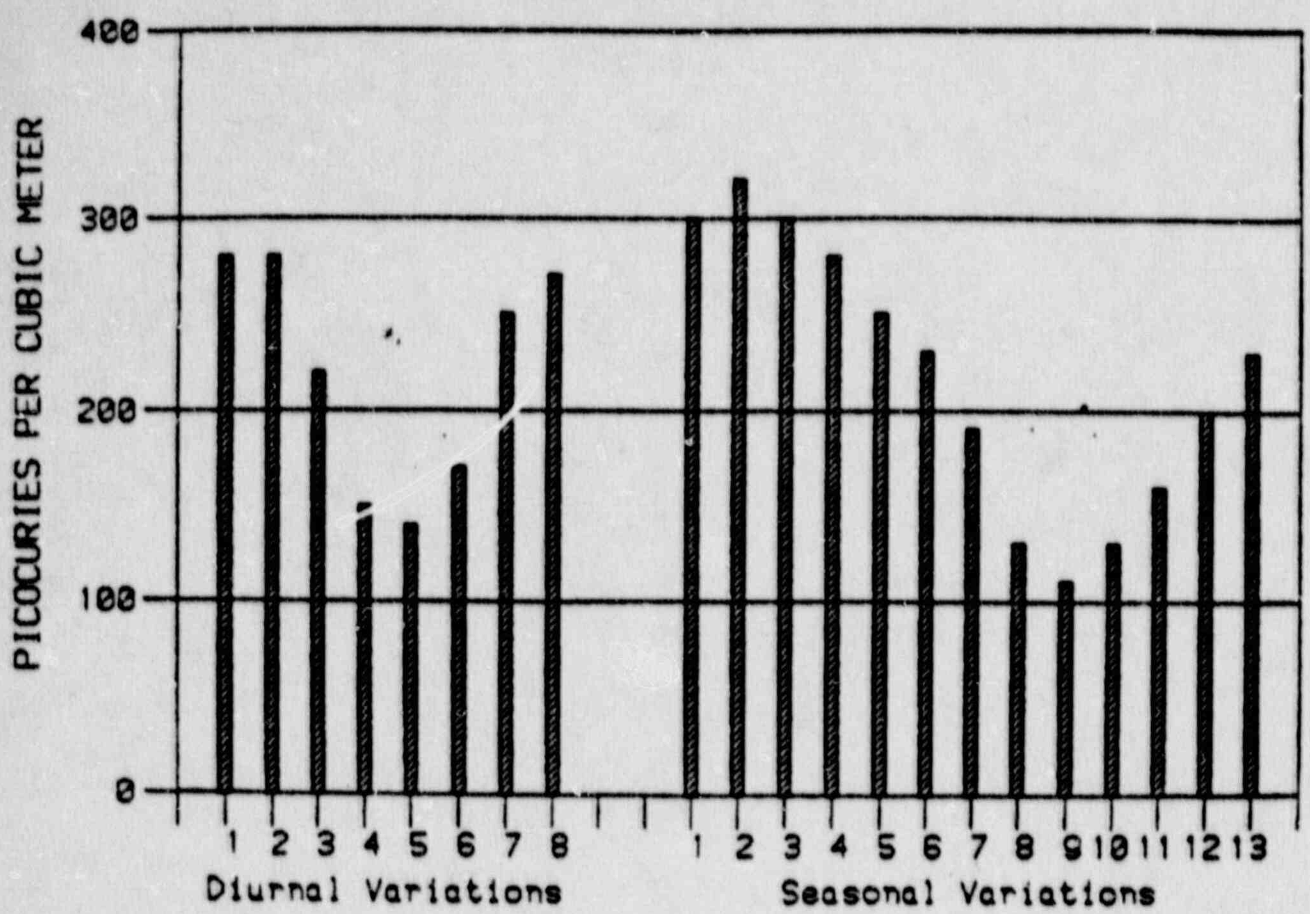


Figure 1.

Nine year (1977 to 1986) average variation in radon concentrations at Chester, NJ. The diurnal variations show the means for the 8, 3-h time periods. The seasonal variations show the means for the 13, 4-wk periods.

Diurnal Periods (EST)	
1	0000 to 0300
2	0300 to 0600
3	0600 to 0900
4	0900 to 1200
5	1200 to 1500
6	1500 to 1800
7	1800 to 2100
8	2100 to 2400

Seasonal Periods *			
1	Jul 07-17	7	Jan 19-20
2	Aug 04-14	8	Feb 16-26
3	Sep 01-11	11	Mar 16-26
4	Sep 29-Oct 09	12	Apr 13-23
5	Oct 27-Nov 06	13	May 11-21
6	Nov 24-Dec 04	14	Jun 08-18

* Denotes the starting dates of the periods over the 9 y interval.