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FLORIDA STATEWIDE RADIATION STUDY

Prepared by GEOMET Technologies, Inc.

under a grant sponsored by the

Florida Institute of Phosphate Research

Bartow, Florida

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FLORIDA INSTITUTE OF PHOSPHATE RESEARCH

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GEOMET Report Number IE-1808

November 5, 1987

FLORIDA STATEWIDE RADIATION STUDY

Final Report

for

Dr. Gordon D. Nifong
Florida Institute of Phosphate Research
1855 West Main Street
Bartow, Florida 33830

under

Contract Number 087-044
GEOMET Contract Number 86-02-013

by

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PERSPECTIVE

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During 1986 and 1987, the State of Florida experienced one of the most thorough studies of indoor air pollution ever attempted. The "Florida Statewide Radiation Study," conducted by Geomet Technologies, Inc. under contract to the Florida Institute of Phosphate Research, surveyed well over 6,000 Florida homes for indoor radon concentrations. Homes in every county in the state were included. In half the homes, radon in soil gas outdoors, and gamma radiation levels both indoors and out, were also included. Besides the new measurements, historical data were compiled and geologic data assessed, all in an effort to be able to predict, with a reasonable degree of accuracy, where indoor radon may be a problem in the state. The cost was high; at nearly one million dollars the contract with Geomet was the largest one-year project ever funded by the Institute. However, the cost will be well-justified as the results are applied for the benefit and protection of the citizens of Florida.

Geomet's final report was turned over to a Peer Review Committee, appointed by the Secretary of the Florida Department of Health and Rehabilitative Services to evaluate the study and to recommend how it should be used by the Department to protect Florida's citizens against natural radiation. The study has shown two general findings: (1) Average indoor radon levels in Florida are lower than were anticipated, lower than in any other state thus far studied. It is likely Florida will place well down in any list of states ranked by radon exposure potential; (2) The geographical extent of elevated radon potential in Florida is wider than had been believed earlier. Some 7% of the state's land area, located in 18 counties, shows definite evidence of elevated radon potential. Limited evidence of elevated levels was found in parts of an additional 14 counties. At this point it might be useful to describe briefly the background of interest in radiation in Florida, and the role of the Institute in its study.

The very beginnings of the story of naturally-occurring radioactive materials in Florida go back to the early part of this century when it was discovered that central Florida phosphate ore contained higher levels of uranium than did most other soils and rocks over the earth. It was not until the mid-1970's, however, that interest in the subject began to pick up, due in part to a finding that some homes built in uranium mining areas of the Rocky Mountains had higher than desirable indoor radiation levels. At that time, both the U.S. Environmental Protection Agency and the Florida Department of Health and Rehabilitative Services performed limited surveys of indoor radiation in homes built in the central Florida phosphate district. Both studies showed that some persons in the area were exposed to levels of radioactivity significantly higher than normal background levels. In May of 1979 the Administrator of EPA wrote to the Governor of Florida, suggesting that remedial action was necessary in some existing homes, and that future new homes built in the region should incorporate construction techniques to resist the entry of radon gas. At that point, the Governor appointed a Task Force to consider the problem and possibly develop an environmental radiation standard,

The result of the Task Force's efforts was a standard for indoor exposure of citizens to naturally-occurring radioactive materials, mainly the decay products of radon gas, promulgated by the state health agency. The standard proposed the identification of land areas in the state where indoor levels of radon would be expected to be elevated above normal, and specified that new homes built in these areas would have to be constructed so as to resist the entry of radon gas, or the homes would have to be inspected for radon progeny and found acceptable before they could be occupied. Controversy quickly arose, however, over what lands in the state would be affected. The State Office of Radiation Control proposed to apply the new rule only in areas of reclaimed phosphate lands, mostly in Polk and Hillsborough counties. Many persons objected to this, feeling that other parts of the state as yet unidentified very probably had areas of elevated radon levels and should be included under the rule. As a result of this, the 1986 Legislature, in the closing days of its session, mandated the Florida Institute of Phosphate Research to direct a study of the entire state to identify all significant land areas of Florida where the rule should be applied.

The first action of the Institute after receiving official notice directing it to conduct the survey was to establish a panel of outside experts in radiation and geology to assist the Institute in developing guidelines for the study and to select a single best contractor to actually perform the work. The study plan called for the performance of five basic work tasks. Task #l was to assemble and evaluate all existing data, including geologic maps of Florida, results of earlier radiation studies in a few areas of the state, and a study of the statewide aerial gamma data obtained in 1981 in conjunction with the National Uranium Resource Evaluation program. Task #2 involved the placing of charcoal canisters in several thousand Florida homes to measure radon gas. The number of samples to be collected in each county would be based on each county's population, but with no fewer than 16 nor more than 160 in each county. Task #3 included also the placing of charcoal canisters in several thousand additional homes, but with the number allotted to each county based on county land area, and weighted as to any perceived elevated radon levels as determined in Task #l. Also in Task #3 soil radon would be checked at each home, and indoor and outdoor gamma levels would be measured. Homes within each county were chosen at random, but not including homes built with radon resistance in mind. Participation by all homeowners was entirely voluntary. Task #4 involved an assembly of all the results from the first three tasks to determine the proportion of homes in each study area expected to exceed the state radiation standard. The final task was to prepare narrative reports and maps presenting all study results.

All data sources in the study were first considered on a county-by-county basis. Areas in 18 counties were shown to have definite evidence of elevated radon potential, and areas in an additional 14 counties were shown to have some limited evidence of elevated radon potential. In 35 counties no evidence of elevated radon potential was found. Within the 18 counties of definite evidence, further analyses were made of the data to identify what parts of each of these counties had an elevated potential. In the land-based study, the geographical unit was the USGS quadrangle (about 60 square miles). In the population study, it was the postal zip code, overlaying the quadrangles. The other data sources were then added by quadrangle to form an overall judgment of potential for radon. Of a total of 1,032 quadrangles in Florida, 74 were designated all or in part as likely having elevated radon potential. Finally, maps of the 18 counties were prepared, indicating the quadrangles of interest.

At the conclusion of the study, it became the task of the Peer Review Committee to evaluate the final report and recommend how it should be used in implementing a statewide radiation program. The committee agreed that the study formed an adequate base for establishing such a program. Members recommended that the state take the following actions:

- Adopt a radon-resistant building code for required use in all parts of the state. This is consistent with the "ALARA" philosophy of radiation protection and would result in reducing the average exposure statewide.

- Devote considerable attention and resources to development of radon predictors based on soil measurements. Predictors would be used to establish variance criteria.

- Require a general radon notification statement to be included on all property sales agreements. Special notification would be required in areas known to have high radon potential.

- Provide for certification of radon measurement and mitigation companies to assure the public of their technical competence.

- Conduct epidemiological studies to determine the relationship between household radon levels and lung cancer.

- Determine the need for financial assistance or tax incentives in meeting mitigation costs for homeowners with elevated radon levels.

- The testing of homes for radon at the time of transfer of ownership shall be at the option of the buyer or the seller.

Now that this study is complete, the future role of the Institute in the area of indoor radon research likely lies in the development of some predictive technique whereby some preconstruction soil or site parameter can be measured that would indicate future indoor radon levels of a structure later built on that site. Given the variables of soil characteristics, home construction and meteorology, it is highly unlikely that an exact correlation can ever be found. It is hoped, however, that some threshold land characteristic can be found, below which it can be stated with a reasonable degree of confidence that indoor radon would not exceed some upper acceptable level. The data in this study will be examined carefully with this goal in mind. Candidates for further research as to their use as a predictive tool would include soil radon (and perhaps soil porosity), local geology, terrestrial uranium, and perhaps gamma levels.

The Florida Institute of Phosphate Research acknowledges with deep appreciation the efforts of the Peer Review Committee in evaluating this study, and the efforts of the special Technical Advisory Committee in designing the study and selecting a contractor. Without the voluntary and extensive contribution of both time and talent of members of both groups, this study could not have been conducted.

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EXECUTIVE SUMMARY

This report contains results of a study on indoor radon levels and related measurements that were conducted throughout the State of Florida. The study was commissioned by the Florida Institute of Phosphate Research (FIPR), in compliance with House Bill 1380 (1986).

The objective of this study was to identify all significant land areas in Florida where the State environmental radiation rule should be applied. Under this rule, newly constructed buildings must be tested for radiation levels unless approved construction techniques are used. The standards in the rule require that human exposure to gamma radiation not exceed 20 microroentgens per hour (μR/h) and that human exposure to radon decay products not exceed 0.02 working level (WL) annual average.

To meet the study objective, two complementary approaches were used for data collection--a land-based survey and a population-based survey. The coverage of the land-based survey was scaled to the extent of inhabited land area in each county in the State, whereas the coverage of the population-based survey was scaled to the number of occupied housing units in each county. Both surveys were restricted to owner-occupied residences with slab-on-grade foundations.

Field technicians working on the land-based survey recruited survey participants using 1:24,000 quadrangle maps prepared by the U.S. Geological Survey (USGS) as a guide for locating residential areas. Measurements of indoor radon, soil radon, and indoor and outdoor gamma radiation were taken in over 3,000 residences starting in late October 1986 and ending in March 1987; radon decay products were also measured in a subset of these homes. A probability sample of residences for the population-based survey was recruited and sent samplers through the mail. Indoor radon levels were measured in over 3,000 residences through this survey between January and June 1987. In total, measurements were obtained from approximately 6,500 residences for the two surveys. Additionally, one or two public schools were measured for each county through the population-based survey approach.

In addition to primary data collected through the land- and population-based surveys, secondary data were assimilated and analyzed. The secondary data were primarily of two types--geologic profiles of the State mapped by previous investigators and terrestrial uranium levels characterized through the National Uranium Resource Evaluation (NURE) program, under which aerial gamma radiation surveys were conducted across the State in 1981.

Initial data analysis efforts focused on determining the extent of evidence of radon potential for each county. The following parameters were used for this analysis: indoor radon measured in both surveys; soil radon and gamma radiation measured in the land-based survey; terrestrial uranium measured under the NURE program; and other existing information such as geological occurrences. Counties were screened for evidence of elevated radon potential based on (1) the highest reading from any house in the county for each parameter measured in the land- and population-based surveys and (2) the highest quadrangle average in the county for terrestrial uranium. Maximum values were used so that any evidence of elevated radon potential would not be overlooked.

To essentially place the different parameters on an equal footing, an index of radon potential ranging from 1 (lowest potential) to 5 (highest potential) was developed for each parameter. Index values were assigned to each parameter for each county and then averaged across parameters to form a composite index value for each county. Based on this analysis, counties were classified into three groups according to radon potential:

- Definite evidence of elevated radon potential (18 counties)
- Limited evidence of elevated radon potential (14 counties)
- No evidence of elevated radon potential (35 counties).

The counties in each group are listed in Exhibit 1.

Within the counties with definite evidence of elevated radon potential, more detailed spatial analyses were conducted to identify areas to which the rule should apply. USGS 1:24,000 quadrangles were used as the geographic unit to designate areas because these boundaries will remain fixed over time and can be readily identified on most types of maps. The primary data analyzed at this level of analysis were indoor radon levels, soil radon levels, and terrestrial uranium levels; gamma radiation readings were not used because they were found through the

Exhibit 1. Classification of Florida Counties by Evidence of Elevated Radon Potential

Definite Evidence of Elevated Potential

Alachua	Hardee	Marion
Charlotte	Hillsborough	Pasco
Citrus	Lee	Pinellas
Columbia	Leon	Polk
Dade	Levy	Sarasota
Gilchrist	Manatee	Sumter

Limited Evidence of Elevated Potential

Bradford	Hernando	Seminole
Collier	Jackson	Taylor
DeSoto	Jefferson	Union
Hamilton	Madison	Wakulla
Hendry	Orange	

No Evidence of Elevated Potential

Baker	Glades	Okeechobee
Bay	Gulf	Osceola
Brevard	Highlands	Palm Beach
Broward	Holmes	Putnam
Calhoun	Indian River	St. Johns
Clay	Lafayette	St. Lucie
Dixie	Lake	Santa Rosa
Duval	Liberty	Suwannee
Escambia	Martin	Volusia
Flagler	Monroe	Walton
Franklin	Nassau	Washington
Gadsden	Okaloosa	

county-level analysis to be low throughout the State. Maps containing geology and soil classifications were used as an interpretive tool at this stage of the analysis.

Based on this analysis, 74 USGS quadrangles, representing about 7 percent of those constituting the state, were identified as having definite evidence of elevated radon potential. The counties with the greatest number of identified quadrangles were Alachua, Hillsborough, Marion, and Polk. Due to low housing density in some areas, it is possible that some quadrangles having elevated radon potential may not have been detected in this study. Areas of particular concern are those in the north central part of the State with near-surface, uranium-bearing geologic formations and phosphatic soils for which the number of participating homes was insufficient to draw definite conclusions.

The recommendations stemming from the study are as follows:

1. The environmental radiation rule should be applied to the 74 USGS quadrangles for which definite evidence of elevated radon potential was found in this study.

2. Conduct supplemental sampling in selected counties with limited or no evidence of elevated radon potential that were not adequately covered by the surveys conducted as part of this study.

3. Conduct supplemental sampling in selected quadrangles that may have potential for elevated radon levels.

4. Conduct more detailed sampling in currently designated quadrangles to help pinpoint localized areas of elevated radon potential.

5. Conduct indoor radon sampling in all schools in the 18 counties with definite evidence of elevated radon potential to characterize the radon risk for children.

6. Conduct indoor radon sampling in selected schools in counties with limited or no evidence of elevated radon potential.

7. Conduct sampling to characterize the radon potential of borrow pits.

8. Develop a predictive tool that can be used as a basis for declaring variances in areas where the rule is to be applied.

9. Notify the public about areas with elevated radon potential so that occupants in existing homes are aware of the possible risks they face.

10. Ensure that quality radon measurement and mitigation services are made available to residents.

Section 1.0

INTRODUCTION

Section 1.0

INTRODUCTION

This project, entitled "Florida Statewide Radiation Study," was commissioned by the Florida Institute of Phosphate Research (FIPR) in compliance with a legislative mandate (House Bill 1380, 1986). The mandate requires that a study be conducted to identify all significant geographical areas of the State in which the State radiation standards should be applied. GEOMET was selected as the contractor to conduct this l-year study, which was initiated on September 8, 1986.

As required in the FIPR/GEOMET contract, this report provides an assessment of the land areas to which the State radiation rule should apply. An initial assessment was performed at the county level to determine those with elevated radon potential; within that subset of counties, a more detailed assessment was performed to determine the spatial extent of elevated potential.

The background and objectives of the project are described more fully in Section 2.0. The types of data collected, processed, and analyzed under the project, as well as associated research methods, are given in Section 3.0. Section 3.0 also summarizes methods of data analysis and discusses criteria for assessing radon potential. In Section 4.0, the major results of the study are presented and counties with definite evidence of elevated radon potential are identified. Detailed results for these counties are provided in Section 5.0. In Section 6.0, land areas identified as subject to the rule are shown, and the implications and limitations of the study results are discussed. The major conclusions and recommendations stemming from the study are given in Section 7.0. Appendixes to this report are contained in a separate document.

GEOMET Technologies, Inc., is the prime contractor for the project and is the author of this report. A number of subcontractors have provided assistance in this project: researchers at the University of Florida in compiling and analyzing much of the information that existed at the project's inception; researchers at the Florida State University in reviewing the assessment of existing data; Rowe Research and Engineering Associates in developing an interpretive framework; SAIC in providing personnel and office facilities in Florida; Martel Laboratories, Inc., in the development of maps to support geographic analyses.

Section 2.0

BACKGROUND AND OBJECTIVES

Section 2.0

BACKGROUND AND OBJECTIVES

2.1 STUDY BACKGROUND

Radon originates from the radioactive decay of radium within the uranium decay series. Uranium and radium are widely dispersed trace constituent of soils and rock. Because radon is a chemically inert gas, there is a potential for radon to migrate considerable distances in the soil before decaying. This environmental mobility, when coupled with situational factors such as local geology and construction details, permits radon to enter buildings by a variety of routes and to accumulate therein.

Though not considered a health hazard itself, radon is a precursor to a series of short-lived decay products that are of concern. Radon decay products may exist as neutral and ionized atoms that, when coalesced with trace gases, form molecular clusters or become attached to aerosols. Upon inhalation, the internal dose of ionizing radiation from radon decay products deposited in the lung poses a long-term cancer risk.

In some mid-Atlantic states such as Pennsylvania and New Jersey, concern over problems posed by radon has arisen only recently; in Florida, however, concern over radon is hardly a new phenomenon. A description of events leading up to the current study appears in the FIPR Newsletter, part of which is reproduced in Figure 2-1.

In 1975, the U.S. Environmental Protection Agency (EPA) reported that the data from preliminary sampling efforts suggested elevated levels of airborne radon progeny in structures built on reclaimed Florida phosphate

"The very beginnings of the story of naturally occurring radioactive materials in Florida go back to the early part of this century when it was discovered that central Florida phosphate ore contained higher levels of uranium than did most other soils and rocks over the earth. It was not until the mid-1970's, however, that interest in the subject began to pick up, due in part to a finding that some homes built in uranium mining areas of the Rocky Mountains had higher than desirable indoor radiation levels. At that time, both the U.S. Environmental Protection Agency and the Florida Department of Health and Rehabilitative Services performed limited surveys of indoor radiation in homes built in the central Florida phosphate district. Both studies showed that some persons in the area were exposed to levels of radioactivity significantly higher than normal background levels. In May of 1979 the Administrator of EPA wrote to the Governor of Florida, suggesting that remedial action was necessary in some existing homes, and that future new homes built in the region should incorporate construction techniques to resist the entry of radon gas. At that point, Governor Graham appointed a Task Force to consider the problem and possibly develop an environmental radiation standard.

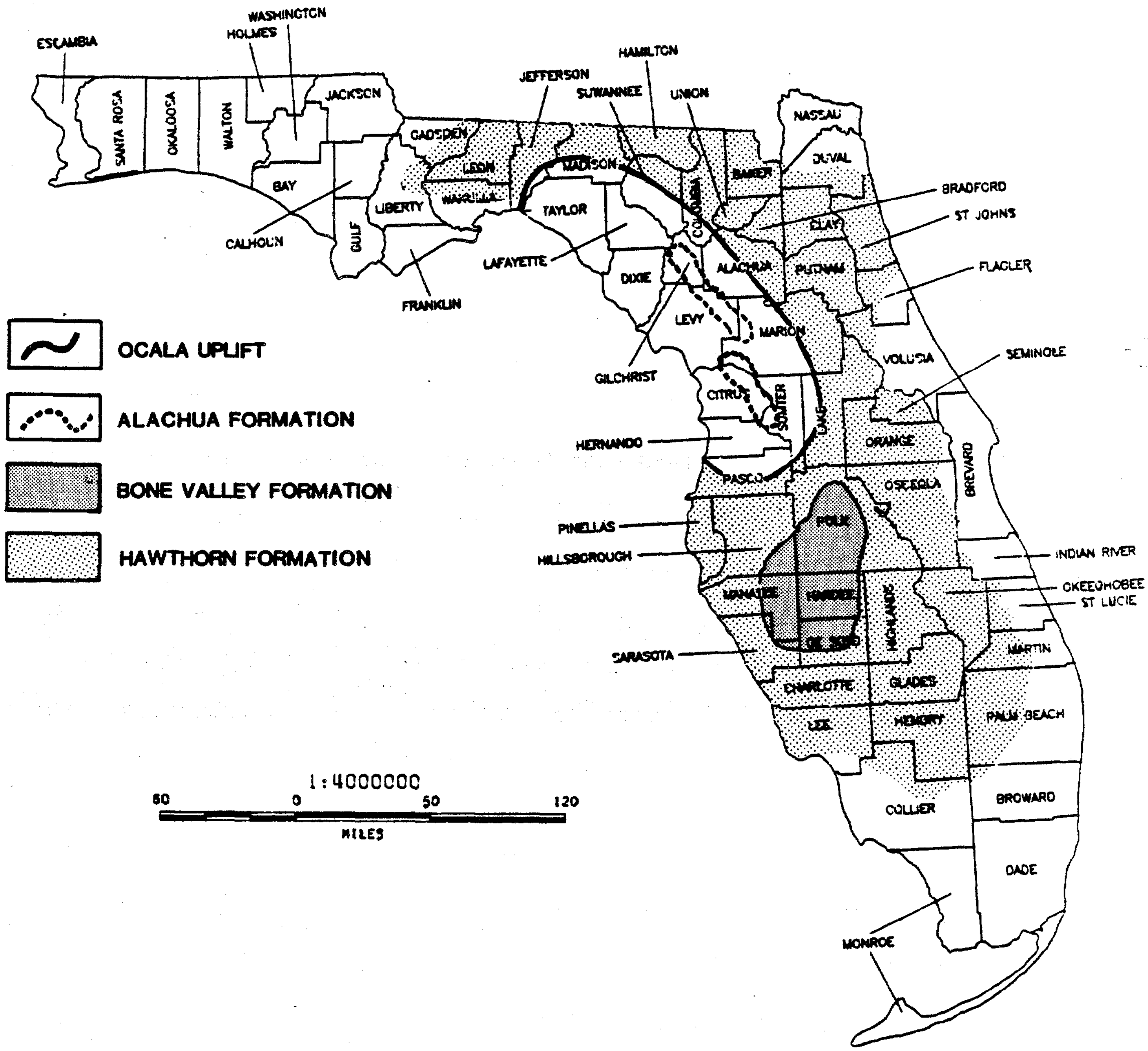
The result of the Task Force's efforts was a standard for indoor exposure of citizens to naturally occurring radioactive materials, mainly the decay products of radon gas. It was promulgated by the state health agency, to become effective February 17, 1986. The standard proposed the identification of land areas in the state where indoor levels of radon would be expected to be elevated above normal, and specified that new homes built in these areas would have to be constructed so as to resist the entry of radon gas, or the home would have to be inspected for radon progeny and found acceptable before the home could be occupied. Controversy quickly arose, however, over what lands in the state would be affected. The State Office of Radiation Control proposed to apply the new rule only in areas of reclaimed phosphate lands, mostly in Polk and Hillsborough counties. Many persons in the affected areas objected to this 'singling out' of their area, feeling that other parts of the state as yet unidentified very probably had areas of elevated radon levels and should be included under the rule. As a result of this, the 1986 Legislature, in the closing days of their session, directed the Florida Institute of Phosphate Research to direct a study of the entire state to identify all significant land areas of Florida where the rule should be applied...."

Source: Gordon Nifong, "Florida Statewide Radiation Study," Florida Institute of Phosphate Research Newsletter, Summer/Fall 1986, Vol. III, Nos. 2 and 3, p. 4.

Figure 2-1. Background of the Florida Statewide Radiation Study lands. There have been several investigations conducted by State agencies, by industry associations, and by universities well before and since that study.

In 1986, the State of Florida became the first state in the Nation to pass a rule (10D-91, Florida Administrative Code) regulating exposure of its citizens to naturally occurring radioactive materials in the environment. Radiation exposure to the public from naturally occurring radioactive materials is to be kept as low as reasonably achievable. The mean gamma exposure rate is not to exceed 20 microroentgens per hour (µR/h) and the annual average radon decay product concentration is not to exceed 0.02 working level (WL) in new homes, schools, and commercial buildings. The radiation source is mainly the soil and rocks, which in some parts of Florida are richer in radioactive elements than in others. Phosphate deposits that underlie some areas of the State are of particular concern. Four geologic occurrences--the Hawthorn Formation, the Bone Valley Formation, the hardrock phosphate along the Ocala Uplift, and the Alachua Formation (sometimes referred to as the residual Hawthorn Formation)--account for the presence of commercial deposits of phosphate in Florida. The extent of geographic area covered by these occurrences is shown in Figure 2-2.

Lands expected to present a radiation problem are also defined in 10D-91. Land "which has been mined, reclaimed, reshaped, restored, or otherwise altered as a result of extraction of phosphate ore" is identified as subject to implementation of the standard. Also identified are lands "which are known to contain uranium, thorium, or other naturally occurring radionuclides or their decay products" to the extent that structures could exhibit radiation levels above the standards.



Source: Adapted from Sweeney, J.W., and S.R. Windham. 1979. Florida: The New Uranium Producer. Bureau of Geology, Division of Resource Management, Florida Department of Natural Resources, Special Publication No. 22.

Figure 2-2. Distribution of Phosphate in Florida

For such lands, methods of home construction that will minimize radon entry into structures are presented in 10D-91. If a new structure is not built with listed construction techniques, it must be tested prior to occupancy, and the owner must undertake remedial action if the structure does not meet environmental radiation standards. Because most previous studies focused their measurements in the commercial phosphate regions, additional measurements throughout the State were needed for the standards to be applied on an equitable basis.

2.2 STUDY OBJECTIVES AND SCOPE

The objective of the study was to identify all significant geographical areas in Florida where the State environmental radiation standards should be applied. Thus; the primary goal of this study was to classify undeveloped land areas into two typesi-areas where the rule is applicable and the remainder of the State where the rule does not apply.

Because the rule only applies to new construction and not to existing housing, measurements of indoor radon prior to construction were not possible. Additionally, there was no proven direct method for precisely quantifying potential indoor radon levels for an undeveloped land area at the time when the study was initiated. Given this state of the art, the study needed to include existing housing and a variety of measurements, all with an ultimate goal of being able to differentiate land areas for the applicability of the State radiation rule. As described in Section 3.0, GEOMET used measurements for indoor radon and radon progeny, soil radon gas, and indoor and outdoor gamma radiation for this survey. Additionally, any data for similar measurements available at the beginning of the study were also used.

Another important factor that dictated our approach was the schedule specified for the study. Study results are to be available within 1 year from the beginning of the study in September 1986, with a part of the results made available on February 25, 1987. To meet these schedule constraints and also to have scientifically defensible results of practical value, the basic framework for GEOMET's approach was developed around the following considerations:

- Use all currently available radiometric and geological data to identify areas of perceived risk.
- Explicitly recognize the given time constraints for the survey. Although it was desirable to complete the above item before starting any other work, this approach was not practical due to time constraints.
- Generate accurate information that can be reproduced to minimize technical uncertainties.
- Optimize use of resources by balancing the competing desires for dense geographic coverage and expensive, sophisticated data collection strategies.
- Carefully explore how the results of the survey can be or will be used prior to developing a design.
- Establish early at least qualitative, if not quantitative, criteria for analyzing results. During the conduct of the work, but well before its completion, establish quantitative criteria.
- Develop a set of maps early that can be used in conjunction with field data collection and routine data processing so that such "standard" maps become a basis for all subsequent analysis, interpretation, and enforcement action.

Our approach, developed in light of these considerations, was refined in subsequent discussions with the Florida Institute of Phosphate Research. The following is the verbatim statement of work for the Florida Statewide Radiation Study:

"Under contract with the Florida Institute of Phosphate Research, GEOMET Technologies, Inc., will perform the following five tasks:

"1. Task 1--Review of Existing Information

a. Review and integration of existing information such as radiometric (including NURE) data, geologic data, and demographic (1980 Census of Population and Housing) data.

b. Development of a common coordinate system for plotting maps of geopolitical boundaries (e.g., counties), existing information (USGS quadrangle coordinates), and results from the land-based survey (quadrangle coordinates) and the population-based survey (centroids of census tracts or enumeration districts).

"2. Task 2--Conduct of a Land-Based Survey

a. Measurement of 3-day indoor radon with charcoal canisters and 1-month soil radon with alpha track detectors in a maximum of 6 houses per 1:24,000 quadrangle (measurements restricted to habitable portions of 1,042 quadrangles in the State of Florida, assumed equivalent to 750 fully habitable quadrangles or a maximum of 4,500 houses in total). A minimum of 3,000 homes shall be surveyed.

b. Measurement of 1-month indoor radon with alpha track detectors and 3-day indoor radon progeny with radon progeny integrating sampling units (RPISUs) in 10 percent of the houses monitored under 2a, or a maximum of 450 houses in total.

c. Measurements with gamma survey meters (1) indoors and in the outdoor vicinity of each house monitored under 2a and (2) while driving between houses that are monitored.

d. Survey to be administered in two phases; Phase I to cover the lower one-third of the State and Phase II to cover the upper two-thirds of the State.

e. No less than 15 nor more than 45 structures surveyed in part (a) shall be public schools or other public buildings.

"3. Task 3--Conduct of a Population-Based Survey

a. Measurement of 3-day indoor radon with charcoal canisters in a maximum of 3,000 houses. A minimum of 2,500 houses shall be surveyed.

b. Houses to be selected randomly and to cover all 67 counties in Florida.

c. Survey to be administered in up to four phases (750 houses per phase) at intervals of approximately 6 weeks.

"4. Task 4--Assessment of Environmental Radiation Rule

a. Assembly of results from Tasks 2 and 3 to identify the proportion of houses in various subareas of the State (e.g., counties or 1:24,000 quadrangles) in which radiation standards are exceeded.

b. Based on a statistical analysis of the results assembled under 4a, identification of all significant land areas of the State of Florida in which the State environmental radiation rule (10D-91, F.A.C.) shall be applied.

"5. Task 5--Reporting

a. Provision of monthly progress reports beginning October 15, 1986; reports to include a summary of progress during the past month, plans for the next month, and any significant problems encountered.

b. Provision of an interim report by January 31, 1987 (draft) and February 25, 1987 (final); report to include results of Task 1, results to date of Phase I of Task 2 and Phase I of Task 3, and a preliminary assessment of the State rule based on available data.

c. Provision of a final report by August 15, 1987 (draft) and September 15, 1987 (final); report to include a description of study methods, major results from each task, and a final assessment of the State environmental radiation rule based on all study data.

d. All pertinent software and-analytic techniques, not proprietary in nature, used in the preparation of reports and maps, shall be made available upon request to the Institute.

"Products from the overall work effort will include progress reports, the interim report, and the final report. In addition, map products will be developed under Tasks 1, 2, 3, and 4. These maps will indicate the following:

- Perceived risk based on existing information (Task 1)
- Relative radon concentrations in outdoor soil and indoor air and relative gamma radiation levels based on the land-based survey (Task 2)
- Relative indoor radon concentrations based on the population-based survey (Task 3)
- Areas of the State of Florida in which provisions of the State environmental rule shall be applied (Task 4).

"Although USGS maps of scale 1:24,000 will be used to guide the land-based survey and to code measurement results, all maps of study results will be produced at a scale of 1:250,000 or smaller."

Section 3.0

METHODOLOGY

Section 3.0

METHODOLOGY

3.1 OVERVIEW

Two complementary approaches were used for the collection of data for this study--a land-based survey and a population-based survey. Additionally, existing information, consisting mainly of geologic profiles of the State and various types of radiometric data, was assembled and analyzed. This subsection provides an overview of the overall methodology.

Some basic differences between the land-based and population-based surveys are summarized in Table 3-1. In brief the land-based approach involved a team of field technicians moving systematically throughout the State, using U.S. Geological Survey (USGS) maps of a 1:24,000 scale as a guide for locating residential areas. A technician was sent to each 1:24,000 quadrangle, or quad, to recruit households for measurements by knocking on doors in residential areas, explaining the nature and importance of the study, and soliciting their participation.

To maintain appropriate control of data quality and to properly coordinate efforts, technicians worked as a single team under the control of a GEOMET field supervisor. Because of the field technicians' involvement, it was possible to collect various types of data--radon concentrations and radon progeny working levels inside residences, radon concentrations in the nearby soil, and gamma radiation levels both inside and outside residences. However, the single-team approach did not allow different regions of the State to be covered simultaneously, as could be accomplished in the population-based survey.

Table 3-1. Basic Differences Between Land-Based and Population-Based Surveys

Characteristic	Land-Based Survey	Population-Based Survey
Geographic Units to Be Surveyed	USGS 1:24,000 quads	Census tracts and enumeration districts
Method of Household Selection	Technician's judgment in each quad	Random selection from computer data base
Information that Can Be Collected	Indoor radon and radon progeny, soil radon, and indoor/outdoor gamma radiation	Indoor radon
Timing of Information	Field team moves systematically throughout the State	Can be gathered from different parts of the State almost simultaneously or at different times
Geographic Units for Which Measurement Results Can Be Summarized	County Zip Code USGS 1:24,000 quads	County Zip Code

The population-based survey involved mailing letters and questionnaires to residences throughout the State for participant recruitment. This type of survey is well suited to the use of 1980 Census data as a basis for selecting a random sample of households with known probabilities. The types of measurements that could be conducted by mail were restricted to indoor radon measurements. Because the population-based survey was administered by mail, different parts of the State could be surveyed at the same time and each part of the State could be surveyed more than once. The population survey was conducted in four cycles spread over a 6-month period.

Because the population-based and land-based approaches each offered distinct, complementary advantages to the project, both were used. Collection of data by these two different routes offered a means of checking the consistency of results for different areas of the State. The greater measurement detail from the land-based survey strengthened the single measurement for each house from the population-based survey, and the greater time-related detail from the population-based survey strengthened the one-time measurements for each geographic area from the land-based survey. By design, a minimum of 3,000 households were to participate in the land-based survey and a minimum of 2,500 households in the population-based survey. Methods used for the two surveys are described in greater detail in Sections 3.2 (land-based) and 3.3 (population-based).

Existing information, consisting mainly of geologic profiles of the State and various types of radiometric data from projects of modest scope, was assembled and analyzed by researchers at the University of Florida to construct indexes of potential for each county. Data from a larger project, National Uranium Resource Evaluation (NURE) survey, were acquired and analyzed by GEOMET staff. The methods used to process and analyze these data are described in Section 3.4.

Approaches to ensuring high-quality measurements, assessing data quality, and integrating the various types of measurement results for analysis are described in Section 3.5. Methods of data analysis are outlined in Section 3.6; much of the analysis was directed toward identifying land areas with evidence of elevated radon potential. Indexes of radon potential were developed to aid this assessment; criteria for these indexes are discussed in Section 3.7.

3.2 LAND-BASED SURVEY

The State of Florida has been mapped by the USGS* at a scale of 1:24,000 (1 in = 2,000 ft). Each 1:24,000 map covers a quadrangle 7.5' (1/8 of 1°) in latitude and longitude, an area of about 60 mi^2. Approximately 1,000 such maps are required to cover the entire State of Florida. Each map indicates roadways, bodies of water, and land areas that are color-coded according to use. Individual residences or clusters of residences are indicated on the map with a special symbol (see Figure 3-1). Although many of these maps are based on aerial photographic surveys flown in the 1970s or earlier, they serve as an indicator of the relative housing density and specific locations where residences are likely to be found. The USGS 1:24,000 maps formed the basis for the land-based survey strategy.

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* U.S. Geological Survey, Mapping Department, 12201 Sunrise Valley Drive, Reston, VA, 22092, (703) 648-4000.

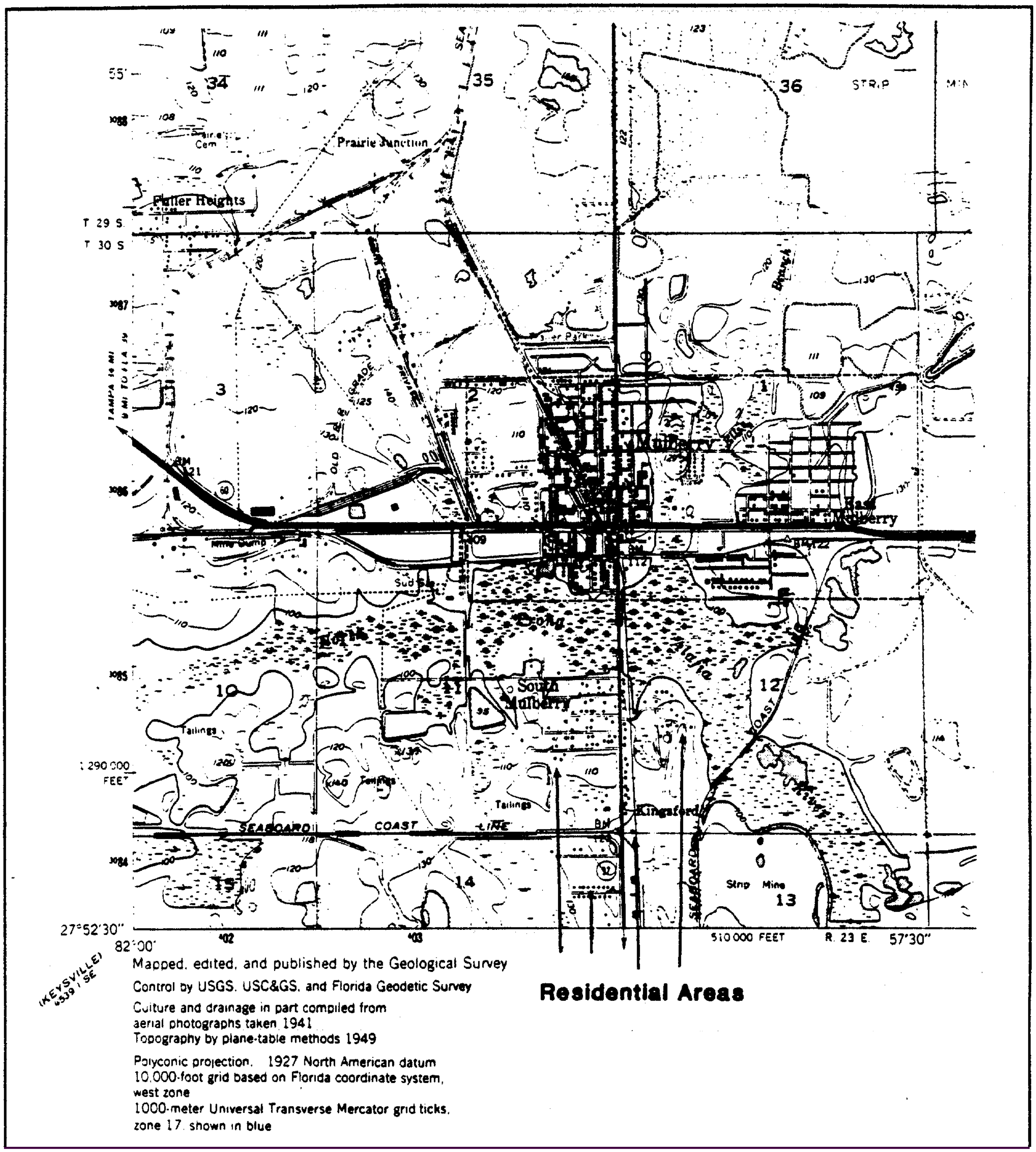

Figure 3-1. Illustrative Portion of a USGS 1:24,000 Map (Mulberry Quadrangle)

County highway maps produced by the Florida Department of Transportation provided additional guidance in locating housing areas and roads.

The general strategy for recruiting households for the land-based survey was to first review the maps to determine candidate residential areas in each quadrangle and then drive to these areas. Residences within each candidate area were recruited by a technician knocking on doors, explaining the nature and purpose of the study with the aid of an introductory letter from FIPR (see Figure 3-2), explaining the types and durations of measurements to be taken, and asking the resident if he or she wished to participate.

The types of measurements and their respective durations are listed in Table 3-2. Three-day indoor radon and 1-month soil radon measurements and instantaneous indoor/outdoor measurements of gamma radiation were taken in all residences. Three-day radon progeny measurements and l-month radon measurements were taken indoors in a subset of participating homes. All measurement devices for the land-based survey were deployed by technicians, who instructed participants when and how to retrieve the devices and return them in postage-paid mailers.

To avoid confusion, mailers for short-term measurements (radon canisters) were left with participants whereas mailers and instructions for long-term measurements (alpha track detectors) were sent by mail shortly before the time when retrieval was scheduled. Radon progeny integrating sampling units (RPISUs), deployed in a subset of participating homes, were

Florida Institute of Phosphate Research
1855 West Main Street
Bartow, Florida 33830
(813) 533-0983

David P. Borris
Executive Director

Dear Florida Homeowner:

The purpose of this letter is to introduce to you a representative of Geomet Technologies, Inc. Geomet is a consulting scientific research firm that has been given a contract by the Florida Institute of Phosphate Research to conduct a statewide study of citizens' exposure to naturally occurring radiation. Perhaps you have read about this study in your newspaper or heard about it on television.

The Institute is asking you to participate in this study by allowing Geomet to take radon measurements in your home and yard. While the number of homes selected in each county is based on population and land area, individual homes have been selected at random. Since the number of homes selected state-wide is small, it is extremely important that you return your sampler to Geomet. The value of this measurement is from $20 to $50, if you had purchased a sampling device from a commercial firm.

You will have the option of whether or not you wish to be told the results of the test in your home. All results will be held confidential by Geomet - the Institute will be provided only with statistical analyses of the data. Should you have any questions about this study, please contact the Institute at the above address or phone number.

Sincerely,

Gordon D. Nifong, Ph.D.
Research Director - Environmental Services

GDN:rc

SERVING FLORIDA THROUGH APPLIED RESEARCH

Figure 3-2. FIPR Letter of Introduction for Field Technicians

Table 3-2. Summary of Measurements Planned for the Land-Based Survey

Type of Measurement (Device)	Measurement Duration	Target Percentage of Participating Residences
Indoor radon (charcoal canister)	3 days	100
Indoor radon (alpha track detector)	1 month	10
Indoor radon progeny (RPISU)	3 days	10
Soil radon (alpha track detector)	1 month	100
Indoor and outdoor gamma radiation (scintillometer)*	5 minutes per site (one indoor site, two outdoor sites)	100

* Capable of measuring gross gamma radiation as well as energies specific to potassium (K), uranium (U), and thorium (T); three 10-second readings were taken for gross gamma and six 10-second readings for each of K, U, and T.

retrieved by field technicians. Participants signed a simple agreement form on which they indicated whether or not they wished to receive results from the indoor measurement. A copy of a pamphlet* discussing various issues related to radon was given to each study participant.

The survey was restricted to slab-on-grade structures (single-family residences in almost all cases) so that different areas of the State could be compared on an equitable basis. Because of the sensitive nature of the issue of radon measurements, the survey excluded renter-occupied residences and was restricted to owner-occupied residences. To further ensure the comparability of measurement results, only those residents who were willing to maintain "closed-house" conditions during a 3-day period of radon measurement with charcoal canisters were to be allowed to participate.

During September 1986, a preliminary survey was conducted to evaluate recruitment and measurement protocols and to assess the extent of variation that could be expected in measurement results. Three quads representing different presumed levels of radon potential were surveyed:

- Mulberry quad (Polk County)--presumed high potential
- Dunnellon quad (Marion/Citrus Counties)--presumed moderate potential
- Vero Beach quad (Indian River County)--presumed low potential.

For the preliminary survey, as many as 20 residences were to be recruited from each quad. Because each quad had some sizable areas that were either

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* U.S. Environmental Protection Agency, Office of Air and Radiation, and U.S. Department of Health and Human Services, Centers for Disease Control. 1986. A Citizen's Guide to Radon: What It Is and What To Do About It. OPA-86-004.

uninhabited or without eligible residences, the actual number of homes surveyed was 16 for Mulberry, 7 for Dunnellon, and 11 for Vero Beach. These numbers were in excess of the four to six homes per quad that were planned in the initial design of the land-based survey so that adequacy of four to six homes per quad could be assessed.

The preliminary survey was invaluable for assessing protocols, estimating the time required to recruit participants, and providing information about measurement variations. Gamma measurements while driving between residential areas, planned under the initial protocol, were dropped because the readings were heavily influenced by the characteristics of the road surface that was traveled, and thus did not represent the surrounding terrain. Protocols and associated field forms were documented in a report entitled "Florida Statewide Radiation Study: Operational Protocol for the Land-Based Survey" (GEOMET Report Number IE-1695, submitted to FIPR in October 1986).

Indoor radon levels were higher and more variable in the high- and moderate-potential quads than in the low-potential quads. Nonetheless, a decision was made not to scale the number of measurements per quad to radon potential because not all areas of the State could be confidently characterized with respect to potential at an early stage of the project. Instead, a more practical approach was adopted whereby the number of homes to be recruited from each quad was generally scaled to the availability of residences, but limited to a maximum of six homes per quadrangle.

This approach allowed data collection with a nearly uniform spatial distribution throughout the State. Based on the preliminary survey experience and a review of maps, it was anticipated that about 2,500 study residences would be recruited from the first pass through the State. Thus, some resources would remain for revisiting selected areas to provide additional information for an assessment.

Recruitment of field technicians for the survey began during September 1986 and training was conducted in Tampa in October. During this period, monitoring equipment and samplers for the survey were ordered and tested as required. Training began in the classroom and ended with field sessions, where trainees accompanied by field supervisors. went through all recruitment and measurement procedures. Technicians hired for the project then performed these procedures on their own during a formal pretest period.

Based on the pretest experience, minor revisions to protocols were made, primarily to streamline gamma radiation measurements. The most substantive revision was to allow a "closed-room" protocol, whereby the constraint of keeping exterior doors and windows closed during the 3-day sampling period was restricted to the room in which the radon canister was placed. The "closed-room" protocol was allowed as a last resort for geographic areas and weather conditions for which maintenance of "closed-house" conditions was considered impractical by occupants. This compromise to the customary sampling protocol was minimized to the extent feasible and was documented so that such cases could be separated in the analysis.

The first phase of the land-based survey started in the Tampa area and proceeded east and south, covering parts of Pasco, Polk, Osceola, and Brevard Counties and all counties to the south. This phase of the survey was completed in mid-December 1986. The field team then returned to Tampa to cover the remainder of the partially covered counties and all counties to the north. This phase of the survey, which ended in the panhandle area, was completed in February 1987. During a third phase conducted in March 1987, the field team performed additional sampling in most counties in the west central part of the State, extending as far as Gilchrist and Alachua Counties to the north and Lee and Hendry Counties to the south, As a result of this supplemental sampling effort, more than six homes were sampled in some quadrangles.

As noted in the statement of work given in Section 2.0, some public schools or other public buildings were to be included in the land-based survey. At the request of the FIPR project manager, measurements in such buildings were conducted under the population-based survey, discussed below. A radon sampler (charcoal canister) was sent to one public school in all counties except Hillsborough, Polk, and Sarasota, where samplers were sent to two schools.

3.3 POPULATION-BASED SURVEY

The population-based survey was guided by 1980 Census of Population and Housing data collected by the U.S. Census Bureau, which provides enumerations of persons and housing units for each State by county and by county subareas such as census tracts and enumeration districts (EDs).* A stratified random sampling design was used, wherein residences from each of Florida's 67 counties were sampled independently.

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* Census tracts are small, relatively permanent areas delineated by the Census Bureau, mainly in metropolitan areas. Tracts generally have between 2,500 and 8,000 residents and are designed to be homogeneous with respect to population characteristics, economic status, and living conditions. In rural areas, enumeration districts are delineated; these tend to be larger in area but smaller in population than tracts. About half of Florida's counties are tracted and the remainder contain EDs. A few counties contain both; in these cases, EDs are subsets of census tracts.

The number of residences to be sampled from each county was scaled to the number of occupied housing units (Table 3-3), with 16 housing units to be sampled from the least populated counties and 160 units to be sampled from the most populated counties. In total, 3,312 participants were sought for the population-based survey; this number represents just under 0.1 percent of the occupied housing units throughout the State of Florida (3.74 million as of 1980).

Within each county, census tracts or EDs were sampled with probabilities proportional to size (PPS), with the measure of size being the number of owner-occupied, single-unit attached or detached structures. Within each tract/ED that was sampled, two participants were sought. This strategy, when combined with the above PPS approach, yields an ultimate sample of households in each county with equal selection probabilities. Selection probabilities do, however, vary slightly from county to county.

To provide information on time-related variations in radon concentrations, the population-based survey was split into four cycles to be carried out at intervals of about 6 weeks. One-fifth of the tracts/EDs selected for the survey were included in all four cycles and the remainder in only one cycle each. This approach can be illustrated for a county with five census tracts (designated A through E) as follows:

Survey Cycle

1	2	3	4
A	A	A	A
B	C	D	E

Table 3-3. Scaling of Participants Sought per County to Number of Occupied Housing Units

Range of Occupied Housing Units in County	Number of Counties	Participants Sought per County
170,000 - 610,000	7	160
101,000 - 115,000	3	128
81,000 - 89,000	4	96
54,000 - 64,000	4	64
32,000 - 46,000	6	48
17,000 - 27,000	12	32
1,000 - 13,000	31	16
Totals	67	3,312

Within each cell of this matrix, two participants were sought. Thus, participants from tract A would have selection probabilities four times higher than tracts B through E. Tract A would be used to quantify time-related radon variations within a subarea of the county.

The sampling design described above requires five (A through E) tracts/EDs for every 16 participants that are sought. As shown in Table 3-3, the number of participants sought per county was scaled in multiples of 16 to accommodate this design. The design was carried out by obtaining a census data file on computer tape from the Census-Bureau-designated data processing center for the State. Counts of owner-occupied, single unit attached or detached structures were extracted from the data files for each tract or ED in each county.

After tracts and EDs were randomly sampled, a request was sent to Donnelly Marketing (Oakbrook Terrace, Illinois), which maintains a computerized data base of residential listings (name, address, and telephone number where available) that is compiled mainly from telephone directories. The data base is organized to permit random sampling of households by county or by county subareas such as tracts, EDs, or zip codes. A list of tracts/EDs to be sampled for each cycle of the survey was sent to Donnelly Marketing, which drew a random sample of single-family residences in each designated tract/ED and supplied mailing labels and a computer tape listing the sample. To accommodate factors such as nonresponse or ineligibility for the survey, Donnelly Marketing was instructed to draw a sample 10 times as large as that actually needed for the sampling design.

Households selected for the survey were sent a brief screening survey with a letter from GEOMET soliciting their participation, a letter of support from FIPR, and a 1-page summary description about radon. The screening questionnaire contained three questions about the type of structure, structure foundation, and ownership. bike the land-based survey, only owner-occupied, single-family structures with slab-on-grade foundations were eligible. The questionnaire also indicated that some of the responding households would be selected for a 3-day radon measurement at no cost to them. Respondents were asked to indicate their interest in participating in this measurement and to provide limited contact information (name, telephone number, and convenient times to be called) if they were interested.

From respondents to the screening questionnaire who met eligibility requirements and were willing to participate, homes were randomly selected for radon measurements within each tract or ED. In cases where tracts or EDs exactly met or fell short of the quota, all eligible and willing respondents were selected. Participants were sent a letter notifying them of their selection (Figure 3-3), along with a charcoal canister, a booklet of instructions and records for radon sampling, and a postage-paid return mailer. The booklet (1) described the "closed-house" sampling requirements; (2) provided instructions for choosing a sampling location, starting and stopping the sample, and returning the sampler to the laboratory; and (3) requested documentation of the sampler location, start and stop times, sampling conditions, and selected characteristics of the residence.

A pretest of the population-based survey was initiated-in October 1986 by mailing screening questionnaires to randomly selected households in

GEOMET TECHNOLOGIES, INC. 301 428-9898
20251 Century Boulevard, Germantown, Maryland 20874

Dear Sir or Madam:

Thank you for completing the questionnaire we sent for the Florida Statewide Radiation Study. You indicated on the questionnaire that you would be willing to help us with radon measurements.

Enclosed is a radon measurement kit that contains three items:

1. A radon sampler
2. A booklet of instructions and records for radon sampling
3. A postage-paid mailer for returning the sampler and booklet.

The radon sampler should be opened for a period of 72 hours (3 days) in your home. Please read over the instructions in the booklet first, and then start the sample as soon as possible. Call us if you have any problems.

Please be sure to return both the sampler and the booklet after you have finished the sample. We will send you the results of the radon measurement if you wish. We will also send you a pamphlet entitled "A Citizen's Guide to Radon: What It Is and What To Do About It."

If you participate in this measurement, there will be no cost to you for either the result or the pamphlet. Thank you for your assistance.

Sincerely,

Diane Kunkle,

Indoor Environment Division

MDK:sly

Enclosure

Figure 3-3. Letter to Participants Selected for Radon Measurements for the Population-Based Survey

Dade, Marion, and Washington Counties. Charcoal canisters were sent to eligible and willing respondents during November. The pretest confirmed the need to send screening questionnaires to 10 times as many households as required to compensate for nonresponse, ineligibility, or unwillingness to participate. It was discovered through the pretest that Donnelly Marketing's data base was less complete for rural areas such as Washington County. For such counties, additional EDs needed to be sent to Donnelly for the formal survey in case the primary selections were not covered by their data base.

Lastly, the pretest revealed that only about two-thirds of the respondents who indicated a willingness to participate actually completed the radon measurement. To compensate for this rate of nonparticipation and the fact that eligible and willing participants could not be found in all tracts or EDs, the quota of residences selected for measurements from each tract/ED was increased from two to four. In addition, for selected rural counties in which few slab-on-grade homes could be located, some samplers were sent to homes with crawlspaces. Such homes were "flagged" in the data base so that they could be included in, or excluded from, later analysis.

The first cycle of the formal survey began in December 1986. The screening questionnaires for the final cycle of the survey were mailed by early May 1987, and the last batch of samplers was mailed to prospective participants during the last week in May.

3.4 EXISTING INFORMATION FROM OTHER STUDIES

The collection of existing information focused on what is believed to be the major source of indoor radon in Florida, namely, the entry of radon directly from the soil underlying the structure. Six categories of existing data were identified:

- Indoor radon and radon progeny
- Soil gas radon and radon flux
- Soil radium-226 (surface soil and/or depth profile)
- Gamma-ray well logs
- Gamma radiation surveys
  - Local surveys
  - National Uranium Resource Evaluation (NURE) Program
- Geological data.

Analyses of the radiation data from the NURE program were conducted by GEOMET staff. The other types of existing information were analyzed by researchers at the University of Florida under a subcontract with GEOMET; the description of methods pertinent to those data are extracted from the University of Florida report entitled "Radon Potential in Florida," which is reproduced in its entirety in Appendix A.

Of the six categories of existing data identified above, indoor radon and radon progeny are the primary parameters of interest in assessing indoor exposure routes; however, the coverage of existing data was not sufficiently comprehensive for performing a statewide assessment of the likelihood of elevated indoor radon. The other categories of data are various steps removed from the primary parameters of interest, but provide further depth and/or geographic extent of coverage.

The availability and implications of each type of data were assessed on a county-by-county basis. Parameter-specific ratings were assigned when data related to such parameters were available; from these ratings a five-point composite scale of radon potential (low, medium-low, medium, medium-high, and high) was constructed. The data review and assessment began in October 1986 and was completed in January 1987.

The pool of existing indoor radon data from other studies included 460 points in 39 counties and consists mainly of data collected by the University of Pittsburgh, the University of Florida, and the Terradex Corporation. The score assigned to each county was based on the fraction of measured homes above 4 picocuries per liter (pCi/L) and the fraction projected to be above 4 pCi/L on the basis of the geometric mean and standard deviation, assuming a lognormal distribution.

Soil gas radon or radon flux measurements existed only in eight counties, several of which had only a single data point. The soil radium data for the State included 765 entries for 284 sites in 37 counties. Disturbed sites were excluded from the preliminary analysis. Mined areas in Hamilton and Polk Counties were treated separately. The effective radium concentration* (ERC), expressed in pCi/g, was used as the basis for assessment of potential. ERCs were also inferred from gamma-ray well logs for 14 counties with no soil radium data and for 8 counties with surface but no depth data available.

Data from gamma radiation surveys were available for eight counties. Assessment of potential was based on readings in microroentgens per hour (μR/h) for unmined and disturbed (active mine, mined, or reclaimed) lands. Geologic information was used to judge potential for each county on the basis of equivalent uranium-bearing surface (equivalent surface), for which the scale ranged from 0 to 100.

The single source of radiation data that was uniformly available throughout the State resulted from the NURE program, under which aerial gamma radiation surveys were conducted across Florida in early 1981. The NURE data are based on gamma spectroscopy, allowing the separation of contributions from potassium-40, thorium-232, and uranium-238 decay series to the gross gamma count rate (0.4 to 3.0 MeV).

The NURE data provide statewide coverage through east-west transects at a spacing of 6 mi. Perpendicular north-south tie lines were also flown

* The effective radium concentration is the uniform radium-226 concentration projected to deliver the same radon to the surface as the actual profile,

$$ERC = \Sigma w_i C_i$$

where

C_i = average concentration in the ith layer; and
w_i = weighting factor for the ith layer, based on the projected relative contribution of that layer to surface radon in Florida soils.

at approximately 20-mi intervals. The NURE data have been summarized on nine-track tapes in separate files for each 1:250,000 quadrangle.* The State of Florida is covered at this scale by 15 maps produced by USGS (Figure 3-4). One of these maps, Dothan, consists mainly of land area in Alabama and covers only a very small portion of the land area in Florida.

To evaluate the utility of the NURE data for the statewide radiometric assessment, magnetic data tapes for three 1:250,000 quadrangles (Gainesville, Daytona Beach, and Fort Pierce) were ordered from USGS EROS Data Center in Sioux Falls, South Dakota, during December 1986. Because readings from the aerial survey were taken at 1-second intervals, the data files are quite large, containing as many as 50,000 records. Such extensive data sets were reduced by producing statistical summaries of radiometric data and geologic formations by 1:24,000 quadrangle within each 1:250,000 quadrangle.

Statistical summaries were produced for uranium expressed as apparent terrestrial concentration in ppm equivalent U. The spatial trends in relative counts/concentrations and the association of higher readings with the occurrence of specific types of map geologic units (e.g., Tertiary Hawthorn Formation) appeared to be very informative. Consequently, tape files for all remaining 1:250,000 quadrangles except Dothan were ordered and statistical summaries were produced and analyzed.

3.5 DATA QUALITY AND INTEGRATION

3.5.1 Quality Control and Quality Assurance

The quality of an environmental measurement is dependent on the performance characteristics of the sample collection device, the appropriateness of sampling conditions, the integrity of the sample between collection

* A 1:250,000 quadrangle, covering 1° latitude and 2° longitude, is equivalent to 128 1:24,000 quadrangles, or an area of 8,000 to 8,500 mi^2 for the State of Florida.

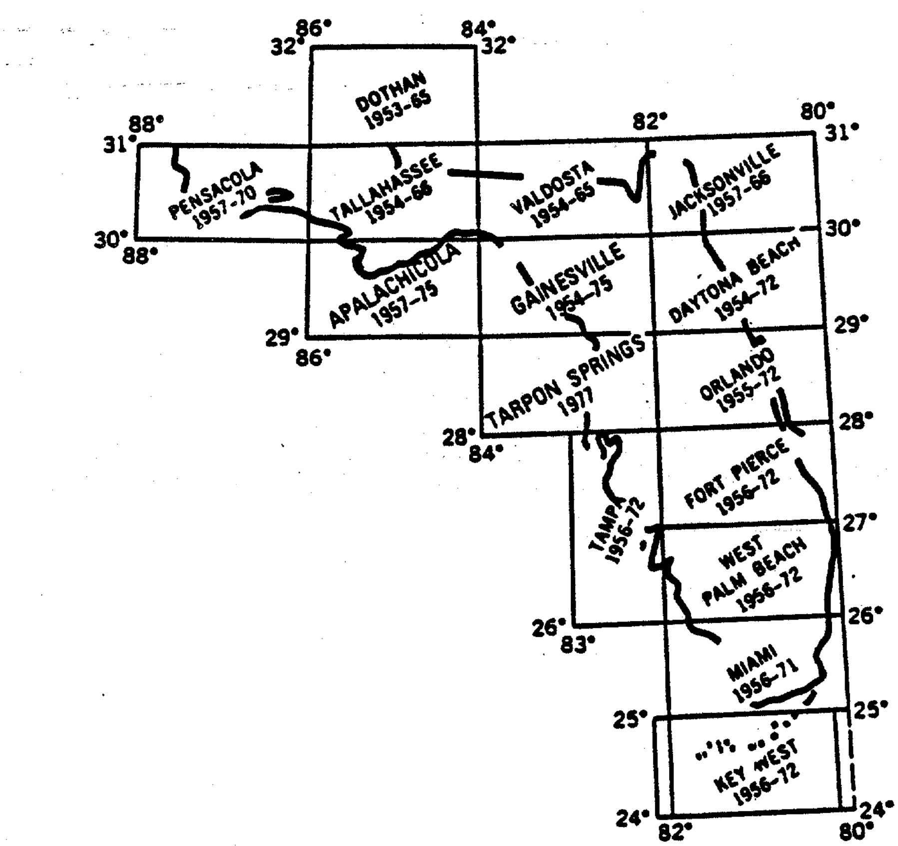

Figure 3-4. Maps Published by USGS for the State of Florida at the Scale of 1:250,000

in the field and analysis in the laboratory, and performance characteristics of analytical equipment and operators in the laboratory. Levels of accuracy and precision during the period when the statewide survey was conducted were assessed for both charcoal canisters (GEOMET Laboratory) and alpha track detectors (Terradex Laboratory) through participation in EPA's Radon Measurement Proficiency Testing Program (RMP). The precision of the sampling and analytical process was further documented by deploying samplers in duplicate for approximately 10 percent of the monitored residences.

For charcoal canisters, GEOMET established a laboratory at the facilities of Science Applications International Corporation (SAIC) in Clearwater, Florida. Technology transfer from GEOMET to this satellite laboratory was accomplished in October 1986. The performance of this laboratory's equipment and its analysts was assessed through daily calibration of gamma-counters, submission of open and blind quality control samples by GEOMET, and participation in the RMP. Laboratory procedures were documented in a report entitled "Florida Statewide Radiation Study: Operational Protocol for the Charcoal Canister Analytical Laboratory" (GEOMET Report Number IE-1703, October 1986). Based on a lower detection limit of 0.4 pCi/L, all calculated concentrations below this level were assigned a value of 0.2 pCi/L.

For the land-based survey, the appropriateness of sample siting was ensured through technician training, and sample sites were documented on field forms. The protocol for sampling conditions was explained to the occupants and maintenance of such conditions during sampling was documented by participants on forms that they returned with exposed samplers. For the population-based survey, both sampler deployment and maintenance of appropriate sampling conditions were carried out by the participant. An instruction and record booklet, returned with the exposed sampler, was used to document deployment, retrieval, and sampling conditions.

Scintillometers used to measure gamma radiation for the land-based survey were calibrated through participation in exercises held in the Bartow area during September 1986 and February 1987. These exercises were coordinated by Florida's Department of Health and Rehabilitation Services. Field technicians using the scintillometers recorded instrument settings, counts referenced to a calibration setting, and background counts at every monitored residence so that measured count rates for gross gamma (above 0.4 MeV) could be properly converted to microroentgen-per-hour (μR/h) readings.

Due to production delays, the RPISUs chosen to measure radon progeny working levels for the land-based survey were not received by GEOMET until December 1986. Following tests in the Department of Energy's radon chamber and GEOMET's research houses to calibrate these instruments and verify adequate performance, they were released to the field in January 1987; thus, they were used only during part of the land-based survey.

For radon measurements with charcoal canisters, a series of data quality flags was developed to document the following types of compromises to the protocol for sampling, retrieval, and return to the laboratory:

- Dates/times of opening or closing the sampler were not documented. (Corrective action: retrieval of this information by mail or telephone.)
- Closed-room, rather than closed-house, conditions were maintained during sampling.
- The exposure period for the sampler was less than 48 hours or greater than 96 hours.
- The sampler was not sealed properly or was dented.

- The delay period between closing the sampler and its arrival for analysis at the laboratory was greater than 7 days.
- The sampler was returned without documentation forms. (Corrective action: participant contacted by mail or telephone to obtain missing information.)
- An invalid sample was received at the laboratory (e.g., no lid on canister).

With these types of flags, it was possible to successively restrict the study data base to measurements considered to represent higher quality. In addition, as noted in Section 3.3, any home with a crawlspace selected for the population-based survey was given a special flag to indicate this compromise to eligibility criteria.

The quality assurance aspects of existing data from previous studies could not be explicitly addressed because these measurments were conducted outside of this study. The primary concern lies in the degree of representativeness with regard to the needs of this study. In most cases, differences in objectives resulted in data sets that were obviously sparse with regard to a county-based assessment. In other cases, a sufficiently large number of data points was available, but the degree of representativeness could be questioned because data collection was not necessarily based on random sampling.

Past experience indicates that problems with calibration inconsistencies are likely to be small.* The primary contributors of the indoor radon

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* Nero et al. 1986. "Distribution of Airborne Radon-222 Concentrations in U.S. Homes. Science, Vol, 234, pp. 992-97.

data, for example, have participated in EPA's RMP, and much of the data were extracted from peer-reviewed publications.

3.5.2 Data Integration

Two types of data integration were required:

- Uniting the various types of measurement results for each residence in the land-based and population-based surveys according to a common format
- Uniting the results from three information sources--land-based survey, population-based survey, and existing information--to assess their consistency and implications.

Integration of data from the field surveys was complicated because samplers were not always received in the same order as they were deployed, due to delays attributable to occupants or to the U.S. postal service. Forms completed by technicians when they visited each residence were used as a basis for constructing a master file containing identifiers for each home and each type, of sample as well as county, quadrangle, and zip codes. These forms were collected by the field supervisor and sent to the home office on a weekly basis. All field measurement results were eventually merged with the master file. A similar master file was prepared for residences selected for the population-based survey.

The flow of different types of sample media and associated forms from the field to laboratories and the office, enabling ultimate entry and merging of measurement results, is shown for the land-based survey in Figure 3-5. Data were entered with IBM personal computers and compatibles using Lotus 1-2-3 software and were merged using dBASE III software. Data integration for the population-based survey was simpler because only charcoal

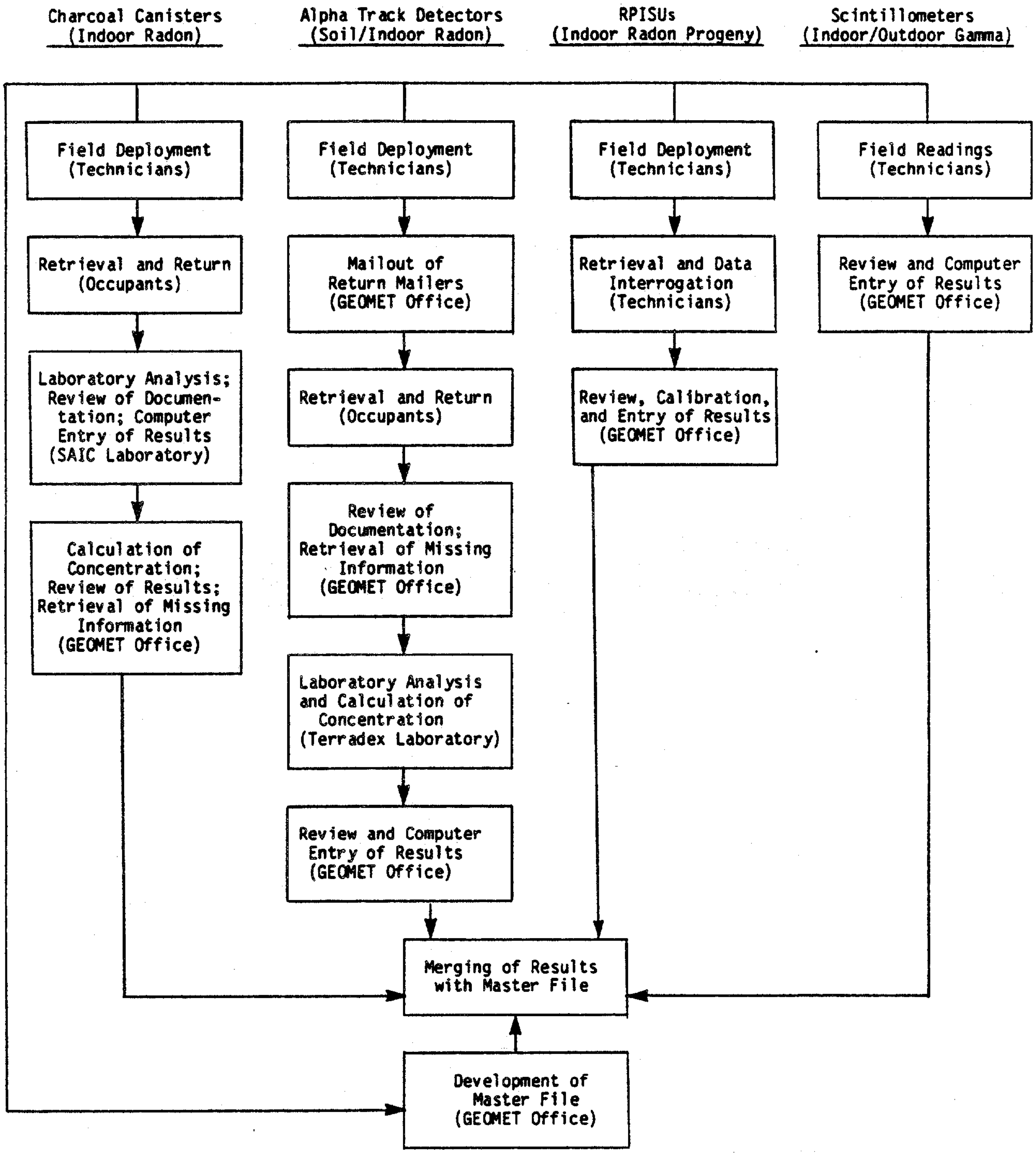

Figure 3-5. Flow of Sample Media and Documentation for the Land-Based Survey

canisters were used, but the ultimate data files were formatted in a manner compatible with those from the land-based survey.

Integration of data from the land-based and population-based surveys was partly accomplished through use of similar data file formats. Further integration among these data sets, the index of radon potential for existing data, and the outputs from the NURE data base was achieved through computation of summary statistics or indexes at compatible units of geography--county, 1:24,000 quadrangle, and zip code. As a visual aid to the display and analysis of results, a series of base maps and overlays were prepared by Martel Laboratories (St. Petersburg, Florida), a subcontractor for cartographic services. Three basic mapping tools were prepared and used:

- A single map for the State of Florida showing county boundaries, produced at a 1:4,000,000 scale
- A series of 14 maps (one per 1:250,000 quadrangle) showing boundaries of counties and 1:24,000 quadrangles, produced at a 1:1,000,000 scale
- A series of 14 maps showing boundaries of counties, 1:24,000 quadrangles and zip codes, produced at a 1:250,000 scale.

Analytical strategies associated with these geographic units are described below.

3.6 DATA ANALYSIS

Data analysis efforts focused on addressing the fundamental study objective--identification of geographic areas where the State environmental radiation rule should be applied. Analyses began at the county level to determine whether certain counties could be declared as problem-free and, hence, not subject to the rule. For the remaining counties, further analyses were conducted at more refined geographic levels--quadrangle and zip code--to discover whether elevated radiation levels apparent from county-level statistics were widely distributed or confined to specific localities. This analysis resulted in the identification of counties, or parts of counties defined by quadrangles, to which the rule should apply.

The various data sets assembled under this study were used in a complementary fashion at each level of geographic analysis. As shown in Table 3-4, at least two data sets could be used for each level of analysis. Four data sets--results from the land-based survey, results from the population-based survey, results from the NURE survey, and the index of radon potential developed from other existing information--were used at the county level and two data sets each at the quadrangle and zip code levels. Thus, no level of analysis relied exclusively on one data set, and the degree to which different data sets reinforced or contradicted one another was considered in the analysis.

Table 3-4. Data Sets Used at Three Different Levels of Geographic Analysis

	Data Set			
Geographic Level	Land-Based Survey	Population-Based Survey	NURE Data	Other Existing Information
County	X	X	X	X
Quadrangle	X		X	
Zip Code	X	X		

Analyses at the county level focused on the following parameters:

- Indoor radon measured in the land-based and population-based surveys
- Soil radon and indoor/outdoor gamma radiation measured in the land-based survey
- Terrestrial uranium measured in the NURE program
- Other existing information.

Counties were screened for elevated radiation levels based on: (1) the highest reading from any house in the county for each parameter measured in the land- and population-based surveys and (2) the highest quadrangle average in the county for terrestrial uranium. To essentially place these different parameters on an equal footing, an index of radon potential ranging from 1 to 5 was assigned to each. A similar index was developed on the basis of other existing information. The criteria chosen for each index are discussed in Section 3.7. Through analysis of these indexes, counties were grouped into three categories--those with definite evidence of elevated radon potential, those with limited evidence, and those with no evidence.

For counties with definite evidence of elevated radon potential, further analysis was conducted with 1:24,000 quadrangles as the geographic unit for assessing the spatial extent of elevated radiation levels. Considerations in determining elevated levels were the maximum level measured within the quadrangle and the proportion of homes with measurements above the value used to define the midpoint of the county index for each parameter (see Section 3.7). For the terrestrial uranium readings from the NURE program, quadrangle averages were examined.

For both counties and quadrangles, the proportion of homes with measurement results at or above the value associated with the midpoint of each index was tested for statistical significance using the following formula:

$$Z = \frac{p}{\sqrt{pq/(n - 1)}}$$

where p is the proportion of homes at or above the value, q is equal to one minus p, and n is the number of homes with measurement results. Using normal approximation theory, for values of Z greater than 1.65 it was concluded that the proportion is significantly greater than zero; this test is equivalent to constructing a 90 percent confidence interval for p and determining whether the interval is away from zero. For small sample sizes (i.e., $n \leq 10$), exact confidence intervals calculated by Clopper and Pearson* were used.

Various types of supplementary analyses were also conducted to address issues peripheral to the identification of land areas subject to the rule. More specifically, the analyses addressed:

1. Results of sampling in schools
2. Accuracy and precision of indoor and soil radon samplers
3. Distribution of equilibrium factors
4. Correlations among different types of radiation measurements

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* Clopper, C.J. , and E.S. Pearson. 1934. "The Use of Confidence or Fiducial Limits Illustrated in the Case of the Binomial," Biometrika. 26:404-413.

5. Time-related variations for indoor radon concentrations

6. Impacts of special sampling conditions such as homes with crawlspaces and homes in which windows were opened or a "closed-room" protocol was used during sampling.

3.7 CRITERIA FOR INDEXES OF RADON POTENTIAL

The radiation standards in Rule 10D-91.1104 of the Florida Administrative Code are quite explicit--the mean gamma exposure rate in a dwelling, school, or commercial building is not to exceed 20 μR/h, including background, and the annual average radon decay product concentration is not to exceed 0.02 working level (WL), including background. For each measurement parameter, a conservative approach (i.e., one that would tend to provide greater protection of public health) was used in selecting values for indexes.

3.7.1 Criteria Related to Gamma Radiation

Application of the study measurement results to the μR/h standard is quite straightforward. For the land-based survey, scintillometers were used to measure gamma radiation (in counts per second) both inside and outside study residences. Through calibration exercises, the gamma readings were converted to units of μR/h. Because previous external gamma radiation surveys conducted by the State* used a value of 10 μR/h in displaying results, the midpoint for the index of radon potential was chosen as 15 μR/h, a value 25 percent below the standard.

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* Florida Department of Health and Rehabilitation Services. 1978. Study of Radon Daughter Concentrations in Polk and Hillsborough Counties.

Using a midpoint of 15 μR/h and increments of 5 μR/h, the following index was developed for indoor gamma measurements in assessing radon potential at the county level:

- 1--All measurements in the county below 10 μR/h
- 2--Highest measurement in the county between 10 and 14.9 μR/h
- 3--Highest measurement in the county between 15 and 19.9 μR/h
- 4--Highest measurement in the county between 20 and 24.9 μR/h
- 5--Highest measurement in the county at or above 25 μR/h.

Thus, the lowest value of the index relates to a level that is half the standard, whereas the highest value corresponds to a level 25 percent above the standard.

3.7.2 Criteria Related to Indoor Radon Decay Products

Application of the study measurement results to the annual WL standard is more difficult. It was not feasible from standpoints of logistics, costs, or timeliness of results needed for this project to perform annual measurements. Similarly, it was more cost-effective to measure radon concentrations than radon decay product WL. Thus, in developing the index of radon potential, it is necessary to consider both the equilibrium factor, which quantifies the relationship between radon decay product WL and radon concentrations indoors, and the length of the sampling period.

The equilibrium factor (E) is defined as follows:

$$E = \left(\frac{\text{Radon Decay Products}}{\text{Radon}} \right) * 100$$

where concentrations of radon decay products are measured in WL and radon concentrations are measured in picocuries per liter (pCi/L). The factors affecting the equilibrium between radon and decay products are not completely understood, but the equilibrium factor is rarely outside the interval 0.3 to 0.7, averaging approximately 0.5.* At equilibrium factors of 0.25 and 0.75, the level of 0.02 WL equates to annual average radon concentrations of 8 pCi/L and 2.7 pCi/L, respectively. At the value (0.5) usually cited by EPA as an average or typical equilibrium factor for homes in the United States, the standard equates to an average annual concentration of 4 pCi/L. For Florida homes, the average value of the equilibrium factor is believed to be close to 0.4.

To compare an annual standard to measurements of shorter duration, such as 1 mo or 3 d, assumptions must be considered regarding the mean, standard deviation, and shape of the distribution. For most environmental parameters, either a normal curve or a lognormal curve can adequately approximate the shape of the annual distribution of short-term measurements taken at a single location. In a recent study** performed during the heating season, we observed that the coefficient of variation (i.e., ratio of the

* George, A.C. 1985. "Measurements of Sources and Air Concentrations of Radon and Radon Daughters in Residential Buildings. ASHRAE Transactions 91(2), Paper Number HI-85-39, No. 1.

** "Characterization of Indoor Air Quality in Energy-Efficient Housing," Wisconsin Electric Power Company Contract Number CS-125.

standard deviation to the mean) for radon samples from the same residence averaged 0.1 for 1-mo samples and 0.2 for 3-d samples. Considering possible variations across seasons, the coefficient of variation might be twice as large, or 0.2 for 1-mo samples and 0.4 for 3-d samples.

Using an annual average of 4 pCi/L as an example, then, the expected standard deviations for a single house would be 0.8 pCi/L for a 1-mo sample and 1.6 pCi/L for a 3-d sample. Given these parameters and the assumption of a normal distribution, one can ask the question: "What value for a single sample from that house can be taken as conclusive evidence that the annual average is at or above 4 pCi/L?" On a statistical basis, the appropriate value is 1.65 standard deviations above the mean (such a value would occur, at most, 5 percent of the time if the true annual mean is below 4 pCi/L). Thus, the appropriate value for a 1-mo sample is 4+(0.8x1.65), or 5.3 pCi/L, and the appropriate value for a 3-d sample is 4+(1.6x1.65), or 6.6 pCi/L. If a lognormal distribution is assumed, the values do not change substantially--5.4 pCi/L for a 1-mo sample and 7.0 pCi/L for a 3-d sample.

Given the above considerations, radon concentrations ‘corresponding to the 0.02 WL annual average for decay products are shown in Table 3-5 for different equilibrium factors and sampling durations. Based on the information given in this table, 4 pCi/L was chosen as the central value for the index of radon potential. For a home with an annual average decay product concentration of 0.02 WL and an equilibrium factor of 0.5, such a measurement result would occur approximately half the time. Thus, any measurement result for a county at or above 4 pCi/L provides some evidence that there might be one or more homes in the county with an annual average concentration of 4.0 pCi/L or higher. The occurrence of higher values, such as 8 pCi/L or 12 pCi/L, provide stronger evidence that such a situation exists. A concentration of 2.0 pCi/L would provide some evidence only in the relatively unlikely event that there are homes with an equilibrium factor of one.

Table 3-5. Indoor Radon Concentrations (in pCi/L) Corresponding to an Annual Average Decay Product Concentration of 0.02 WL Under Closed-House Conditions, by Equilibrium Factor and Sampling Duration

Equilibrium Factor	Sampling Duration		
	1 Year	1 Month	3 Days
0.25	8.0	10.8	13.6
0.50	4.0	5.4	6.8
0.75	2.7	4.0	5.3
1.00	2.0	2.7	3.4

The values in Table 3-5 are appropriate under the assumption that closed-house conditions are maintained throughout the year. Opening windows would dilute the indoor radon concentration and, thus, even higher measurement results under closed-house conditions would equate to the annual standard. However, our index of radon potential draws from the values given in the table to protect against the worst-case condition (i.e., no windows opened throughout the year), which could occur in some schools or commercial buildings in Florida or even in selected residences (e.g., homes of individuals with allergies).

Based on the above discussion, the following index was developed for indoor radon measurements in assessing radon potential at the county level:

- 1--All measurements in the county below 2.0 pCi/L
- 2--Highest measurement in the county between 2.0 and 3.9 pCi/L
- 3--Highest measurement in the county between 4.0 and 7.9 pCi/L
- 4--Highest measurement in the county between 8.0 and 11.9 pCi/L
- 5--Highest measurement in the county at or above 12 pCi/L.

3.7.3 Criteria Related to Soil Radon and Near-Surface Uranium

Radon concentrations in the-soil near the residence were collected as part of the land-based survey and data files were obtained with results from aerial radiation surveys flown throughout the State in 1981 as part of the NURE program. The two principal parameters used for analysis--soil radon concentrations from the land-based survey and apparent terrestrial uranium concentrations from the NURE survey--do not relate directly to the environmental radiation standards for Florida, but should correlate to some extent with indoor radon concentrations or gamma radiation levels.

As part of schemes to decrease radon decay products indoors, the Swedish Board of Physical Planning has proposed a classification of risk* to houses from radon from the ground. Normal radon ground is defined by soil

* Swedjemark, G.A. 1986. "Swedish Limitation Schemes to Decrease Rn Daughters in Indoor Air," Health Physics 51(5).

gas concentrations ranging from 270 to 1350 pCi/L or by terrestrial uranium concentrations ranging from 2.4 to 8.0 ppm-equivalent (ppme). Low radon ground and high radon ground are defined by the extremes of these ranges. Based on the Swedish criteria, the following index was developed for radon soil measurements in assessing radon potential at the county level:

- 1--All measurements in the county below 270 pCi/L
- 2--Highest measurement in the county between 270 and 629.9 pCi/L
- 3--Highest measurement in the county between 630 and 989.9 pCi/L
- 4--Highest measurement in the county between 990 and 1349.9 pCi/L
- 5--Highest measurement at or above 1350 pCi/L.

The intermediate points (630 and 990 dCi/L) were arbitrarily chosen to provide constant increments between the low and high ends of the range. On a similar basis, the following index was developed for terrestrial uranium concentrations in assessing radon potential:

- 1--All measurements in the county below 2.4 ppme
- 2--Highest measurement in the county between 2.4 and 4.2 ppme
- 3--Highest measurement in the county between 4.3 and 6.1 ppme
- 4--Highest measurement in the county between 6.2 and 7.9 ppme
- 5--Highest measurement in the county at or above 8.0 ppme.

The intermediate points (4.3 and 6.2 ppm) provide constant increments between the low and high ends of the range.

3.7.4 Summary

The criteria chosen for indexes of radon potential related to gamma radiation, indoor radon, soil radon, and terrestrial uranium are listed in Table 3-6. These criteria may be refined in light of subsequent data analysis. For example, the analysis could indicate that a radon soil concentration exceeding 1000 pCi/L is a necessary condition for observing indoor radon concentrations in excess of 4 pCi/L. If so, then 4 pCi/L for indoor radon and 1000 pCi/L for soil radon should correspond to the same index value. (Currently, 4 pCi/L corresponds to an index value of 3 for indoor radon whereas 1000 pCi/L corresponds to an index value of 4 for soil radon.)

Table 3-6. Summary of Criteria for Indexes of Radon Potential at the County Level

Measurement Parameter (units)	Data Source*	Index Value** 1	2	3	4	5
Indoor/Outdoor Gamma Radiation (µR/h)	L	<10	10-14.9	15-19.9	20-24.9	≥25
Indoor Radon (pCi/L)	L,P	<2	2-3.9	4-7.9	8-11.9	≥12
Soil Radon (pCi/L)	L	<270	270-629.9	630-989.9	990-1349.9	≥1350
Terrestrial Uranium (ppme)	N	<2.4	2.4-4.2	4.3-6.1	6.2-7.9	≥8

* L = Land-based survey
P = Population-based survey
N = NURE aerial survey.

** 1 = Lowest radon potential and 5 = highest radon potential based on the highest measurement result for the county.

Section 4.0

GENERAL RESULTS

Section 4.0

GENERAL RESULTS

In this section, the coverage of the land- and population-based surveys is described, and the results from these two surveys and from existing information are summarized by county. The results by county are further synthesized to form indexes of radon potential using the criteria discussed in Section 3.7. Based on these indexes, counties are identified for which a more detailed assessment of results is indicated. The section concludes with a presentation of supplemental information relating to important study aspects such as measurement quality, results for schools, radon equilibrium factors, and time-related variations in measurement results.

4.1 SURVEY COVERAGE

A total of 7,244 residences were selected for the study. Field technicians visited 3,319 homes for the land-based survey, and indoor radon samplers (charcoal canisters) were mailed to 3,925 homes for the population-based survey. The temporal and spatial coverages of these two surveys are described in the subsections that follow.

4.1.1 Land-Based Survey Coverage

The land-based survey was initiated toward the end of October 1986 and completed by the end of March 1987. The coverage of this survey is summarized in Table 4-l by 1:250,000 quadrangle (see Figure 3-4, page 3-23). These 14 quadrangles collectively contain 1,032 1:24,000 quadrangles; at least one home was sampled in 629 (61 percent) of these

Table 4-1. Coverage of the Land-Based Survey, by 1:250,000 Quadrangle

1:250,000 Quadrangle	Number of 1:24,000 Quads in Quadrangle	Number of Quads in Which Samplers Were Deployed	Additional Quads in Which Outdoor Gamma Readings Were Taken	Total Number of Quads With Measurements	Number of Homes in Which Samplers Were Deployed
Pensacola	71	51 (72%)	15 (21%)	66 (93%)	195
Tallahassee	112	69 (62%)	41 (37%)	110 (98%)	210
Valdosta	89	42 (47%)	41 (46%)	83 (93%)	140
Jacksonville	35	30 (86%)	4 (11%)	34 (97%)	132
Apalachicola	28	11 (39%)	13 (46%)	24 (86%)	39
Gainesville	91	61 (67%)	25 (27%)	86 (95%)	397
Daytona Beach	60	49 (82%)	11 (18%)	60 (100%)	231
Tarpon Springs	50	46 (92%)	3 (6%)	49 (98%)	416
Orlando	92	73 (79%)	15 (16%)	88 (96%)	428
Tampa	61	49 (80%)	11 (18%)	60 (98%)	382
Fort Pierce	114	68 (60%)	27 (24%)	95 (83%)	339
West Palm Beach	125	52 (42%)	46 (37%)	98 (78%)	291
Miami	78	18 (23%)	16 (21%)	34 (44%)	87
Key West	26	10 (38%)	4 (15%)	14 (54%)	32
Total, all Quadrangles	1,032	629 (61%)	272 (26%)	901 (87%)	3,319

quadrangles. Coverage ranged from a high of 92 percent in the Tarpon Springs 1:250,000 quadrangle to a low of 23 percent in the Miami 1:250,000 quadrangle. The lower coverage in selected quadrangles was due to a lack of housing in areas with swamps or lakes or to a paucity of slab-on-grade housing that occurred in some rural areas. The coverage in the Miami quadrangle, for example, was severely constrained because much of the area was in the Everglades. On the average, 5.3 homes were sampled per 1:24,000 quadrangle.

In an additional 272 quadrangles (26 percent) for which homes could not be located but for which there was some access by roads, technicians took gamma readings at one or more outdoor sites. Thus, in total, there were 901 quadrangles (87 percent of all possible quadrangles) in which either homes were sampled or outdoor gamma readings were taken.

The coverage of the land-based survey (homes per 100 square miles) is summarized by county in Table 4-2. For the State as a whole, 6.1 homes were sampled per 100 mi^2. The density of survey coverage was less than 3 homes per 100 mi^2 for 12 counties--Calhoun, Collier, Columbia, Glades, Hendry, Jefferson, Lafayette, Liberty, Madison, Okeechobee, Taylor, and Union. Poorer coverage in these counties occurred for two reasons: (1) significant uninhabited land areas associated with the presence of swamps, lakes, or National/State parks and (2) lack of homes with slab-on-grade foundations.

4.1.2 Population-Based Survey Coverage

The number of households selected for the population-based survey is summarized by survey cycle in Table 4-3. A total of 3,925 radon samplers were mailed to prospective participants identified through a screening

Table 4-2. Land Area and Number of Homes Sampled for the Land-Based Survey, by County

County	Land Area,* Square Mile	Number of Homes Sampled	Homes Sampled per 100 Square Mile
Alachua	916	121	13.2
Baker	585	31	5.3
Bay	747	46	6.2
Bradford	294	29	9.9
Brevard	1011	87	8.6
Broward	1219	45	3.7
Calhoun	561	15	2.7
Charlotte	703	88	12.5
Citrus	560	83	14.8
Clay	593	30	5.1
Collier	2006	45	2.2
Columbia	784	22	2.8
Dade	2042	62	3.0
DeSoto	648	28	4.3
Dixie	692	24	3.5
Duval	766	71	9.3
Escambia	665	55	8.3
Flagler	487	27	5.5
Franklin	536	19	3.5
Gadsden	512	21	4.1
Gilchrist	346	27	7.8
Glades	753	6	0.8
Gulf	565	17	3.0
Hamilton	514	23	4.5
Hardee	629	33	5.2
Hendry	1187	21	1.8
Hernando	484	96	19.8
Highlands	997	51	5.1
Hillsborough	1038	147	14.2
Holmes	482	17	3.5
Indian River	506	31	6.1
Jackson	935	40	4.3
Jefferson	605	4	0.7

Table 4-2. Land Area and Number of Homes Sampled for the Land-Based Survey, by County (Concluded)

County	Land Area,* Square Mile	Number of Homes Sampled	Homes Sampled per 100 Square Mile
Lafayette	549	8	1.5
Lake	961	100	10.4
Lee	785	149	19.0
Leon	670	28	4.2
Levy	1083	68	6.3
Liberty	839	4	0.5
Madison	703	6	0.9
Manatee	739	51	6.9
Marion	1600	181	11.3
Martin	556	32	5.8
Monroe	1034	44	4.3
Nassau	650	25	3.8
Okaloosa	944	50	5.3
Okeechobee	777	19	2.4
Orange	910	77	8.5
Osceola	1313	42	3.2
Palm Beach	2023	70	3.5
Pasco	742	79	10.6
Pinellas	265	83	31.3
Polk	1858	174	9.4
Putnam	779	52	6.7
St. Johns	605	45	7.4
St. Lucie	584	34	5.8
Santa Rosa	1032	43	4.2
Sarasota	587	81	13.8
Seminole	305	34	11.1
Sumter	555	51	9.2
Suwannee	686	30	4.4
Taylor	1051	21	2.0
Union	241	13	5.4
Volusia	1062	77	7.3
Wakulla	601	14	2.3
Walton	1053	46	4.4
Washington	585	26	4.4
Total, all counties	54,095	3,319	6.1

* Source: U.S. Department of Commerce, County and City Data Book: 1972, U.S. Government Printing Office, Washington, D.C. 1973.

questionnaire. By design, 1,000 samplers were to be mailed per cycle, in anticipation of participation rates between 65 and 75 percent based on the pretest experience, The target number of samplers was met within ±8 percent for each cycle.

Table 4-3. Number of Households to Which Indoor Radon Samplers Were Mailed for the Population-Based Survey, by Survey Cycle

Cycle	Number of Samplers Mailed
1	1,037
2	1,024
3	941
4	923
Total, all Cycles	3,925

Samplers were mailed for this survey beginning in early January 1987 and ending in late May 1987. Because of variations in speed with which households returned screening questionnaires or samplers mailed to them, there was some overlap in the time-related coverage of successive survey cycles. For the first cycle, samplers were deployed by participants mainly during the latter part of January and the whole of February; for the second cycle, samplers were largely deployed during March and the first half of April; most samplers were deployed between the latter part of April and the first half of May for the third cycle and between the last half of May and early part of June for the fourth cycle.

The number of homes selected for the population-based survey is summarized in Table 4-4. Because more homes were sent samplers (3,925) than

Table 4-4. Occupied Housing Units and Number of Homes Selected for the Population-Based Survey, by County

County	Number of Occupied Housing Units (1980 Census)	Target Number of Homes for Survey	Number of Homes Selected for Survey	Ratio of Number Selected to Target Number
Alachua	54,607	64	81	1.27
Baker	4,243	16	16	1.00
Bay	34,754	48	61	1.27
Bradford	6,297	16	22	1.38
Brevard	101,783	128	208	1.63
Broward	417,517	160	178	1.11
Calhoun	3,221	16	14	0.88
Charlotte	25,922	32	49	1.53
Citrus	22,985	32	53	1.66
Clay	21,646	32	50	1.56
Collier	33,966	48	64	1.33
Columbia	12,183	16	11	0.69
Dade	609,830	160	111	0.69
DeSoto	6,256	16	21	1.31
Dixie	2,663	16	17	1.06
Duval	208,351	160	173	1.08
Escambia	81,067	96	103	1.07
Flagler	4,359	16	6	0.38
Franklin	2,765	16	12	0.75
Gadsden	12,092	16	12	0.75
Gilchrist	2,006	16	20	1.25
Glades	2,224	16	12	0.75
Gulf	3,683	16	14	0.88
Hamilton	2,904	16	13	0.81
Hardee	6,253	16	20	1.25
Hendry	5,959	16	20	1.25
Hernando	17,735	32	53	1.66
Highlands	18,960	32	48	1.50
Hillsborough	237,943	160	172	1.08
Holmes	5,244	16	14	0.88
Indian River	23,331	32	52	1.63
Jackson	13,332	16	17	1.06
Jefferson	3,486	16	11	0.69

(Continued)

Table 4-4. Occupied Housing Units and Number of Homes Selected for the Population-Based Survey, by County (Concluded)

County	Number of Occupied Housing Units (1980 Census)	Target Number of Homes for Survey	Number of Homes Selected for Survey	Ratio of Number Selected to Target Number
Lafayette	1,413	16	18	1.13
Lake	41,650	48	52	1.08
Lee	82,509	96	127	1.32
Leon	54,103	64	57	0.89
Levy	7,267	16	16	1.00
Liberty	1,485	16	14	0.88
Madison	4,977	16	12	0.75
Manatee	61,998	64	83	1.30
Marion	45,458	48	48	1.00
Martin	25,863	32	36	1.13
Monroe	26,340	32	20	0.63
Nassau	10,976	16	23	1.44
Okaloosa	37,538	48	81	1.69
Okeechobee	6,981	16	18	1.13
Orange	170,754	160	194	1.21
Osceola	18,615	32	33	1.03
Palm Beach	234,339	160	184	1.15
Pasco	81,346	96	139	1.45
Pinellas	319,527	160	234	1.46
Polk	114,394	128	157	1.23
Putnam	18,397	32	32	1.00
St. Johns	18,623	32	21	0.66
St. Lucie	32,506	48	59	1.23
Santa Rosa	18,595	32	34	1.06
Sarasota	88,739	96	154	1.60
Seminole	63,247	64	83	1.30
Sumter	8,582	16	22	1.38
Suwannee	7,739	16	20	1.25
Taylor	5,826	16	14	0.88
Union	2,119	16	21	1.31
Volusia	105,773	128	149	1.16
Wakulla	3,730	16	11	0.69
Walton	8,043	16	21	1.31
Washington	5,235	16	10	0.63
Total, all counties	3,744,254	3,312	3,925	1.19

the number initially targeted (3,312) for the entire State to allow for the possibility of nonparticipation, the ratio of samplers mailed to the target number was greater than 1 for about three-fourths of the counties. Most counties with ratios below one have significant rural areas, for which the coverage of Donnelly Marketing's sampling frame was less complete than for urban areas and for which proportionately fewer homes had slab-on-grade foundations.

4.1.3 Sampler Return Rates

The number of prospective participants returning radon samplers by mail for analysis is summarized for the two surveys in Table 4-5. A total-of 3,235 samplers (97.5 percent) were returned by land-based participants and 3,230 samplers (82.3 percent) were returned by population-based participants. A higher return rate was expected for the land-based survey because the commitment received from the participant was stronger. Field technicians deployed the samplers in land-based survey homes and the residents signed participation agreements, whereas population-based households indicated an intent to participate by checking a response category on the screening questionnaire. Soil samplers, which were to be retrieved by participants 1 month after deployment by digging approximately 1 foot below ground level at a location marked by the field technician, were returned by 2,896 (87.3 percent) of the land-based households.

The total number of participating households for the two surveys (i.e., households returning radon samplers) ranged from a high of 307 for

Table 4-5. Number of Residents Returning Indoor Radon Samplers from the Two Surveys, by County

County	Land Survey	Population Survey	Total	County	Land Survey	Population Survey	Total
Alachua	120	70	190	Lafayette	8	12	20
Baker	21	15	36	Lake	99	45	144
Bay	46	56	102	Lee	147	102	249
Bradford	25	14	39	Leon	25	53	78
Brevard	86	172	258	Levy	68	12	80
Broward	44	130	174	Liberty	4	12	16
Calhoun	15	13	28	Madison	6	11	17
Charlotte	88	39	127	Manatee	50	71	121
Citrus	83	49	132	Marion	179	41	220
Clay	30	41	71	Martin	30	26	56
Collier	43	52	95	Monroe	44	11	55
Columbia	22	8	30	Nassau	31	19	50
Dade	60	82	142	Okaloosa	49	66	115
DeSoto	24	17	41	Okeechobee	18	13	31
Dixie	23	13	36	Orange	76	163	239
Duval	69	133	202	Osceola	41	29	70
Escambia	52	92	144	Palm Beach	70	152	222
Flagler	27	5	32	Pasco	77	123	200
Franklin	17	9	26	Pinellas	82	190	272
Gadsden	21	12	33	Polk	169	132	301
Gilchrist	26	15	41	Putnam	51	29	80
Glades	6	7	13	St. Johns	42	18	60
Gulf	15	11	26	St. Lucie	33	51	84
Hamilton	23	11	34	Santa Rosa	41	27	68
Hardee	33	15	48	Sarasota	80	138	218
Hendry	20	13	33	Seminole	33	65	98
Hernando	93	46	139	Sumter	49	18	67
Highlands	45	38	83	Suwannee	29	15	44
Hillsborough	144	138	282	Taylor	21	12	33
Holmes	17	11	28	Union	13	18	31
Indian River	30	46	76	Volusia	73	129	202
Jackson	40	11	51	Wakulla	16	8	24
Jefferson	4	8	12	Walton	44	18	62
				Washington	25	9	34
Total, all counties					3,235	3,230	6,465

Polk County to a low of 12 for Jefferson County. County-specific differences between the two surveys exist mainly because the population-based survey was scaled to housing density, whereas the land-based survey was scaled to land area.

4.2 MEASUREMENT RESULTS BY COUNTY

4.2.1 Land-Based Survey

Indoor Radon. Results of indoor radon measurements are summarized by county in Table 4-6. The 3,050 results summarized in the table exclude three categories of households from which samplers were received: (1) those with invalid samples, (2) those who did not return the documentation form and did not respond to followup attempts to retrieve information necessary to calculate the concentration, and (3) those for whom the delay between termination of sampling and laboratory receipt of the sampler was too long to enable an accurate calculation of the concentration. Measured concentrations averaged more than 2 pCi/L in four counties--Alachua, Columbia, Marion, and Sumter. The maximum concentration was at least 12 pCi/L (the cutpoint for an index value of 5; see Section 3-7) in five counties, ranking in order of highest measured concentration as follows: Marion, Alachua, Sumter, Leon, and Polk. Concentrations at or above 8 pCi/L (the cutpoint for an index value of 4) were measured in four additional counties--Citrus, Columbia, Hillsborough, and Pasco. There were 10 other counties with at least one measurement result at or above 4 pCi/L (the cutpoint for an index value of 3)--Charlotte, Dade, Gilchrist, Hardee, Hendry, Lee, Levy, Pinellas, Taylor, and Union.

Table 4-6. Indoor Radon Results from the Land-Based Survey, by County

County	Number of Homes with Valid Results	Radon Concentrations Average, pCi/L	Standard Deviation, pCi/L	Maximum, pCi/L	Percent Homes ≥4 pCi/L	Percent Homes ≥8 pCi/L	Percent Homes ≥12 pCi/L
Alachua	109	3.3	5.6	29.5	17.4*	10.1	7.3
Baker	20	0.3	0.3	1.2	--	--	--
Bay	41	0.3	0.2	1.1	--	--	--
Bradford	23	0.4	0.4	1.4	--	--	--
Brevard	85	0.5	0.4	3.2	--	--	--
Broward	43	0.5	0.4	1.8	--	--	--
Calhoun	12	0.3	0.2	0.9	--	--	--
Charlotte	82	1.0	1.1	5.3	3.7*	--	--
Citrus	81	1.1	1.1	8.5	1.2	1.2	--
Clay	28	0.5	0.5	2.3	--	--	--
Collier	43	0.7	0.6	3.1	--	--	--
Columbia	20	2.2	3.4	11.7	15.0*	10.0	--
Dade	55	1.0	1.1	4.7	3.6	--	--
DeSoto	23	0.8	0.8	3.0	--	--	--
Dixie	21	0.6	0.4	1.9	--	--	--
Duval	66	0.3	0.2	1.1	--	--	--
Escambia	51	0.7	0.5	2.6	--	--	--
Flagler	26	0.6	0.5	2.2	--	--	--
Franklin	14	0.4	0.4	1.3	--	--	--
Gadsden	18	0.6	0.3	1.4	--	--	--
Gilchrist	25	1.4	1.4	6.2	4.0	--	--
Glades	6	0.3	0.3	1.0	--	--	--
Gulf	14	0.3	0.3	1.2	--	--	--
Hamilton	23	0.5	0.4	1.4	--	--	--
Hardee	32	0.9	1.4	7.5	3.1	--	--
Hendry	19	1.4	1.4	4.7	10.5	--	--
Hernando	93	0.9	0.8	3.6	--	--	--
Highlands	42	0.3	0.2	0.9	--	--	--
Hillsborough	137	1.1	1.7	9.9	5.1*	2.2	--
Holmes	15	0.7	0.8	3.3	--	--	--
Indian River	30	0.5	0.4	1.7	--	--	--
Jackson	34	0.7	0.5	2.2	--	--	--
Jefferson	2	0.4	0.2	0.5	--	--	--

(Continued)

* Counties for which the proportion of homes with measured concentrations at or above 4 pCi/L is significantly different from zero.

Table 4-6. Indoor Radon Results from the Land-Based Survey, by County (Concluded)

		Radon Concentrations					
County	Number of Homes with Valid Results	Average, pCi/L	Standard Deviation, pCi/L	Maximum, pCi/L	Percent Homes ≥4 pCi/L	Percent Homes ≥8 pCi/L	Percent Homes ≥12 pCi/L
Lafayette	4	0.6	0.2	0.8	--	--	--
Lake	97	0.5	0.5	3.1	--	--	--
Lee	144	1.0	1.0	5.8	2.1*	--	--
Leon	21	1.8	3.1	13.8	9.5	4.8	4.8
Levy	65	1.1	0.9	4.9	1.5	--	--
Liberty	4	0.7	0.5	1.4	--	--	--
Madison	5	0.4	0.4	1.2	--	--	--
Manatee	48	0.6	0.6	3.1	--	--	--
Marion	176	3.1	4.5	32.4	22.2*	9.1	5.1
Martin	29	0.4	0.3	1.6	--	--	--
Monroe	43	0.6	0.7	3.2	--	--	--
Nassau	29	0.4	0.2	0.7	--	--	--
Okaloosa	39	0.5	0.4	1.8	--	--	--
Okeechobee	18	0.5	0.4	1.3	--	--	--
Orange	72	0.7	0.6	2.6	--	--	--
Osceola	37	0.4	0.3	1.5	--	--	--
Palm Beach	68	0.5	0.4	1.6	--	--	--
Pasco	74	0.9	1.4	8.0	5.4*	1.4	--
Pinellas	81	0.5	0.7	4.3	1.2	--	--
Polk	157	1.4	2.2	13.2	11.5*	2.6	0.6
Putnam	50	0.5	0.3	1.4	--	--	--
St. Johns	39	0.4	0.3	1.3	--	--	--
St. Lucie	29	0.4	0.3	1.0	--	--	--
Santa Rosa	36	0.6	0.5	2.6	--	--	--
Sarasota	78	0.9	0.7	3.2	--	--	--
Seminole	31	0.5	0.4	2.0	--	--	--
Sumter	47	2.8	5.0	25.3	14.9*	4.3	4.3
Suwannee	27	0.6	0.6	3.3	--	--	--
Taylor	19	0.9	1.0	4.3	5.3	--	--
Union	13	1.3	2.3	6.6	15.4	--	--
Volusia	68	0.5	0.4	1.4	--	--	--
Wakulla	16	0.5	0.4	1.6	--	--	--
Walton	34	0.6	0.5	1.7	--	--	--
Washington	19	0.4	0.3	1.2	--	--	--
Total, all counties	3,050	1.0	2.1	32.4	3.8	1.3	0.7

* Counties for which the proportion of homes with measured concentrations at or above 4 pCi/L is significantly different from zero.

Another way of looking at elevated radon readings is to examine the proportion of results above a stated value. Using the midpoint of the index of radon potential --4 pCi/L (see Section 3.7)--as a reference point, it was determined for each county whether the proportion of homes with measured concentrations at or above 4 pCi/L is significantly different from zero. For the land-based indoor measurements, nine counties have a signficant proportion of results at or above 4 pCi/L--Alachua, Charlotte, Columbia, Hillsborough, Lee, Marion, Pasco, Polk, and Sumter. Two additional counties--Hendry and Union--had values at or above 4 pCi/L in 10 percent or more of the sampled homes, but the number of homes sampled was not sufficient for the result to be statistically significant.

Soil Radon. The results of soil radon measurements are summarized by county in Table 4-7. Measured concentrations averaged more than 270 pCi/L in five counties--Alachua, Columbia, Leon, Marion, and Polk. The maximum concentration was at least 1,350 pCi/L (the cutpoint for an index value of 5) in 11 counties, ranking in order of highest measured concentration as follows: Polk, Pinellas, Alachua, Columbia, Marion, Lee, Gilchrist, Hardee, Hillsborough, Citrus, and Pasco. Concentrations at or above 990 pCi/L (the cutpoint for an index value of 4) were measured in six additional counties--Dade, Hernando, Leon, Manatee, Sumter, and Union. There were six other counties with at least one measurement result at or above 630 pCi/L--Charlotte, Jackson, Levy, Sarasota, Taylor, and Wakulla.

The proportion of homes with soil radon results at or above the midpoint of the index for radon potential --630 pCi/L (see Section 3.7)--is

Table 4-7. Soil Radon Results from the Land-Based Survey, by County

County	Number of Homes with Valid Results	Radon Concentrations					
		Average, pCi/L	Standard Deviation, pCi/L	Maximum, pCi/L	Percent Homes ≥630 pCi/L	Percent Homes ≥990 pCi/L	Percent Homes ≥1350 pCi/L
Alachua	99	469	831	5,475	17.2*	15.2	12.1
Baker	16	44	32	107	--	--	--
Bay	41	41	62	359	--	--	--
Bradford	23	58	44	152	--	--	--
Brevard	80	44	39	236	--	--	--
Broward	40	78	54	224	--	--	--
Calhoun	13	164	123	426	--	--	--
Charlotte	76	161	165	756	4.0*	--	--
Citrus	69	161	230	1,505	3.0	3.0	1.5
Clay	27	48	42	189	--	--	--
Collier	36	70	62	220	--	--	--
Columbia	19	544	1,137	4,402	21.1*	21.1	10.5
Dade	54	150	180	1,206	1.9	1.9	--
DeSoto	24	83	92	368	--	--	--
Dixie	20	47	35	136	--	--	--
Duval	57	43	52	342	--	--	--
Escambia	43	107	122	525	--	--	--
Flagler	25	65	66	243	--	--	--
Franklin	16	21	21	75	--	--	--
Gadsden	19	87	67	242	--	--	--
Gilchrist	23	238	492	2,400	4.4	4.4	4.4
Glades	6	83	66	192	--	--	--
Gulf	15	58	72	210	--	--	--
Hamilton	21	68	69	308	--	--	--
Hardee	30	232	401	1,909	6.7	6.7	3.3
Hendry	15	137	85	290	--	--	--
Hernando	86	161	195	1,273	3.5*	1.2	--
Highlands	46	21	19	96	--	--	--
Hillsborough	117	179	248	1,520	6.8*	1.7	0.9
Holmes	16	132	84	267	--	--	--
Indian River	29	27	27	144	--	--	--
Jackson	35	150	156	707	2.9	--	--
Jefferson	1	121	--	121	--	--	--

(Continued)

* Counties for which the proportion of homes with measured concentrations at or above 630 pCi/L is significantly different from zero.

Table 4-7. Soil Radon Results from the Land-Based Survey, by County (Concluded)

County	Number of Homes with Valid Results	Radon Concentrations: Average, pCi/L	Standard Deviation, pCi/L	Maximum, pCi/L	Percent Homes ≥630 pCi/L	Percent Homes ≥990 pCi/L	Percent Homes ≥1350 pCi/L
Lafayette	7	53	26	82	--	--	--
Lake	85	44	51	313	--	--	--
Lee	135	142	312	3,087	1.5	1.5	1.5
Leon	21	286	349	1,278	9.5	9.5	--
Levy	60	201	202	923	5.0*	--	--
Liberty	4	92	88	210	--	--	--
Madison	5	157	169	450	--	--	--
Manatee	45	175	242	1,274	4.4	2.2	--
Marion	165	416	601	3,256	22.4*	12.7	8.5
Martin	25	43	33	130	--	--	--
Monroe	41	23	16	81	--	--	--
Nassau	28	57	42	144	--	--	--
Okaloosa	45	71	81	409	--	--	--
Okeechobee	17	44	44	182	--	--	--
Orange	66	66	64	318	--	--	--
Osceola	34	48	51	210	--	--	--
Palm Beach	62	88	114	623	--	--	--
Pasco	75	142	247	1,488	4.0*	2.7	1.3
Pinellas	77	171	723	6,367	1.3	1.3	1.3
Polk	157	356	828	6,587	14.7*	11.5	8.3
Putnam	48	42	46	253	--	--	--
St. Johns	39	58	52	285	--	--	--
St. Lucie	29	39	34	119	--	--	--
Santa Rosa	36	96	93	357	--	--	--
Sarasota	76	176	161	953	1.3	--	--
Seminole	31	40	56	264	--	--	--
Sumter	48	229	275	1,296	6.3*	4.2	--
Suwannee	28	96	63	297	--	--	--
Taylor	18	164	186	776	5.6	--	--
Union	12	183	369	1,336	8.3	8.3	--
Volusia	68	45	42	170	--	--	--
Wakulla	14	110	174	688	7.1	--	--
Walton	37	116	108	371	--	--	--
Washington	21	76	99	349	--	--	--
Total, all counties	2,896	155	376	6,587	4.2	2.7	1.7

* Counties for which the proportion of homes with measured concentrations at or above 630 pCi/L is significantly different from zero.

significantly greater than zero for the following 10 counties: Alachua, Charlotte, Columbia, Hernando, Hillsborough, Levy, Marion, Pasco, Polk, and Sumter. All of these counties, except Hernando and Levy, also have a statistically significant proportion of indoor radon results at or above 4 pCi/L.

Gamma Radiation. The results of indoor gamma radiation measurements are summarized by county in Table 4-8. The average result for every county is near background (6 μR/h) and the environmental standard (20 μR/h) was exceeded indoors in only one home. Even for this home, 'located in Pinellas County, the measured value (20.2 μR/h) was just above the standard of 20 μR/h. The midpoint of the index for gamma radiation--15 μR/h (see Section 3.7)--was exceeded in three counties other than Pinellas--Charlotte, DeSoto, and Sarasota. Only for Charlotte and Sarasota Counties is the proportion of results at or above 15 μR/h significantly different from zero. Thus, these measurement results clearly indicate that the State of Florida does not have a problem with respect to the standard for indoor gamma exposure.

4.2.2 Population-Based Survey

The results of indoor radon measurements from the population-based survey are summarized by county in Table 4-9. On making the same restrictions as for the land-based indoor radon results (see Section 4.2.1), the number of homes with valid results was 3,106. Measured concentrations averaged more than 2 pCi/L in three counties--Alachua, Levy, and Marion. The maximum concentration was at least 12 pCi/L in eight counties, ranking in order of

Table 4-8. Indoor Gamma Radiation Results from the Land-Based Survey, by County

County	Number of Homes with Valid Results	Radiation Levels: Average, μR/h	Standard Deviation, μR/h	Maximum, μR/h	Percent Homes ≥15 μR/h	Percent Homes ≥20 μR/h
Alachua	121	6.6	1.2	13.5	--	--
Baker	24	6.4	0.9	8.2	--	--
Bay	47	6.3	1.4	11.4	--	--
Bradford	29	5.9	0.6	7.5	--	--
Brevard	87	5.8	0.6	7.4	--	--
Broward	45	6.2	0.7	7.4	--	--
Calhoun	15	6.2	0.6	7.3	--	--
Charlotte	89	8.6	2.7	18.0	6.8*	--
Citrus	85	6.0	0.7	8.5	--	--
Clay	30	6.4	0.9	8.1	--	--
Collier	45	7.4	1.3	9.9	--	--
Columbia	23	6.5	0.7	8.4	--	--
Dade	62	6.4	0.9	8.6	--	--
DeSoto	28	7.2	3.0	17.5	7.1	--
Dixie	24	5.8	0.5	7.0	--	--
Duval	72	6.7	1.1	10.9	--	--
Escambia	55	6.1	0.8	8.7	--	--
Flagler	27	6.1	0.4	7.0	--	--
Franklin	17	6.0	0.8	7.8	--	--
Gadsden	21	6.2	0.7	7.4	--	--
Gilchrist	27	6.1	0.6	7.6	--	--
Glades	6	6.2	0.8	7.5	--	--
Gulf	17	6.9	1.5	10.2	--	--
Hamilton	23	6.5	0.9	8.7	--	--
Hardee	33	6.0	1.1	9.4	--	--
Hendry	21	7.0	1.6	12.2	--	--
Hernando	94	6.1	0.9	10.6	--	--
Highlands	51	5.9	0.8	8.9	--	--
Hillsborough	147	6.0	1.2	14.2	--	--
Holmes	18	6.4	0.8	8.6	--	--
Indian River	31	6.0	0.9	8.6	--	--
Jackson	40	6.5	0.8	9.4	--	--
Jefferson	4	6.1	0.3	6.6	--	--

(Continued)

* Counties for which the proportion of homes with measured levels at or above 15 μR/h is significantly different from zero.

Table 4-8. Indoor Gamma Radiation Results from the Land-Based Survey, by County (Concluded)

County	Number of Homes with Valid Results	Radiation Levels: Average, μR/h	Standard Deviation, μR/h	Maximum, μR/h	Percent Homes ≥15 μR/h	Percent Homes ≥20 μR/h
Lafayette	8	5.9	0.4	6.4	--	--
Lake	100	5.7	0.8	10.8	--	--
Lee	149	7.9	1.3	12.4	--	--
Leon	27	6.6	0.9	9.3	--	--
Levy	68	6.0	0.6	8.2	--	--
Liberty	5	6.2	0.4	6.8	--	--
Madison	6	6.2	0.8	7.3	--	--
Manatee	51	6.3	1.1	9.3	--	--
Marion	177	6.2	1.0	12.3	--	--
Martin	32	5.9	0.6	7.2	--	--
Monroe	44	6.2	0.9	8.0	--	--
Nassau	31	6.8	1.0	9.9	--	--
Okaloosa	50	5.9	0.8	9.2	--	--
Okeechobee	19	6.4	0.8	7.9	--	--
Orange	77	5.7	0.5	7.6	--	--
Osceola	42	5.8	1.1	11.1	--	--
Palm Beach	70	6.4	1.0	8.5	--	--
Pasco	79	5.8	0.8	8.4	--	--
Pinellas	83	6.1	2.3	20.2	2.4	1.2
Polk	174	6.4	1.2	11.6	--	--
Putnam	52	5.9	0.6	7.4	--	--
St. Johns	45	6.5	1.2	10.4	--	--
St. Lucie	34	6.2	1.0	9.6	--	--
Santa Rosa	43	6.2	0.8	8.6	--	--
Sarasota	80	7.9	2.5	17.3	5.0*	--
Seminole	34	5.7	0.5	7.3	--	--
Sumter	51	6.2	0.8	9.0	--	--
Suwannee	29	6.1	0.6	7.2	--	--
Taylor	21	6.1	0.8	8.3	--	--
Union	13	6.4	1.1	9.1	--	--
Volusia	76	6.0	0.7	8.1	--	--
Wakulla	16	7.1	1.6	12.0	--	--
Walton	46	5.8	0.6	7.6	--	--
Washington	25	6.1	0.8	9.1	--	--
Total, all counties	3,315	6.4	1.3	20.2	0.4	0.03

* Counties for which the proportion of homes with measured levels at or above 15 μR/h is significantly different from zero.

Table 4-9. Indoor Radon Results from the Population-Based Survey, by County

County	Number of Homes with Valid Results	Radon Concentrations: Average, pCi/L	Standard Deviation, pCi/L	Maximum, pCi/L	Percent Homes ≥4 pCi/L	Percent Homes ≥8 pCi/L	Percent Homes ≥12 pCi/L
Alachua	67	2.4	3.0	14.4	22.4*	7.5	3.0
Baker	15	0.4	0.2	0.9	--	--	--
Bay	51	0.3	0.2	1.1	--	--	--
Bradford	13	0.3	0.4	1.6	--	--	--
Brevard	166	0.3	0.3	1.8	--	--	--
Broward	127	0.4	0.5	2.7	--	--	--
Calhoun	13	0.4	0.3	1.3	--	--	--
Charlotte	39	1.7	1.4	6.1	10.3*	--	--
Citrus	49	1.9	2.9	15.9	10.2*	4.1	2.0
Clay	39	0.3	0.2	1.0	--	--	--
Collier	51	0.9	1.1	7.5	2.0	--	--
Columbia	8	0.2	0.0	0.2	--	--	--
Dade	71	0.8	1.0	5.3	1.4	--	--
DeSoto	15	0.8	0.9	3.5	--	--	--
Dixie	12	0.2	0.1	0.6	--	--	--
Duval	126	0.3	0.3	1.3	--	--	--
Escambia	90	0.5	0.2	1.5	--	--	--
Flagler	5	0.3	0.2	0.7	--	--	--
Franklin	9	0.3	0.2	0.8	--	--	--
Gadsden	11	0.5	0.6	2.3	--	--	--
Gilchrist	15	1.8	2.2	7.2	13.3	--	--
Glades	6	0.4	0.4	1.1	--	--	--
Gulf	11	0.2	0.0	0.2	--	--	--
Hamilton	9	0.3	0.1	0.5	--	--	--
Hardee	15	0.8	1.1	3.9	--	--	--
Hendry	13	0.6	0.7	2.2	--	--	--
Hernando	46	0.5	0.3	1.4	--	--	--
Highlands	37	0.4	0.3	1.2	--	--	--
Hillsborough	134	1.0	2.0	17.8	3.7*	2.2	0.8
Holmes	11	0.4	0.3	1.1	--	--	--
Indian River	46	0.3	0.2	1.1	--	--	--
Jackson	11	0.4	0.2	0.9	--	--	--
Jefferson	8	0.2	0.1	0.5	--	--	--

(Contin

* Counties for which the proportion of homes with measured concentrations at or above 4 pCi/L is significantly different from zero.

Table 4-9. Indoor Radon Results from the Population-Based Survey, by County (Concluded)

County	Number of Homes with Valid Results	Radon Concentrations: Average, pCi/L	Standard Deviation, pCi/L	Maximum, pCi/L	Percent Homes ≥4 pCi/L	Percent Homes ≥8 pCi/L	Percent Homes ≥12 pCi/L
Lafayette	12	0.5	0.2	0.8	--	--	--
Lake	44	0.3	0.3	2.0	--	--	--
Lee	101	1.6	3.2	28.2	5.9*	2.0	2.0
Leon	51	1.7	1.7	7.0	13.9*	--	--
Levy	11	2.2	4.1	14.0	18.2	9.1	9.1
Liberty	12	0.3	0.2	0.8	--	--	--
Madison	8	0.5	0.6	1.8	--	--	--
Manatee	69	0.8	1.7	13.3	2.9	1.5	1.5
Marion	39	4.3	5.6	25.4	30.8*	18.0	12.8
Martin	23	0.3	0.1	0.7	--	--	--
Monroe	9	0.2	0.0	0.2	--	--	--
Nassau	18	0.3	0.2	0.7	--	--	--
Okaloosa	63	0.3	0.2	1.3	--	--	--
Okeechobee	13	0.4	0.3	1.0	--	--	--
Orange	157	0.5	0.7	4.6	1.9*	--	--
Osceola	28	0.4	0.3	1.4	--	--	--
Palm Beach	141	0.4	0.4	2.3	--	--	--
Pasco	121	0.8	1.4	8.0	5.0*	0.8	--
Pinellas	185	0.4	0.4	4.4	0.5	--	--
Polk	128	0.9	1.7	15.1	3.1*	1.6	0.8
Putnam	25	0.2	0.1	0.5	--	--	--
St. Johns	17	0.3	0.1	0.7	--	--	--
St. Lucie	49	0.3	0.3	1.2	--	--	--
Santa Rosa	24	0.5	0.6	2.5	--	--	--
Sarasota	135	0.7	0.8	5.6	1.5	--	--
Seminole	65	0.6	0.7	4.4	1.5	--	--
Sumter	15	1.9	2.6	8.5	13.3	6.7	--
Suwannee	15	0.5	0.9	3.7	--	--	--
Taylor	11	0.8	0.7	2.1	--	--	--
Union	18	0.7	0.5	1.6	--	--	--
Volusia	126	0.4	0.3	1.7	--	--	--
Wakulla	7	0.4	0.4	1.1	--	--	--
Walton	18	0.3	0.2	0.7	--	--	--
Washington	9	0.5	0.3	1.0	--	--	--
Total, all counties	3,106	0.7	1.5	28.2	2.6	0.8	0.5

* Counties for which the proportion of homes with measured concentrations at or above 4 pCi/L is significantly different from zero.

highest measured concentration as follows: Lee, Marion, Hillsborough, Citrus, Polk, Alachua, Levy, and Manatee. Concentrations at or above 8 pCi/L were measured in Pasco and Sumter Counties, and there were nine other counties with at least one result as high as 4 pCi/L--Charlotte, Collier, Dade, Gilchrist, Leon, Orange, Pinellas, Sarasota, and Seminole.

The proportion of homes with concentrations at or above 4 pCi/L was significantly greater than zero for the following 10 counties:, Alachua, Charlotte, Citrus, Hillsborough, Lee, Leon, Marion, Orange, Pasco, and Polk. In three additional counties--Gilchrist, Levy, and Sumter--the proportion of homes at or above 4 pCi/L was greater than 10 percent but is not significantly different from zero due to small sample size.

4.2.3 Existing Information

The primary types of existing information were results of aerial radiation surveys flown in 1981 under the NURE program, geological profiles, and limited measurement results from previous studies (see Section 3.4). The results from the NURE program, equivalent ppm (ppme) uranium readings, are summarized by county in Table 4-10. Due to the size of the data base (approximately 250,000 records for the entire State), the results were first averaged for each 1:24,000 quadrangle and then summarized at the county level. The use of quadrangle averages will tend to suppress the results; consequently, a lower value such as 2.4 ppme (cutpoint for an index value of 2) is appropriate for screening purposes. Because county and quadrangle boundaries overlap, results for each county are based on quadrangles completely or mainly contained within the county boundary.

Table 4-10. Terrestrial Uranium Results from the NURE Program, by County

County	Number of 1:24,000 Quadrangles	Uranium Reading Average, ppme	Uranium Reading Maximum, ppme	County	Number of 1:24,000 Quadrangles	Uranium Reading Average, ppme	Uranium Reading Maximum, ppme
Alachua	14	2.1	5.9	Lafayette	8	1.1	1.3
Baker	14	1.0	1.8	Lake	20	1.0	1.7
Bay	15	0.6	1.4	Lee	15	0.8	1.7
Bradford	6	1.5	1.9	Leon	12	1.3	2.4
Brevard	16	1.0	1.8	Levy	20	1.4	3.3
Broward	16	0.4	1.2	Liberty	13	0.8	1.3
Calhoun	8	1.4	2.0	Madison	11	1.4	2.1
Charlotte	9	0.8	1.2	Manatee	12	0.8	3.5
Citrus	12	1.4	2.3	Marion	25	1.7	3.9
Clay	8	1.4	1.7	Martin	8	0.4	0.5
Collier	35	0.8	1.9	Monroe	11	0.4	1.4
Columbia	11	1.4	2.7	Nassau	12	1.3	1.9
Dade	24	1.1	3.4	Okaloosa	9	1.3	1.7
DeSoto	9	0.7	1.0	Okeechobee	14	0.4	0.8
Dixie	13	1.1	1.9	Orange	12	1.0	1.9
Duval	14	1.7	2.1	Osceola	24	0.5	1.0
Escambia	15	1.1	1.6	Palm Beach	32	0.4	1.3
Flagler	8	1.0	1.1	Pasco	14	1.0	1.8
Franklin	9	0.4	0.9	Pinellas	2	1.4	1.9
Gadsden	9	1.2	1.6	Polk	31	2.5	13.5
Gilchrist	6	1.3	1.8	Putnam	11	1.2	1.3
Glades	15	0.5	0.6	St. Johns	11	1.0	1.3
Gulf	12	0.9	1.9	St. Lucie	6	0.6	0.6
Hamilton	9	1.1	1.6	Santa Rosa	17	1.1	1.8
Hardee	6	0.9	1.2	Sarasota	12	0.8	1.7
Hendry	18	0.5	1.4	Seminole	5	1.0	1.3
Hernando	7	1.4	2.3	Sumter	7	1.6	3.8
Highlands	20	0.4	0.8	Suwanee	12	1.6	2.1
Hillsborough	17	2.1	7.3	Taylor	17	1.3	2.7
Holmes	7	1.3	1.5	Union	3	1.5	2.0
Indian River	11	0.5	0.7	Volusia	21	0.8	1.3
Jackson	14	1.6	2.0	Wakulla	8	0.5	0.9
Jefferson	11	1.5	2.7	Walton	12	1.1	1.6
				Washington	7	1.1	1.9

There were three counties--Alachua, Hillsborough, and Polk--for which the average uranium reading was greater than 2 ppme. These three counties also were the only three with average readings for any quadrangle exceeding 4.3 ppme (the cutpoint for an index value of 3); the maximum quadrangle readings were 13.5 ppme for Polk County, 7.3 ppme for Hillsborough County, and 5.9 ppme for Alachua County. Other counties with minor elevations (maximum quadrangle average at or above 2.4 ppme) were Dade (3.4), Jefferson (2.7), Levy (3.3), Manatee (3.5), Marion (3.9), Sumter (3.8), and Taylor (2.7).

The relative radon potential assigned to each county on the basis of geological profiles or measurements from other studies is summarized in Table 4-11. Two counties--Hillsborough and Polk--were assigned the highest potential. Fourteen additional counties were assigned a medium-high potential--Alachua, Bradford, Citrus, Columbia, DeSoto, Hamilton, Hardee, Jefferson, Leon, Madison, Manatee, Marion, Pinellas, and Union. Details on the procedures used to assign the relative radon potential are provided in the Appendix.

4.3 DETERMINATION OF RADON POTENTIAL

Indexes of radon potential ranging from 1 (lowest potential) to 5 (highest potential) were calculated for each type of data--indoor radon from the population- and land-based surveys, soil radon and indoor gamma from the land-based survey, terrestrial uranium from the NURE program, and other existing information such as geological data--using the criteria presented in Section 3.7. These indexes are listed and averaged for each county in Table 4-12.

Table 4-11. Relative Radon Potential by County, Based on Existing Information Other Than NURE Data

County	Potential*	County	Potential*
Alachua	MH	Lafayette	M
Baker	M	Lake	ML
Bay	ML	Lee	M
Bradford	MH	Leon	MH
Brevard	ML	Levy	ML
Broward	L	Liberty	ML
Calhoun	L	Madison	MH
Charlotte	M	Manatee	MH
Citrus	MH	Marion	MH
Clay	ML	Martin	ML
Collier	L	Monroe	L
Columbia	MH	Nassau	L
Dade	M	Okaloosa	ML
DeSoto	MH	Okeechobee	L
Dixie	L	Orange	ML
Duval	ML	Osceola	ML
Escambia	ML	Palm Beach	L
Flagler	L	Pasco	L
Franklin	L	Pinellas	MH
Gadsden	M	Polk	H
Gilchrist	M	Putnam	ML
Glades	L	St. Johns	L
Gulf	L	St. Lucie	M
Hamilton	MH	Santa Rosa	ML
Hardee	MH	Sarasota	M
Hendry	ML	Seminole	L
Hernando	ML	Sumter	ML
Highlands	ML	Suwannee	ML
Hillsborough	H	Taylor	L
Holmes	L	Union	MH
Indian River	L	Volusia	L
Jackson	M	Wakulla	M
Jefferson	MH	Walton	L
		Washington	ML

* L = Low, ML = Medium Low, M = Medium, MH = Medium High, H = High.

Table 4-12. Indexes of Radon Potential from Different Data Sources, by County

County	Population-Based Indoor Radon	Land-Based Indoor Radon	Land-Based Soil Radon	Land-Based Indoor Gamma	NURE Data (terrestrial uranium)	Other Existing Information	Average Across Data Sources	Standard Deviation
Alachua	5	5	5	2	3	4	4.0	1.3
Baker	1	1	1	1	1	3	1.3	0.8
Bay	1	1	2	2	1	2	1.5	0.5
Bradford	1	1	1	1	1	4	1.5	1.2
Brevard	1	2	1	1	1	2	1.3	0.5
Broward	2	1	1	1	1	1	1.2	0.4
Calhoun	1	1	2	1	1	1	1.2	0.4
Charlotte	3	3	3	3	1	3	2.7	0.8
Citrus	5	4	5	1	1	4	3.3	1.9
Clay	1	2	1	1	1	2	1.3	0.5
Collier	3	2	1	1	1	1	1.5	0.8
Columbia	1	4	5	1	2	4	2.8	1.7
Dade	3	3	4	1	2	3	2.7	1.0
DeSoto	2	2	2	3	1	4	2.3	1.0
Dixie	1	1	1	1	1	1	1.0	0.0
Duval	1	1	2	2	1	2	1.5	0.5
Escambia	1	2	2	1	1	2	1.5	0.5
Flagler	1	2	1	1	1	1	1.2	0.4
Franklin	1	1	1	1	1	1	1.0	0.0
Gadsden	2	1	1	1	1	3	1.5	0.8
Gilchrist	3	3	5	1	1	3	2.7	1.5
Glades	1	1	1	1	1	1	1.0	0.0
Gulf	1	1	1	2	1	1	1.2	0.4
Hamilton	1	1	2	1	1	4	1.7	1.2
Hardee	2	3	5	1	1	4	2.7	1.6
Hendry	2	3	2	2	1	2	2.0	0.6
Hernando	1	2	4	2	1	2	2.0	1.1
Highlands	1	1	1	1	1	2	1.2	0.4
Hillsborough	5	4	5	2	4	5	4.2	1.2
Holmes	1	2	1	1	1	1	1.2	0.4
Indian River	1	1	1	1	1	1	1.0	0.0
Jackson	1	2	3	1	1	3	1.8	1.0
Jefferson	1	1	1	1	2	4	1.7	1.2

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Table 4-12. Indexes of Radon Potential from Different Data Sources, by County (Concluded

County	Population-Based Indoor Radon	Land-Based Indoor Radon	Land-Based Soil Radon	Land-Based Indoor Gamma	NURE Data (terrestrial uranium)	Other Existing Infor-mation	Average Across Data Sources	Standard Deviation
Lafayette	1	1	1	1	1	3	1.3	0.8
Lake	2	2	2	2	1	2	1.8	0.4
Lee	5	3	5	2	1	3	3.2	1.6
Leon	3	5	4	1	2	4	3.2	1.5
Levy	5	3	3	1	3	2	2.8	1.3
Liberty	1	1	1	1	1	2	1.2	0.4
Madison	1	1	2	1	1	4	1.7	1.2
Manatee	5	2	4	1	2	4	3.0	1.5
Marion	5	5	5	2	2	4	3.8	1.5
Martin	1	1	1	1	1	2	1.2	0.4
Monroe	1	2	1	1	1	1	1.2	0.4
Nassau	1	1	1	1	1	1	1.0	0.0
Okaloosa	1	1	2	1	1	2	1.3	0.5
Okeechobee	1	1	1	1	1	1	1.0	0.0
Orange	3	2	2	1	1	2	1.8	0.8
Osceola	1	1	1	2	1	2	1.3	0.5
Palm Beach	2	1	2	1	1	1	1.3	0.5
Pasco	4	4	5	1	1	1	2.7	1.9
Pinellas	3	3	5	4	1	4	3.3	1.4
Polk	5	5	5	2	5	5	4.5	1.2
Putnam	1	1	1	1	1	2	1.2	0.4
St. Johns	1	1	2	2	1	1	1.3	0.5
St. Lucie	1	1	1	1	1	3	1.3	0.8
Santa Rosa	2	2	2	1	1	2	1.7	0.5
Sarasota	3	2	3	3	1	3	2.5	0.8
Seminole	3	2	1	1	1	1	1.5	0.8
Sumter	4	5	4	1	2	2	3.0	1.5
Suwannee	2	2	2	1	1	2	1.7	0.5
Taylor	2	3	3	1	2	1	2.0	0.9
Union	1	3	4	1	1	4	2.3	1.5
Volusia	1	1	1	1	1	1	1.0	0.0
Wakulla	1	1	3	2	1	3	1.8	1.0
Walton	1	1	2	1	1	1	1.2	0.4
Washington	1	1	2	1	1	2	1.3	0.5
Average, all counties	2.0	2.0	2.4	1.3	1.3	2.4	1.9	0.5

Of the six indexes, the highest average values (2.4) across all counties were obtained for soil radon and other existing information. The lowest average values (1.3) were obtained for NURE data and indoor gamma, and intermediate average values of 2.0 were obtained for indoor radon from the population- and land-based surveys. The standard deviation shown in the right-hand column of the table can be interpreted as a measure of consistency across the six indexes (the lower the standard deviation, the more consistent are the index values). In most cases, the larger standard deviations (i.e., those greater than one) are caused either by relatively-low values for indoor gamma or terrestrial uranium or by relatively high values for other existing information.

To assess the mutual consistency among the different indexes, a nonparametric test of association (Kendall's Tau) appropriate for ranked data was computed. As shown in Table 4-13, the indoor gamma index was least associated with other indexes. The most strongly associated indexes were indoor radon (both surveys) and soil radon. The same relative strengths of association were also calculated using Pearson correlation coefficients; however, this measure is not suitable to testing levels of statistical significance in this case because underlying assumptions of normality are not met. Based on Kendall's Tau, all associations except that between indoor gamma and NURE data are significant at the 0.05 level.

Based on a value of 2.5 or greater for average index value given in Table 4-12, 18 counties are considered to have definite evidence of elevated radon potential. In addition to a relatively high index value, these 18 counties share one other feature--at least 3 individual indexes

Table 4-13. Association (Kendall's Tau) Among Indexes of Radon Potential

	Land-Based Indoor Radon	Land-Based Soil Radon	Land-Based Indoor Gamma	Terrestrial Uranium	Other Existing Information
Population-based indoor radon	0.67*	0.57*	0.24**	0.47*	0.30*
Land-based indoor radon		0.66*	0.20**	0.50*	0.36*
Land-based soil radon			0.33*	0.44*	0.49*
Land-based indoor gamma				0.07	0.25**
Terrestrial Uranium					0.37*

* Statistically significant at the 0.01 level.
** Statistically significant at the 0.05 level.

with values of 3 or greater. Average index values for the 18 counties are listed in Table 4-14; also indicated in the table are counties with a statistically significant proportion of homes at or above 4 pCi/L for indoor radon, 630 pCi/L for soil radon, or 15 µR/h for indoor gamma radiation. The geographic location of the 18 counties is shown in Figure 4-1. These 18 counties are examined in greater detail in Section 5.0.

The relative ranking of the 18 counties by their average index values is not as important as the fact that all counties have an average index value of 2.5 or greater. Had the component indexes been based on average rather than maximum concentrations, a different ranking may have been obtained but the counties designated would have remained essentially the same. Counties with the highest maximum values generally also had the highest average values. Had average values been used, then the criteria for index values developed in Section 3.7 would need to be altered. Maximum values were considered more appropriate for this screening step so that any evidence of elevated radon potential in any county would not be overlooked.

An alternative composite index of radon potential could have been developed by applying different weights to the component indexes. The following is an example of such a weighting scheme:

Composite Index = (0.3 x index for land-based indoor radon)
+ (0.3 x index for population-based indoor radon)
+ (0.2 x index for land-based soil radon)
+ (0.1 x index for terrestrial uranium)
+ (0.1 x index for other existing information).

Indoor radon was assigned the highest weight because it relates most directly to the environmental standard. Soil radon was given a higher weight than terrestrial uranium or other existing information because it represents

Table 4-14. Average Index Value and Parameters with Significant Proportion of Elevated Homes for 18 Counties with Definite Evidence of Elevated Radon Potential

County	Average Index Value	Parameters with Significant Proportion of Elevated Homes			
		Population-Based Indoor Radon	Land-Based Indoor Radon	Land-Based Soil Radon	Land-Based Indoor Gamma
Alachua	4.0	X	X	X	
Charlotte	2.7	X	X	X	X
Citrus	3.3	X			
Columbia	2.8		X	X	
Dade	2.7				
Gilchrist	2.7				
Hardee	2.7				
Hillsborough	4.2	X	X	X	
Lee	3.2	X	X		
Leon	3.2	X			
Levy	2.8			X	
Manatee	3.0				
Marion	3.8	X	X	X	
Pasco	2.7	X	X	X	
Pinellas	3.3	X			
Polk	4.5	X	X	X	
Sarasota	2.5				X
Sumter	3.0		X	X	

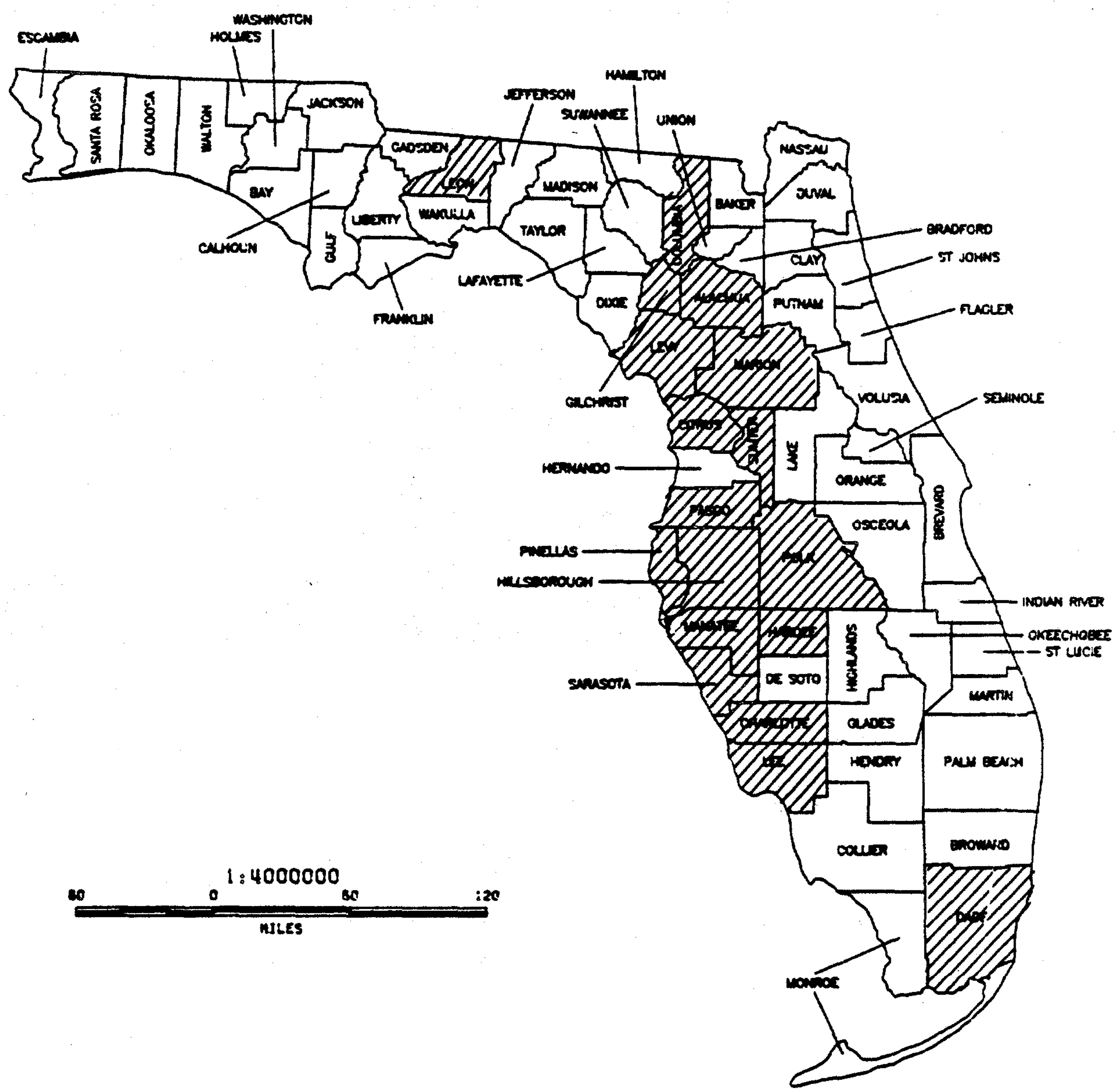

Figure 4-1. Florida Counties with Definite Evidence of Elevated Radon Potential

primary data collected under this study in the immediate vicinity of each home visited for the land-based survey. Indoor gamma radiation was given a weight of zero (i.e., excluded from the weighted index) because it was not strongly associated with other measures and only one study home had an indoor gamma reading above the standard of 20 µR/h.

It should be emphasized that the weights assigned here were based on technical judgement and have no specific quantitative basis. When the above weighting scheme was used, the same 18 counties, plus one additional county (Union), had index values of 2.5 or greater. Because the results were not substantially different and the above weighting scheme could be construed as somewhat arbitrary, the more straightforward approach of assigning equal weights to the six types of evidence examined under the study was used.

In addition to the 18 counties identified in Figure 4-1, there are 14 counties with limited evidence of elevated radon potential. As shown in Table 4-15, the evidence of potential is restricted to a single parameter in most cases. For these 14 counties, further sampling would be required to determine whether elevated radon potential indeed exists. In particular, Taylor and Union Counties warrant further investigation because both the land-based indoor and soil radon indexes were at or above the midpoint value of 3. For DeSoto County, index values were at or above the midpoint value for indoor gamma and other existing information.

The 14 counties with limited evidence of radon potential are shown together with the 18 counties having definite evidence of elevated potential in Figure 4-2. For the 35 remaining counties, there is no evidence of elevated radon potential from the study results.

Table 4-15. Index(es) Indicating Radon Potential and Extent of Survey Coverage for 14 Counties with Limited Evidence of Elevated Radon Potential

County	Index Indicating Radon Potential*					Extent of Survey Coverage	
	Population-Based Indoor Radon	Land-Based Indoor Radon	Land-Based Soil Radon	Land-Based Indoor Gamma	Other Existing Information	Fewer Than Three Homes/100 mi^2 for Land-Based Survey	Fewer Than Target Number for Population-Based Survey
Bradford					X		
Collier	X					X	
DeSoto				X	X		
Hamilton					X		X
Hendry		X				X	
Hernando			X				
Jackson			X				
Jefferson					X	X	X
Madison					X	X	X
Orange	X						
Seminole	X						
Taylor		X	X			X	X
Union		X	X		X	X	
Wakulla			X				X

* Index value ≥4 for other existing information or index value ≥3 for other parameters.

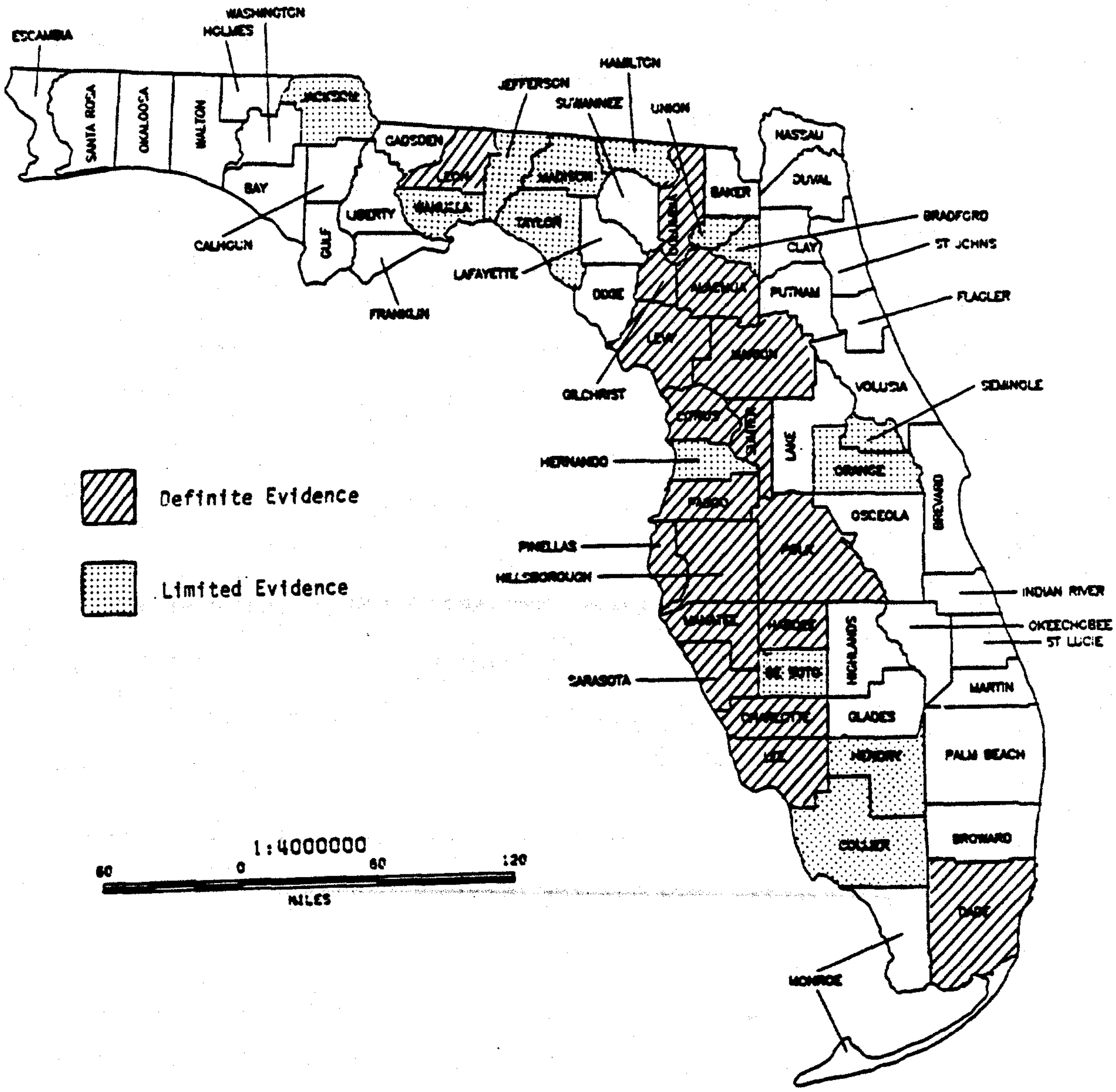

Figure 4-2. Florida Counties with Definite or Limited Evidence of Elevated Radon Potential

4.4 SUPPLEMENTAL INFORMATION

Additional information collected in the study is presented and discussed in the subsections that follow. This information includes (1) results for schools; (2) measurement accuracy and precision; (3) equilibrium factors for radon and radon progeny; (4) effects of specific sampling conditions such as reclaimed land areas, the "closed-room" sampling protocol used in selected study homes, and time when sampling occurred; and (5) extent of correlation among different measurement parameters collected in the land-based survey.

4.4.1 Results for Schools

Indoor radon samplers were sent by mail to one or more public schools in all 67 counties; for Hillsborough, Polk, and Sarasota Counties, samplers were sent to two different schools. The sampling results are listed in Table 4-16. The highest concentrations, at or near 4 pCi/L, were measured in Levy, Marion, and Polk Counties. Four other counties--Citrus, Lee, Madison, and Wakulla--had results within ±10 percent of 2 pCi/L. Thus, the results generally were quite low but were also generally consistent with the overall results presented earlier in this section. For example, Levy, Marion, and Polk are included in the list of 18 counties with definite evidence of elevated potential and the other 4 counties with minor elevations in schools are either on this list or the list of 14 counties with limited evidence. Samplers were not returned by schools in Collier, Gilchrist, Glades, Union, and Volusia Counties. For the school in Leon County, the result for an initial sample was 7.9 pCi/L; however, it was later discovered

Table 4-16. Indoor Radon Results for Public Schools, by County

County	Indoor Radon Concentration, pCi/L	County	Indoor Radon Concentration, pCi/L
Alachua	1.0	Lake	<0.4
Baker	<0.4*	Lee	1.9
Bay	<0.4	Leon	0.5
Bradford	<0.4	Levy	3.9
Brevard	<0.4	Liberty	<0.4
Broward	<0.4	Madison	1.8
Calhoun	<0.4	Manatee	<0.4
Charlotte	0.6	Marion	3.8
Citrus	2.0	Martin	1.0
Clay	<0.4	Monroe	<0.4
Collier	---**	Nassau	<0.4
Columbia	1.0	Okaloosa	<0.4
Dade	1.6	Okeechobee	<0.4
DeSoto	1.1	Orange	<0.4
Dixie	<0.4	Osceola	<0.4
Duval	<0.4	Palm Beach	1.3
Escambia	0.4	Pasco	1.5
Flagler	<0.4	Pinellas	<0.4
Franklin	<0.4	Polk***	4.0
Gadsden	0.4	Polk***	<0.4
Gilchrist	---	Putnam	0.4
Glades	---	St. Johns	<0.4
Gulf	<0.4	St. Lucie	<0.4
Hamilton	<0.4	Santa Rosa	<0.4
Hardee	0.5	Sarasota***	1.1
Hendry	<0.4	Sarasota***	0.4
Hernando	0.8	Seminole	<0.4
Highlands	<0.4	Sumter	1.1
Hillsborough***	1.3	Suwannee	<0.4
Hillsborough***	<0.4	Taylor	0.5
Holmes	<0.4	Union	---
Indian River	0.4	Volusia	---
Jackson	0.6	Wakulla	2.2
Jefferson	<0.4	Walton	<0.4
Lafayette	<0.4	Washington	0.7

* The lower detection limit is 0.4 pCi/L.
** Sampler and/or documentation booklet not returned.
*** Two schools sampled in Hillsborough, Polk, and Sarasota Counties.

that the sampler was placed in a small, closed-in area below ground level with exposed soil, thereby invalidating the result. For a subsequent sample with proper adherence to the deployment protocol, the result was 0.5 pCi/L.

4.4.2 Measurement Quality

GEOMET's quality assurance program for indoor radon measurements includes routine participation in EPA's RMP Program (see Section 3.5). During the study's timeframe, charcoal canisters were exposed in EPA's radon chamber on three occasions and alpha track detectors on one occasion. On each occasion, four samplers of each type were colocated in the chamber; this approach enables calculation of measurement accuracy (true versus measured concentration) and precision (extent of agreement among colocated samplers). EPA's criteria for acceptable performance are accuracy and precision of 25 percent or better. As shown in Table 4-17, these criteria were met on all occasions. For charcoal canisters, accuracy and precision were better than 5 percent on all but one occasion. For alpha track detectors, accuracy and precision were both near 10 percent.

The RMP provides an assessment of measurement quality at relatively high radon levels. For assessment of measurement precision tied to levels encountered during the study, indoor samplers were exposed in duplicate in -a subsample of study homes. A number of these homes had very low levels, making precision assessments almost meaningless. For homes with levels at or above 0.5 pCi/L, the precision estimates for charcoal canisters were 17 percent for the land-based survey and 19 percent for the population-based survey (Table 4-18). Based on homes with levels of 2 pCi/L or greater, the estimates of precision were 5 and 8 percent for the respective surveys.

Table 4-17. Measurement Precision and Accuracy for Indoor Radon Samplers, Based on Participation in EPA's RMP Program

Type of Sampler	Time of Test	True Concentration, pCi/L	Measured Concentration,* pCi/L	Difference**	Coefficient of Variation***	Laboratory
Charcoal Canister	August 1986	25.0	25.6±0.6	+2.4%	2.3%	GEOMET
	February 1987	21.4	17.6±0.3	-17.8%	1.7%	GEOMET
	August 1987	25.1	24.7±0.4	-1.6%	1.6%	GEOMET
Alpha Track Detector	February 1987	22.0	20.1±2.1	-8.6%	10.4%	Terradex

* Average ± standard deviation.

** Measure of accuracy $\left(\frac{\text{Measured-True}}{\text{True}} * 100\right)$.

*** Measure of precision $\left(\frac{\text{Standard Deviation}}{\text{Average Measured}} * 100\right)$.

Table 4-18. Measurement Precision for Indoor Radon (Charcoal Canister), by Concentration Interval

Concentration Interval, pCi/L	Land-Based Survey: Number of Homes	Land-Based Survey: Average Standard Deviation for Interval, pCi/L	Land-Based Survey: Average CV* for Interval	Population-Based Survey: Number of Homes	Population-Based Survey: Average Standard Deviation for Interval, pCi/L	Population-Based Survey: Average CV* for Interval
0.2**	36	0.0	0.0	159	0.0	0.0
0.3 to 0.45	16	0.19	0.52	45	0.17	0.48
0.5 to 0.7	21	0.17	0.27	40	0.17	0.28
0.75 to 0.95	24	0.14	0.17	21	0.17	0.20
1.0 to 1.95	16	0.18	0.15	29	0.17	0.12
2.0 to 3.95	11	0.15	0.06	17	0.25	0.09
≥4.0	7	0.36	0.04	3	0.21	0.02
All cases ≥0.5	79		0.17	110		0.19
All cases ≥2.0	18		0.05	20		0.08

* CV = Coefficient of Variation = Ratio of standard deviation to the mean.
** Both samples below minimum detection limit (0.4 pCi/L).

Alpha track detectors were exposed indoors for approximately 250 homes, and detectors were exposed in duplicate for about 10 percent of these homes. Based on this limited subsample, the precision for indoor alpha track detectors was found to be on the order of 40 to 50 percent (Table 4-19). This poorer precision is partly because these detectors were exposed for a period of 1 month, due to time constraints, rather than the customary duration of 3 months or longer. For alpha track detectors that were placed in the soil for one month but exposed to higher concentrations than those indoors, the average precision was 24 percent (Table 4-20).

Based on 232 homes with valid results for both charcoal canisters and indoor alpha track detectors, the two sets of results were compared. As shown in Table 4-21, the average result was 0.76 pCi/L for the charcoal canisters and 0.95 pCi/L for alpha track detectors. The assessment of the correspondence between the two methods is clouded by the relatively low levels measured and the consequent poor precision for the alpha track detectors. The correlation coefficient between the two sets of results was 0.7. For homes with concentrations at or above 2 pCi/L, the average percent difference between the two methods was between 40 and 50 percent--similar to the level of precision estimated, for alpha track detectors.

4.4.3 Equilibrium Factors

Radon decay products were measured in more than 100 homes; the RPISUs used for these measurements were colocated with charcoal canisters and exposed for the same length of time. Due to cases with invalid results or with radon levels below minimum detection limits, equilibrium factors were

Table 4-19. Measurement Precision for Indoor Radon (Alpha Track Detector), by Concentration Interval

Concentration Interval, pCi/L	Number of Homes	Average Standard Deviation for Interval, pCi/L	Average CV* for Interval
0.25 to 0.45	2	0.14	0.44
0.5 to 0.95	11	0.41	0.53
1.0 to 1.95	8	0.62	0.45
≥4.0	2	0.85	0.37

* CV = Coefficient of Variation = Ratio of standard deviation to the mean.

Table 4-20. Measurement Precision for Soil Radon (Alpha Track Detector), by Concentration Interval

Concentration Interval, pCi/L	Number of Homes	Average Standard Deviation for Interval, pCi/L	Average CV* for Interval
≤49	36	5.3	0.25
50 to 99	26	14.1	0.20
100 to 199	24	38.6	0.26
200 to 399	11	47.3	0.16
400 to 799	6	228.7	0.39
≥800	6	207.7	0.20

* CV = Coefficient of Variation = Ratio of standard deviation to the mean.

Table 4-21. Summary of Indoor Radon Measurements by Two Methods in 232 Homes

Method	Average, pCi/L	Standard Deviation pCi/L	Number of Homes ≥4 pCi/L
Charcoal Canister	0.76	0.89	4
Alpha Track Detector	0.95	1.28	8

calculated for about half of these homes. As shown in Table 4-22, the calculated equilibrium factors ranged from 0.17 to 0.75, averaging between 0.4 and 0.45 across all homes summarized in the table.

4.4.4 Specific Sampling Conditions

Reclaimed Land Areas. Within five quadrangles in Polk County, FIPR staff identified areas known to consist mainly of reclaimed land (Figure 4-3). Homes built on reclaimed land were deliberately sampled for comparison with homes located in these same quadrangles but not built on reclaimed land. As shown in Table 4-23, the homes on reclaimed land had higher levels for all measurement parameters; in particular, the levels were about 50 percent higher for indoor radon and twice as high for soil radon. These results are different from those from a previous study* that found essentially no differences between homes on the two types of land areas. Differences between the two studies could be due to differences in specific locations and homes selected for measurement, in measurement methods, or both.

Compromises to 'Closed-House" Protocol. Ideally, to sample under worst-case conditions, all participating households were to maintain "closed-house" conditions (i.e., no window or door openings, other than for entering or leaving the building) during the 3 days when charcoal canisters were deployed in their homes. To obtain reasonable levels of cooperation during periods of mild weather, some households were allowed to maintain

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* Florida Department of Health and Rehabilitative Services, Study of Radon Daughter Concentrations in Structures in Polk and Hillsborough Counties, 1978.

Table 4-22. Equilibrium Factors by Indoor Radon Concentration Interval

Radon Concentration Interval, pCi/L	Number of Homes	Equilibrium Factor*	
		Average	Range
0.4 to 0.9	18	0.47	0.17 to 0.75
1.0 to 1.9	25	0.40	0.18 to 0.69
2.0 to 3.9	11	0.45	0.30 to 0.68
4.0 to 7.9	4	0.36	0.29 to 0.54
≥8.0	4	0.33	0.25 to 0.41
All Intervals	62	0.42	0.17 to 0.75

$$* \text{ Equilibrium Factor} = 100 \times \frac{\text{Radon Decay Products, WL}}{\text{Radon, pCi/L}} .$$

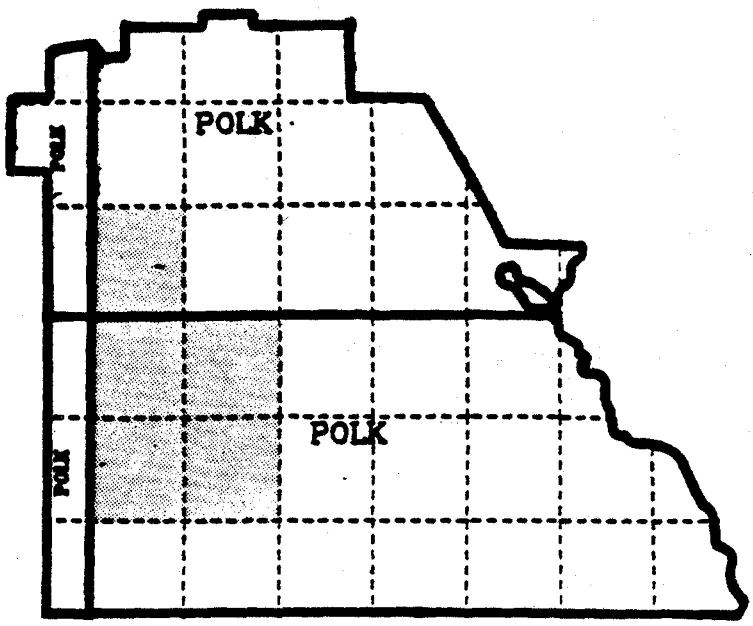

Figure 4-3. Quadrangles in Polk County Used for Locating Homes Built on Reclaimed Land

Table 4-23. Comparison of Sampled Homes on Reclaimed Land Versus Those Not on Reclaimed Land Within Five Quadrangles in Polk County

	Land Area	
Parameter	Reclaimed	Not Reclaimed
Number of Homes	19	28
Indoor Radon, pCi/L*	4.6	3.0
Soil Radon, pCi/L**	1,410	734
Indoor Gamma, μR/h	8.0	7.1
Outdoor Gamma, μR/h	11.9	7.9

* Based on a subset of 40 homes (16 reclaimed, 24 not reclaimed) with valid results.

** Based on a subset of 43 homes (18 reclaimed, 25 not reclaimed) returning samplers.

"closed-room" conditions (i.e., similar to "closed-house" conditions, but restricted to the room in which the sampler was deployed). Further, some of the households agreeing to maintain "closed-house" conditions subsequently reported that they opened windows on occasion during the sampling period.

The extent of homes with compromises to the "closed-house" protocol and apparent impact on indoor radon concentrations is shown in Table 4-24; the impact is termed "apparent" because differences among sampling conditions could be partly due to differences in sampling locations (e.g., county or quadrangle) or sampling times (e.g., winter versus spring, discussed below). For the land-based survey, "closed-room" conditions were maintained in about 30 percent of the sampled homes, and radon concentrations in homes with this condition averaged about 0.3 pCi/L below that for homes with "closed-house" conditions and no reported window openings. The 4 percent of homes with some reported window openings also had lower concentrations than those without, by an average of 0.2 pCi/L.

For the population-based survey, about 9 percent of the participants reported some window openings, and these homes also had concentrations averaging 0.2 pCi/L lower than those with no reported openings. The fraction of homes reporting "closed-room" conditions was much smaller (5 percent) for the population-based survey, with average concentrations about 0.1 pCi/L below those in homes with "closed-house" conditions during sampling. For the population-based survey, the use of "closed-room" conditions was determined from participant comments in the documentation booklet, whereas for the land-based survey the field technicians made this determination when they deployed the samplers and discussed sampling protocols with participants.

Table 4-24. Indoor Radon Results from Land- and Population-Based Surveys, by Sampling Conditions

Sampling Condition	Land-Based Survey: Number (%) of Homes	Land-Based Survey: Average, pCi/L	Land-Based Survey: Standard Deviation, pCi/L	Population-Based Survey: Number (%) of Homes	Population-Based Survey: Average, pCi/L	Population-Based Survey: Standard Deviation, pCi/L
"Closed-House" Conditions, No Window Openings Reported	1995 (65.4)	1.1	2.4	2680 (86.3)	0.7	1.6
"Closed-House" Conditions, Some Window Openings Reported	116 (3.8)	0.9	1.4	270 (8.7)	0.5	0.9
"Closed-Room" Conditions	939 (30.8)	0.8	1.3	156 (5.0)	0.6	1.0
Total, All Conditions	3050 (100)	1.0	2.1	3106 (100)	0.7	1.5

Thus, the extent to which "closed-room" conditions prevailed may be understated for the population-based survey.

The fact that exceptions to the "closed-house" protocol were reported for about one-third of the land-based homes and about one-seventh of the population-based homes means that the worst-case (i.e., "closed-house") condition chosen for the sampling protocol would not occur, as a rule, in a significant number of Florida homes. Although the compromises to the worst-case condition reported above appear to have resulted in some lowering of indoor concentrations, the study results are still oriented toward worst-case conditions because (1) screening of counties was based on the highest concentration measured in each county and (2) indoor radon is the only parameter affected by compromises to the "closed-house" sampling protocol.

Time-Related Variations. The population-based survey was conducted in four successive cycles, with sampler deployment ranging in time from January and February for the first cycle to May and June for the last cycle. Because each cycle included a random sample of households from all 67 counties, this survey provided a basis for examining time-related variations in indoor concentrations with minimal confounding due to geography.

Based on 28 counties with 7 or more homes returning samplers for each cycle, representing 81 percent of the population-based results, there was a time-related trend in average indoor radon concentrations. As shown in Table 4-25, average concentrations were 0.1 pCi/L lower for cycle 2, 0.3 pCi/L lower for cycle 3, and 0.2 pCi/L lower for cycle 4 than those for the first cycle. To further eliminate any effect of geographic factors, the same comparison was restricted to 47 census tracts or enumeration districts

Table 4-25. Indoor Radon Concentrations from the Population-Based Survey, for Selected Counties and Census Tracts, by Survey Cycle

Selection Criterion	Survey Cycle	Number of Homes	Average, pCi/L	Standard Deviation, pCi/L
Counties with ≥7 Homes Per Cycle	1	690	0.9	1.4
	2	678	0.8	1.8
	3	586	0.6	1.3
	4	576	0.7	1.9
CTs* or EDs with ≥2 Homes Per Cycle	1	148	1.0	1.4
	2	161	0.7	1.0
	3	148	0.6	0.8
	4	141	0.5	0.9

* CT = Census Tract; ED = Enumeration District.

with 2 or more homes returning samplers for each cycle. For this smaller (about 20 percent) but geographically compact subset of population-based homes, average concentrations were 0.3 pCi/L lower for the second cycle, 0.4 pCi/L lower for the third cycle, and 0.5 pCi/L lower for the fourth cycle than those for the first cycle.

One possible interpretation of the above results is that the first survey cycle came close to representing worst-case conditions but subsequent cycles did not. The effects of such a possibility were assessed by inflating the results from cycles 2 to 4 by 40 percent (i.e., multiplying by 1.4). As shown in Table 4-26, this inflation had little effect on the county indexes used to assess radon potential. The index value for population-based radon results increased by 1 for 7 counties and remained the same for the remaining 60 counties. Most noteworthy of the 7 counties for which index values would change is DeSoto County, for which the average index across all data sources would increase from 2.3 to 2.5 if the population-based results from the last 3 cycles were to be inflated by 40 percent.

To assess whether time-related variations from the population-based survey were associated with sampling conditions or other factors, the results from 28 counties with 7 or more homes sampled in each cycle were disaggregated both by survey cycle and by sampling condition. As shown in Table 4-27, the occurrence of window openings and "closed-room" conditions was lowest for the first and last cycles, probably because of heating requirements in the former case and air-conditioning requirements in the latter. After netting out the cases with compromises to the "closed-house" protocol, the trend of decreasing results with successive cycles was reduced but some differences persisted. Homes with window openings had the same or lower average concentrations than

Table 4-26. Changes to Index Values for Seven Counties Resulting From Inflation of Population-Based Survey Results for Cycles 2 to 4

	Index for Population-Based Indoor Radon		Average Index (all data sources)	
	Current Value	Possible Value	Current Value	Possible Value
Bradford	1	2	1.5	1.7
Charlotte	3	4	2.7	2.8
DeSoto	2	3	2.3	2.5
Hernando	1	2	2.0	2.2
Leon	3	4	3.2	3.3
Madison	1	2	1.7	1.8
Suwannee	2	3	1.7	1.8

Table 4-27. Indoor Radon Results* from the Population-Based Survey, by Sampling Condition and Survey Cycle

	Survey Cycle							
	Cycle 1		Cycle 2		Cycle 3		Cycle 4	
Sampling Condition	Number (%) of Homes	Average, pCi/L	Number (%) of Homes	Average, pCi/L	Number (%) of Homes	Average, pCi/L	Number (%) of Homes	Average pCi/L
"Closed-House" Conditions, No Window Openings	604 (87.5)	0.9	571 (84.2)	0.8	479 (81.7)	0.6	521 (90.5)	0.7
"Closed-House" Conditions, Some Window Openings	70 (10.1)	0.7	80 (11.8)	0.5	55 (9.4)	0.6	27 (4.7)	0.4
"Closed-Room" Conditions	16 (2.3)	0.5	27 (4.0)	0.7	52 (8.9)	0.6	28 (4.9)	1.0
Total, All Conditions	690 (100)	0.9	678 (100)	0.8	586 (100)	0.6	576 (100)	0.7

* Based on 28 counties with 7 or more homes with results for each cycle.

"closed-house" homes for every survey cycle. Interestingly, the "closed-room" homes had the lowest average results for the first cycle but the highest results for the last cycle; however, the number of such homes was quite small.

Homes with Crawlspace. A limited number of homes with crawlspace was sampled for the population-based survey as a supplement to the slab-on-grade sample. These homes, numbering 135 in total and representing 4 percent of the population-based results, were located in 28 rural counties where sample coverage was sparse. Although the concentrations in homes with crawlspace were expected to be generally lower than in slab-on-grade homes, such homes could still be useful for identifying areas of elevated radon potential given the alternative of lower survey coverage.

In Table 4-28, the indoor radon concentrations for crawlspace and slab-on-grade homes are compared for the 28 counties. The average concentration was higher for slab-on-grade homes in most counties. Although there were small differences between the two groups of homes in most cases, results near minimum detection levels were obtained for many of the crawlspace homes. Sumter and Levy Counties had the largest difference between the group means (1.4 and 2.7 respectively), with the slab-on-grade homes higher. DeSoto, Hardee, Hendry, and Liberty Counties had differences between 0.5 and 0.7. Although there were no crawlspace homes with results at or above 4 pCi/L, results between 3.5 and 4 pCi/L were obtained for such homes in three counties. In one of these counties (Suwannee), the maximum indoor radon concentration measured for the slab-on-grade homes was 0.5 pCi/L. The homes with crawlspace that were sampled for the population-based survey did not excessively dilute the results because they represented only about 4 percent of the total sample.

Table 4-28. Indoor Radon Results from the Population-Based Survey for 28 Counties With Both Slab-on-Grade and Crawlspace Homes Sampled

	Homes with Slab-on-Grade Foundations			Homes with Crawlspace		
County	Number of Homes	Average, pCi/L	Maximum, pCi/L	Number of Homes	Average, pCi/L	Maximum, pCi/L
Bradford	9	0.4	1.6	4	0.2	0.2
Calhoun	4	0.7	1.3	9	0.3	0.6
Columbia	3	0.2	0.2	5	0.2	0.2
DeSoto	13	0.9	3.5	2	0.2	0.2
Dixie	4	0.3	0.6	8	0.2	0.2
Franklin	7	0.3	0.8	2	0.2	0.2
Gadsen	4	0.5	0.7	7	0.5	2.3
Gilchrist	13	1.8	7.2	2	1.9	3.5
Glades	5	0.4	1.1	1	0.2	0.2
Gulf	4	0.2	0.2	7	0.2	0.2
Hamilton	5	0.2	0.4	4	0.3	0.5
Hardee	12	0.9	3.9	3	0.3	0.4
Hendry	12	0.7	2.2	1	0.2	0.2
Jackson	10	0.4	0.9	1	0.2	0.2
Jefferson	0	--	--	8	0.2	0.5
Lafayette	9	0.6	0.8	3	0.3	0.4
Levy	8	2.9	14.0	3	0.2	0.2
Liberty	3	0.7	0.8	9	0.2	0.4
Madison	1	0.5	0.5	7	0.5	1.8
Monroe	6	0.2	0.2	3	0.2	0.2
Nassau	14	0.3	0.7	4	0.2	0.2
Okeechobee	11	0.4	1.0	2	0.2	0.2
Sumter	8	2.6	8.5	7	1.2	3.6
Suwannee	4	0.3	0.5	11	0.5	3.7
Union	13	0.8	1.6	5	0.6	1.0
Wakulla	4	0.3	0.7	3	0.5	1.1
Walton	7	0.3	0.7	11	0.3	0.6
Washington	6	0.5	1.0	3	0.4	0.8

4.4.5 Correlation Among Land-Based Measurement Parameters

The extent of association among different measurement parameters is of particular interest for purposes of predicting specific locations where buildings have not yet been constructed but indoor radiation levels are likely to exceed standards. Based on 2,749 homes with a complete set of results from the land-based survey, Pearson correlation coefficients were calculated among indoor and soil radon results and indoor and outdoor gamma radiation results. As shown in Table 4-29, indoor radon was most strongly associated with soil radon. Indoor and outdoor gamma were associated but to a lesser extent than indoor and soil radon. There was a strong association (r=0.9) between indoor and outdoor uranium readings, but these readings were generally very low and weakly associated with all other parameters.

One difficulty in predicting indoor radon levels at individual sites is that the soil or outdoor readings may be highly sensitive to the specific site chosen. In such a case, it may still be possible to develop accurate predictions at an aggregate level such as a quadrangle. This possibility was investigated by examining correlations between indoor radon and other parameters based on (1) results for individual homes and (2) averages across homes in the same quadrangle. As shown in Table 4-30, the strength of the association between indoor and soil radon increased when quadrangles were used as the unit of analysis; in particular, the correlation coefficient was 0.8 when the analysis was restricted to quadrangles with results from at least four homes. Thus, the results indicate that better predictability can be achieved at geographically aggregated levels. This is

Table 4-29. Matrix of Pearson Correlation Coefficients* Among Parameters Measured for Land-Based Survey Homes

Measurement Parameter	Soil Radon	Indoor Gamma	Outdoor Gamma (Site 1)	Outdoor Gamma (Site 2)
Indoor Radon	0.52	0.24	0.16	0.33
Soil Radon		0.17	0.21	0.39
Indoor Gamma			0.29	0.32
Outdoor Gamma** (Site 1)				0.42

* Based on 2,749 homes with a complete set of measurement results.

** For outdoor gamma readings, site 1 was always near the site where the soil radon measurement was taken and site 2 was usually on the opposite side of the house.

Table 4-30. Correlation Between Indoor Radon and Other Parameters, Based on Individual Homes Versus Quadrangle Averages as the Unit of Analysis

		Correlation Coefficient with Indoor Radon			
Basis for Calculations	Number of Cases	Soil Radon	Indoor Gamma	Outdoor Gamma (Radon Site)	Outdoor Gamma (Other Site)
Individual Homes	2,749	0.52	0.24	0.16	0.33
Quadrangles with 2 or More Homes	496	0.70	0.30	0.28	0.34
Quadrangles with 3 or More Homes	427	0.77	0.23	0.27	0.35
Quadrangles with 4 or More Homes	353	0.80	0.23	0.28	0.36
Quadrangles with 5 or More Homes	281	0.80	0.24	0.33	0.42

not to say that satisfactory predictive power cannot be obtained at the level of individual lots; however, further research is needed to assess this possibility.

Section 5.0

DETAILED RESULTS FOR SELECTED COUNTIES

Section 5.0

DETAILED RESULTS FOR SELECTED COUNTIES

Detailed results are presented for the 18 counties indicated in Section 4.0 as having definite evidence of elevated radon potential. The intent of the analysis is to assess the geographic extent of elevated potential for each county. The counties are presented in alphabetical order.

For each county, results pertaining to indoor radon, soil radon, and terrestrial uranium are shown for each 1:24,000 quadrangle. For indoor radon collected under the land-based survey, the maximum concentration and the fraction of measured homes with a result at or above 4.0 pCi/L are indicated for each quadrangle. For soil radon, the fraction of measured homes with results above 630 pCi/L is-shown in addition to the maximum. For terrestrial uranium collected under the NURE program, only the quadrangle average (in ppme) is given. For indoor and soil radon, quadrangles with any result above the midpoint on the index of potential (4 pCi/L for indoor radon and 630 pCi/L for soil radon) are shaded. Any fraction that is significantly different from zero is indicated with an asterisk. Because a more conservative summary statistic (quadrangle average) is used for uranium, any quadrangle above the first cutoff point for the index (2.4 ppme) is shaded.

Detailed results are not presented for gamma radiation because there were very few occurrences of elevated readings. Based on maps containing county, zip code, and quadrangle boundaries, the indoor radon results from the population-based survey are also incorporated. These map sheets were too large to allow reproduction in this report. Instead, areas covered by zip codes with results at or above 4 pCi/L are indicated on maps shown here for the 18 counties. In addition, indoor radon results from both surveys are summarized by zip code in tabular format. All Florida quadrangles are listed and shown on maps in Appendix B. Radon results from the two surveys are listed in Appendix C for the land-based survey and Appendix D for the population-based survey.

The regional geology of each of the 18 counties was examined using maps compiled by MARTEL Laboratories for the NURE program. The geologic maps were supplemented by information obtained from the Florida Bureau of Geology in Tallahassee. The General Soil Map of Florida* was also reviewed for information regarding the major soil types present.

Figures shown for each county illustrate the regional bedrock geology along with the associated major soil groups. The geologic maps indicate the regional geology of each county with boundaries between the main lithologic units. Soil maps show only those groups that are classified as well drained along with any soils that contain phosphatic sands. It is emphasized that the contact boundaries illustrated in both the soil and geologic maps are highly generalized and should not be interpreted as precise. They are meant to show only the general location of differing soil groups and individual formations. The information is entirely secondary and was not verified in the field.

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* Beckenbach, J.R., and J.W. Hammett. 1962. General Soil Map of Florida. Florida Agricultural Experiment Stations and U.S. Department of Agriculture.

The distribution of soil groups and rock types is described in the subsections for each of the 18 designated counties. The explanations are framed to answer the following questions: What geologic formations and major soil types are present? Are they associated with quadrangles for which direct measurement results indicate elevated radon potential? Does the distribution of rock types and soil groups confirm or refute expectations regarding the distribution of radon potential in the county?

The analysis of secondary data (geology, soils, and NURE information) has been based on the following assumptions:

- All radon gas is originating from the naturally occurring uranium decay series.
- Uranium is geochemically associated with occurrences of phosphate in Florida.*
- NURE measurements of ppm equivalent (ppme) uranium reflect the true concentration of uraniferous materials in the surface cover (i.e., mapped rock units and soils).
- Soils mapped as well drained have the physical attributes (high porosity, high permeability, and low average pore moisture content) required to readily promote the transmission of radon gas to the surface.
- Soils mapped as poorly drained have physical attributes (low porosity, low permeability, and high average pore moisture content) that inhibit the transmission of radon gas to the surface.

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* Altschuler, Z.S., E.B. Jaffe, and F. Cuttitta. 1956. The Aluminum Phosphate Zone of the Upper Bone Valley Formation, Florida and its Uranium Deposits. U.S. Geol. Survey Prof. Pap. 300 pp. 495-504.

Sweeney, J.W., and S.R., Windham, 1979. Florida: The New Uranium Producer. Bureau of Geology, Division of Resource Management, Florida Department of Natural Resources, Special Publication No. 22.

5.1 ALACHUA COUNTY

Results for indoor radon, soil radon, and terrestrial uranium are summarized by quadrangle in Figure 5-1. The three land-based data sources and population-based results show complementary results, with indoor radon showing the most widespread evidence of elevated potential. Only the eastern and northeastern edges of the county appear to have lower potential, and in these cases the number of homes sampled per quadrangle may not have been sufficient to detect elevated radon potential.

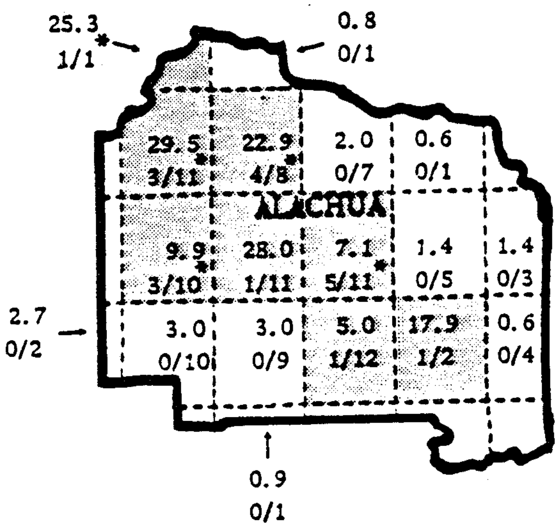
Results are presented in Table 5-1 by zip code. Concentrations at or above 4.0 pCi/L were measured by both surveys in zip codes 32605, 32607, and 32608, and numerous other zip codes had elevated readings from one of the surveys. Of the 12 zip codes with four or more homes sampled in one or both of the two surveys, all but two had at least one measurement result at or above 4.0 pCi/L.

The bedrock geology of Alachua County is characterized by exposures of the Hawthorn Formation (Tmh) in the north and central portions of the county, limestones of the Crystal River Formation (Tecr) in the western portion of the county (see Figure 5-2), thick to thin shelly sands (Qtw) covering Hawthorn sediments in eastern Alachua County, and sandy clays of the Cypress Head Formation (Tpch)* in the southwestern portion of the county.

* New name designation by the Florida Bureau of Geology (1987, unpublished data); refers to the "Citronelle-like" sands and sandy clays that are exposed at the surface in north-central Florida, including the sands and clays that comprise the Brooksville Ridge. The name Alachua Formation is retained, but is restricted to the quartz-rich clays and associated phosphatic nodules that fill sinkholes and other solution depressions in the carbonate platform sediments exposed along the Ocala Uplift, (Scott, 1987, Florida Bureau of Geology, personal communication).

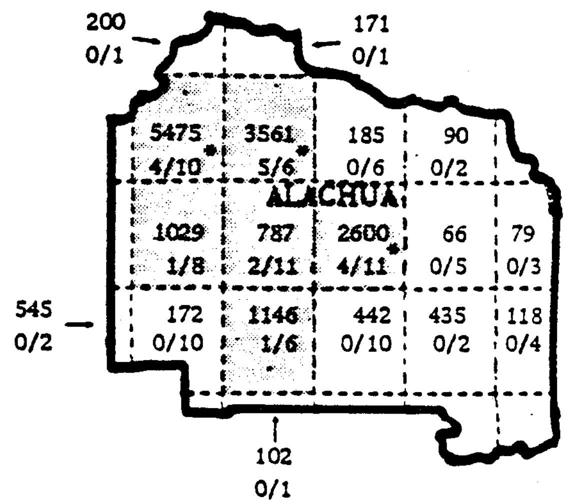
INDOOR RADON:

Maximum, pCi/L;
Fraction ≥ 4 pCi/L



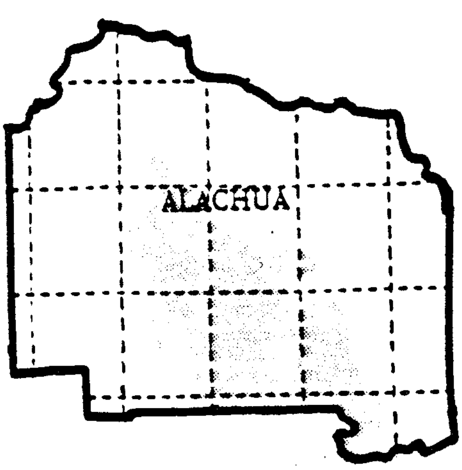
SOIL RADON:

Maximum, pCi/L;
Fraction ≥ 630 pCi/L



INDOOR RADON:

Area covered by zip codes
with elevated results from
population-based survey



TERRESTRIAL URANIUM:

Average, ppme

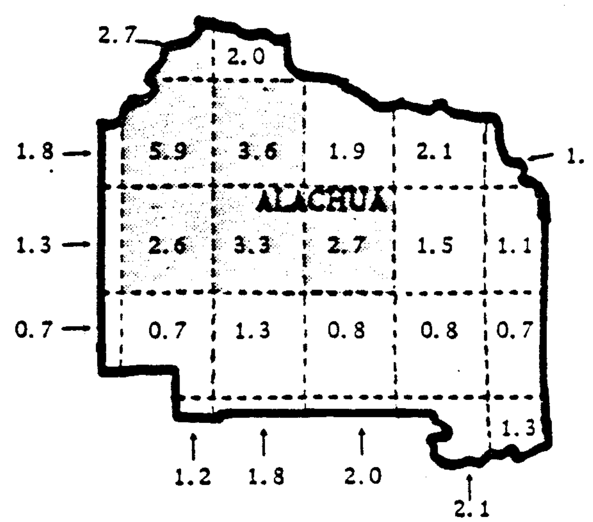
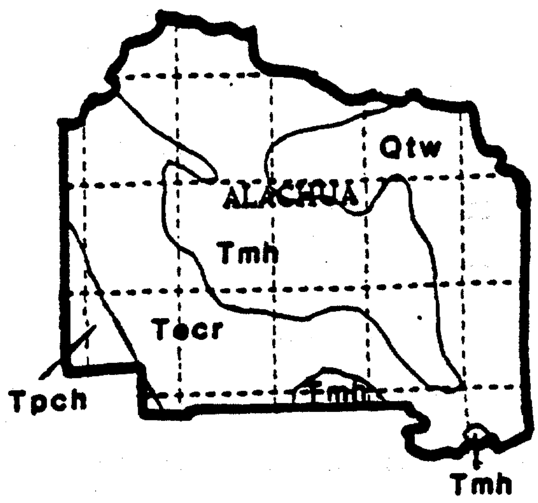


Figure 5-1. Radon and Uranium Results
by 1:24,000 Quadrangle for Alachua County

Table 5-1. Indoor Radon Concentrations for Alachua County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
32601	8	1.5	3.3	17	0.9	6.1
32605	11	2.5	7.1	7	4.5	14.4
32606	4	1.0	1.3	5	2.6	5.1
32607	4	9.1	28.0	19	3.1	10.1
32608	9	2.1	5.0	5	1.8	4.0
32609	7	1.1	2.0	6	0.5	1.1
32610	1	0.5	0.5			
32615	17	9.5	29.5	3	2.4	3.2
32618	12	1.3	3.0	1	0.6	0.6
32631	1	1.4	1.4			
32640	5	3.8	17.9	1	2.6	2.6
32643	5	1.3	2.4	2	2.9	4.2
32662	1	0.4	0.4			
32666	2	0.2	0.2			
32667	9	0.9	1.8	1	12.6	12.6
32669	11	3.3	9.9			
32694	1	0.6	0.6			



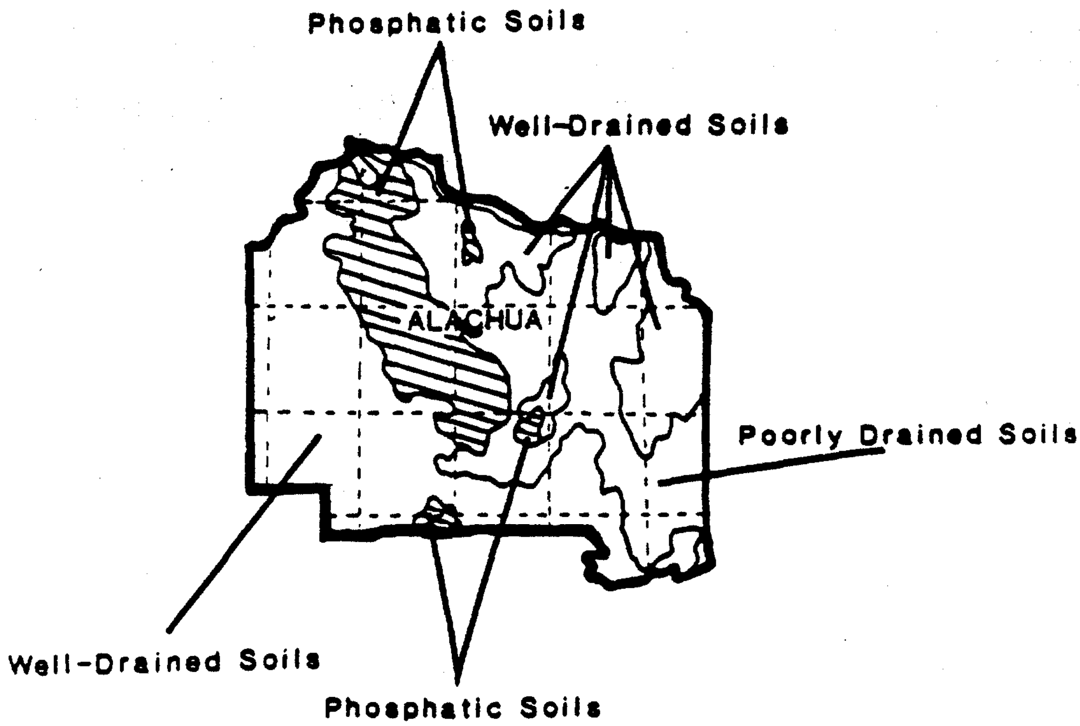


Figure 5-2. Bedrock Geology and Associated Soil Groups for Alachua County

Soils in eastern Alachua County are a mixture of well-drained and poorly drained types. Soils in the western Alachua county are predominantly well drained. A belt of phosphatic soils extends from northwestern Alachua County into central portions of the county.

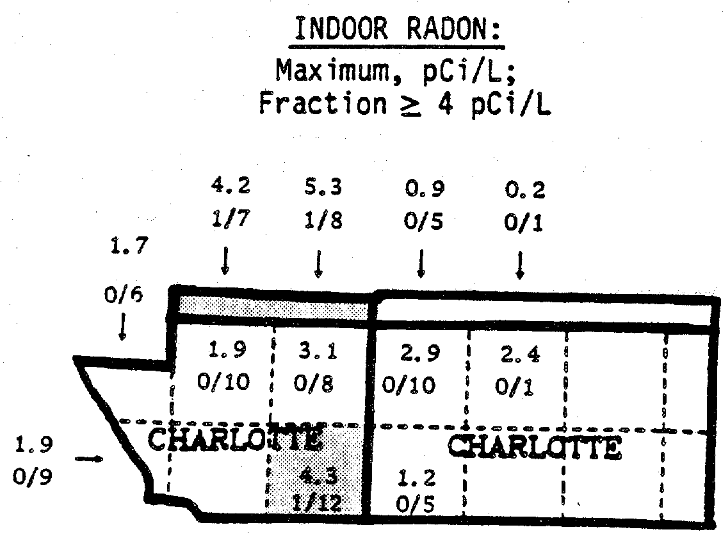
NURE data suggest that the highest average uranium values (2.2 to 7.6 ppme) are associated with areas mapped as part of the Hawthorn Formation. Where limestones are exposed in southern Alachua County, uranium values drop off to less than 1.3 ppme.

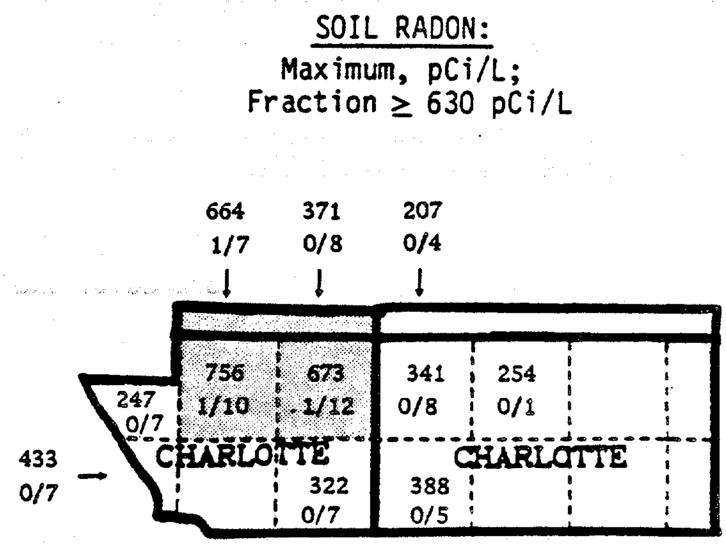
The geology of Alachua county appears to favor the production of large amounts of radon gas. The shaded quadrangles include areas mapped as part of the Hawthorn Formation, have exposures of phosphatic soils within their boundaries, and for the most part exhibit elevated levels of ppme uranium.

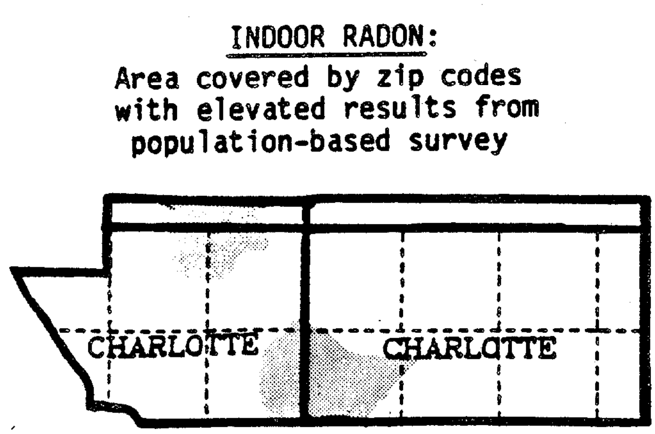
5.2 CHARLOTTE COUNTY

The land-based indoor and soil radon results in Figure 5-3 collectively indicate that areas of elevated potential exist only in the western part of Charlotte County. The zip codes with elevated population-based results also cover the quadrangles with the high land-based readings. The uranium results were relatively low throughout the county. As shown in Table 5-2, of the three zip codes--33952, 33953, and 33954--in which indoor concentrations above 4 pCi/L were measured through the land-based survey, the two (33952 and 33955) covered by the population-based survey also had results at or above this threshold. One additional zip code--33948--had a maximum concentration above 4 pCi/L from the population-based survey.

The geology of Charlotte County (Figure 5-4) is characterized by the occurrence of unconsolidated shelly sands of the Anastasia Formation (Qpa), the shelly carbonates of the Caloosahatchee Formation (Qpcm), and the carbonates of the Tamiami Formation (Tpt). All of the associated soil types are poorly drained. Sediments of the Hawthorn Formation occur near the surface in Charlotte County. NURE data suggest that concentrations of uranium at the surface are uniformly low (less than 1.5 ppme) over all of Charlotte County. The occurrence of elevated levels of radon in the shaded quadrangles in association with apparently uranium-poor sediments could reflect the transport of radon from Hawthorn sediments beneath the surface.







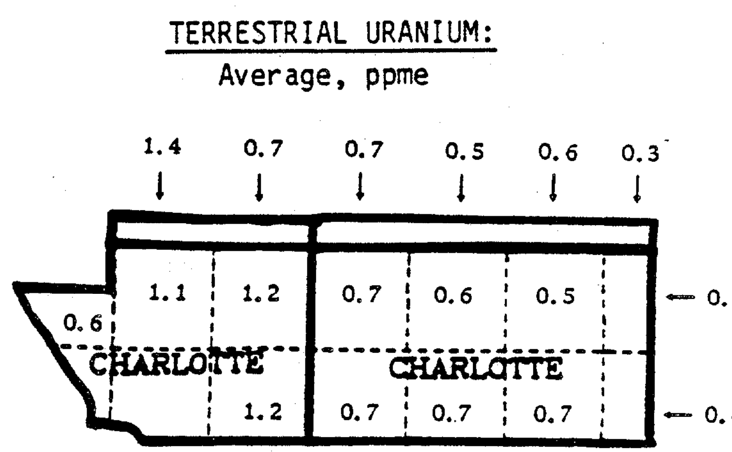


Figure 5-3. Radon and Uranium Results
by 1:24,000 Quadrangle for Charlotte County

Table 5-2. Indoor Radon Concentrations for Charlotte County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
33533	8	0.4	1.7	3	2.2	2.4
33909	1	1.4	1.4			
33946	8	0.7	1.9			
33947	1	0.2	0.2			
33948	7	1.4	2.3	4	3.4	6.1
33950	22	0.7	2.9	2	1.4	2.5
33951	2	0.7	1.1			
33952	6	2.2	5.3	23	1.5	4.0
33953	7	1.6	4.2			
33954	6	1.9	3.9	1	1.2	1.2
33955	14	1.0	4.3	6	1.1	4.4

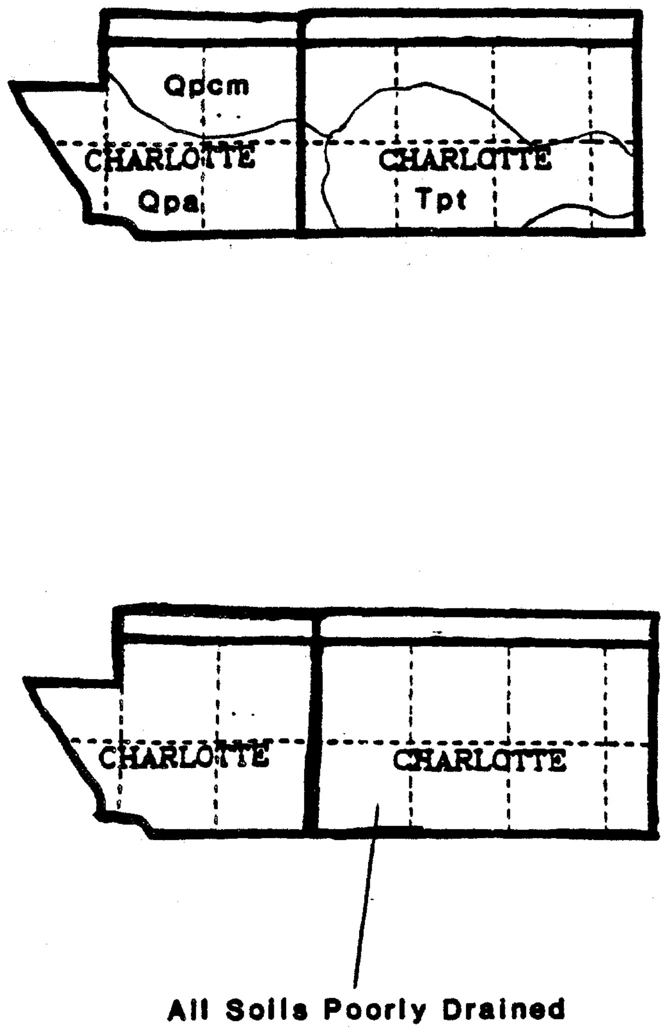


Figure 5-4. Bedrock Geology and Associated
Soil Groups for Charlotte County

5.3 CITRUS COUNTY

Results for indoor radon, soil radon, and terrestrial uranium for Citrus County are summarized by quadrangle in Figure 5-5. Different, but adjoining, quadrangles are indicated by land-based radon and soil results as having elevated potential. Elevated results from the the population-based survey included the quadrangle with the highest soil reading. There are no uranium values at or above 2.4 ppme. (These are quadrangle averages only; formation-specific values are higher.) A quad-average value of 2.3 occurred in the quadrangle where the highest indoor concentration was measured. The collective results indicate that the areas of elevated potential are essentially confined to the northern and eastern parts of the county, bordering on Marion and Sumter Counties.

Indoor radon results by zip code are given in Table 5-3. With the exception of 32650 and 32652, the zip codes covered by the two surveys did not overlap. The land-based results indicate 32642 as a zip code with elevated potential. The population-based results indicate zip codes 32650 and 33652; maximum readings between 3 and 4 pCi/L were obtained from the land-based survey in these zip code areas.

The bedrock geology of Citrus County is characterized by carbonate rocks (see Figure 5-6). Limestones belonging to the Inglis Formation (Tei), Williston Formation (Tew), Crystal River Formation (Tecr), Suwannee Limestone (Suwannee) (Tos), and Avon Park Limestone (Teap) are exposed over much of the county. In eastern Citrus County these carbonates are covered by a ridge of sands and clays belonging to the Cypress Head Formation (Tpch). Central Citrus County has well-drained soils, some of which are phosphatic. Poorly drained soils predominate in the far eastern and far western portions of the county.

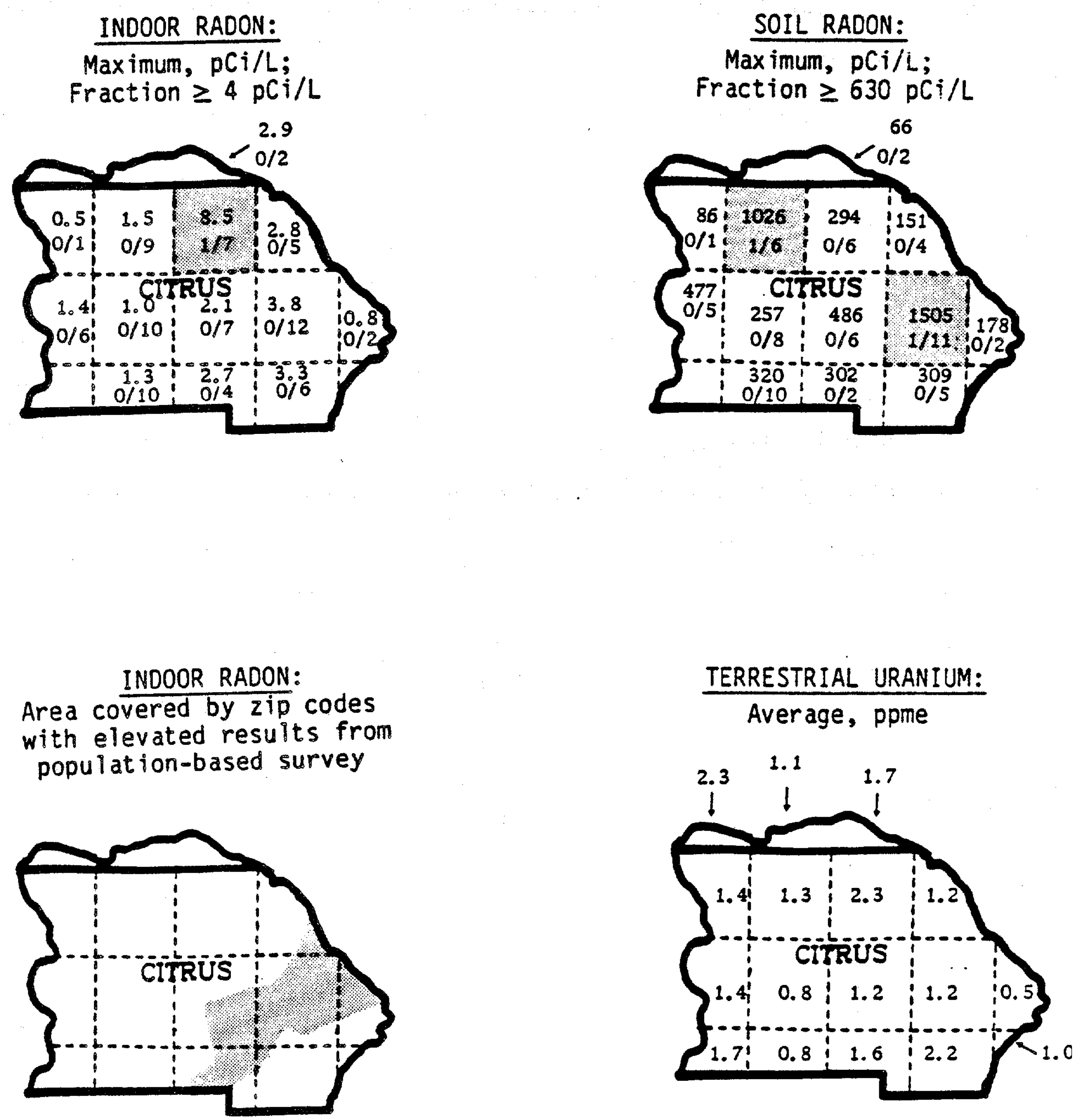
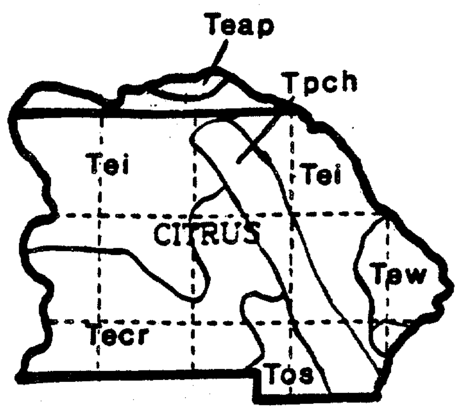


Figure 5-5. Radon and Uranium Results
by 1:24,000 Quadrangle for Citrus County

Table 5-3. Indoor Radon Concentrations for Citrus County, by Zip Code

Zip Code	Land-Based Survey			Population-Based Survey		
	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
32629	16	0.8	1.5	1	0.4	0.4
32630	3	1.7	2.9			
32636	9	1.2	3.3	1	1.9	1.9
32642	8	1.9	8.5			
32646	19	0.6	1.3			
32647	6	0.7	1.3			
32650	9	1.2	3.8	31	1.1	7.5
32652	2	1.9	2.7			
32661	6	1.0	2.1			
33652	2	2.8	3.4	16	3.7	15.9
33785	1	0.8	0.8			



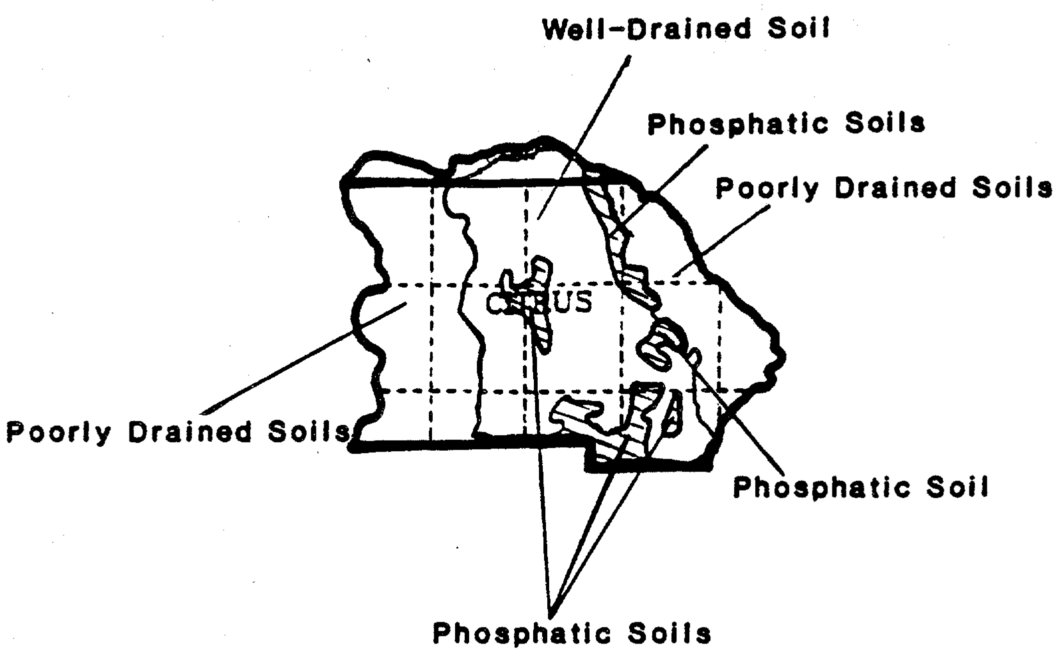


Figure 5-6. Bedrock Geology and Associated
Soil Groups for Citrus County

NURE data suggest that the highest concentrations of uranium occur in areas mapped as part of the Inglis (3.1 ppme average) and Williston (2.7 ppme average) Formations in northeast Citrus County. High concentrations are also found in the southeast in association with sediments of the Cypress Head Formation.

The shaded quadrangles generally include areas with phosphatic soils, although not all areas with phosphatic soils have associated observations of high radon due to gradients in apparent uranium content.

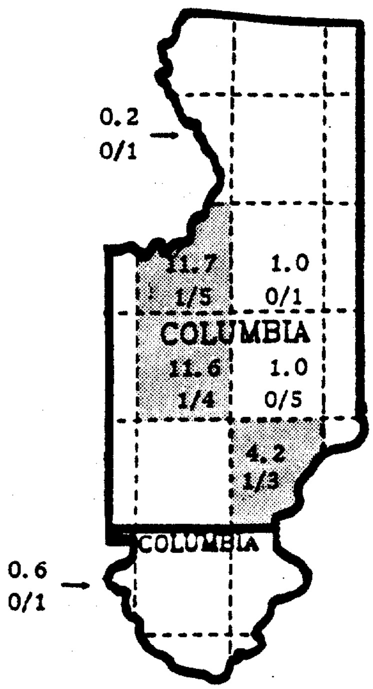
5.4 COLUMBIA COUNTY

Three quadrangles had elevated readings for both indoor and soil radon data from the population-based survey (Figure 5-7). Only one of these had elevated uranium readings, but two additional quadrangles in the southernmost part of the county that were not covered by the land-based survey also had elevated uranium readings. Only about half the quadrangles were covered by the land-based survey due to sparse population and a lack of slab-on-grade housing. As shown in Table 5-4, the elevated indoor results from the land-based survey were confined to zip code 32055, and there were no cases of elevated readings from the population-based survey.

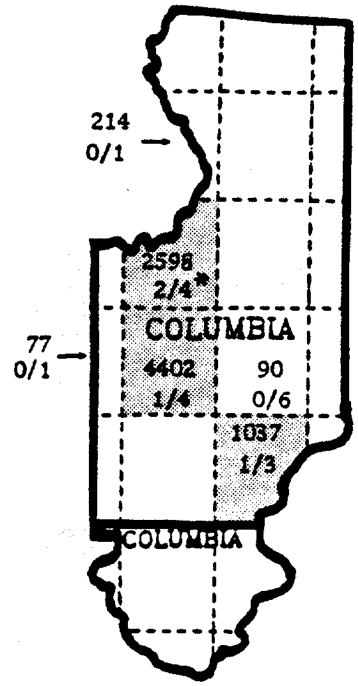
Bedrock geology and associated soil groups for Columbia County are shown in Figure 5-8; the Hawthorn Formation (Tmh) underlies a veneer of alluvial deposits (Qtwm) that thins from east to west. Sediments of the Hawthorn Formation are directly exposed along stream channels in a belt trending northwest to southeast. Carbonates belonging to the Suwannee Limestone (Tos) and Crystal River (Tecr) Formations crop out in the southern portion of the county. Poorly drained soils dominate the eastern portion of Columbia County and well-drained soils dominate the western and southern portions. Phosphatic soils are present in two quadrangles of southeastern Columbia County.

The distribution of the shaded quadrangles follows the pattern of exposure of the Hawthorn Formation. Associated soils are sandy and well-drained, and phosphatic soils are exposed in the southeastern shaded quadrangle.

INDOOR RADON:
Maximum, pCi/L;
Fraction ≥ 4 pCi/L

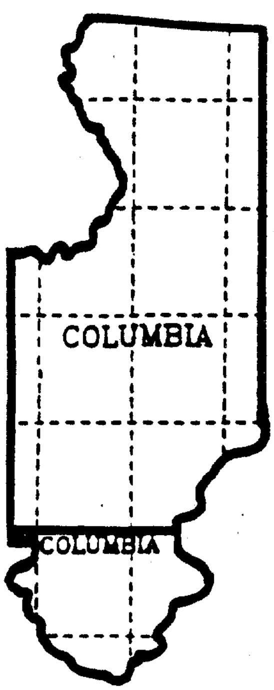


SOIL RADON:
Maximum, pCi/L;
Fraction ≥ 630 pCi/L



INDOOR RADON:

Area covered by zip codes
with elevated results from
population-based survey



TERRESTRIAL URANIUM:
Average, ppme

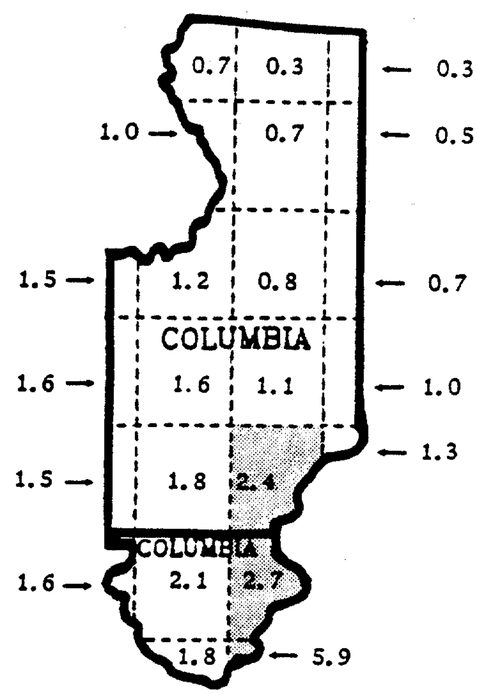


Figure 5-7. Radon and Uranium Results
by 1:24,000 Quadrangle for Columbia County

Table 5-4. Indoor Radon Concentrations for Columbia County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
32055	15	2.7	11.7	8	0.2	0.2
32056	1	1.0	1.0			
32096	4	0.9	3.1			

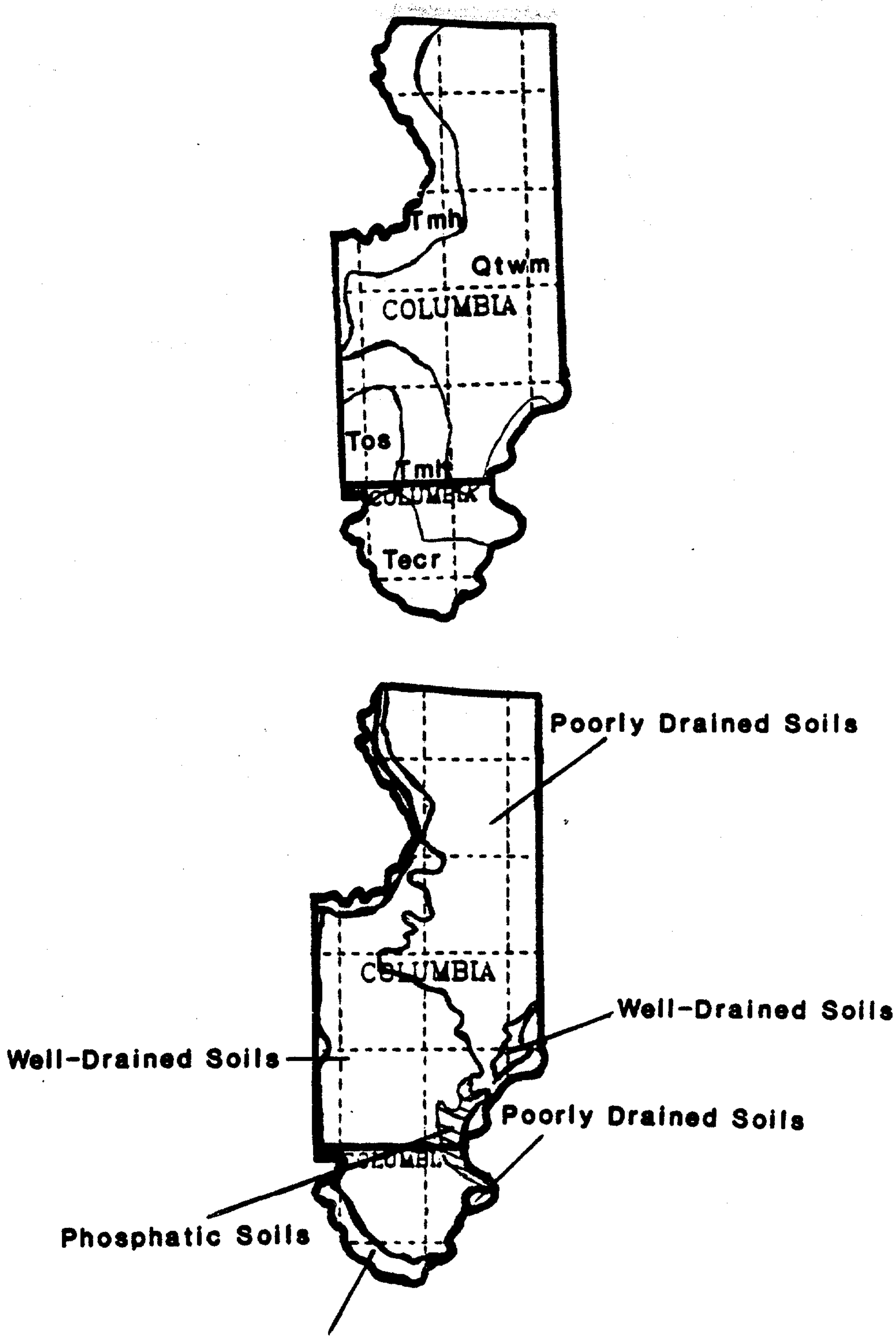


Figure 5-8. Bedrock Geology and Associated
Soil Groups for Columbia County

NURE data show the highest levels of uranium (2.8 to 3.2 ppme) associated with areas mapped as part of the Hawthorn Formation in the southern portion of the county. In contrast, the two more northern shaded quadrangles do not show evidence of elevated levels of uranium (highest averages < 1.7 ppme). Hawthorn sediments are, however, close to the surface in these two quadrangles. Therefore, it is possible that radon is originating in the Hawthorn, beneath the detection depth for the NURE survey instruments, and migrating upwards into the overlaying sands.

5.5 DADE COUNTY

As shown in Figure 5-9, four adjacent quadrangles forming a square were identified by land-based indoor radon, soil radon, or terrestrial uranium (different parameter for each quadrangle) as having elevated radon potential in Dade County. A zip code with elevated readings from the population-based survey covered parts of all four of these quadrangles. A single zip code--33030--had elevated indoor results (Table 5-5), but readings above 4 pCi/L were measured in this zip code by both surveys.

As Figure 5-10 shows, the bedrock geology of Dade County is characterized by carbonates of the Miami Oolite (Qpm) and Key West Limestone (Qpk). The associated soils are all poorly drained, with the exception of an isolated occurrence of well-drained. sand along the coast in northeast Dade County. Uranium concentrations are uniformly low (less than 1 ppme), with the exception of two quadrangles in central Dade County where average uranium concentrations in the Miami Oolite exceed 3 ppm equivalent. The shaded quadrangles are associated with these areas of high uranium concentration.

The source of the uranium is enigmatic. The Miami Oolite is a pure limestone and does not contain any uraniferous material. It is inferred that the source of uranium is not native to the Miami Oolite, but is transported from some other rock unit, possibly the Hawthorn sediments to the north.

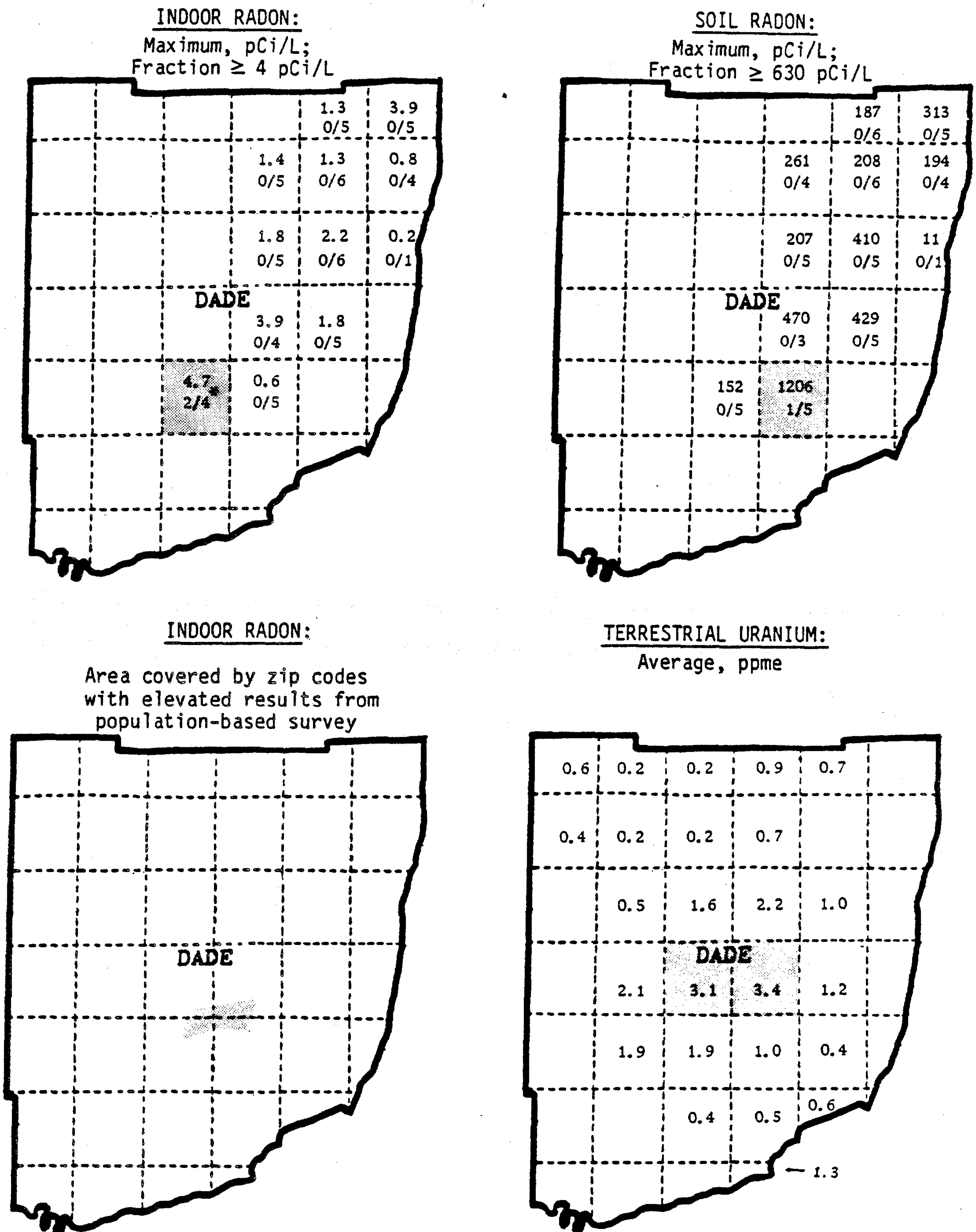


Figure 5-9. Radon and Uranium Results
by 1:24,000 Quadrangle for Dade County

Table 5-5. Indoor Radon Concentrations for Dade County, by Zip Code

Zip Code	Land-Based Survey Number of Homes	Land-Based Survey Mean, pCi/L	Land-Based Survey Maximum, pCi/L	Population-Based Survey Number of Homes	Population-Based Survey Mean, pCi/L	Population-Based Survey Maximum, pCi/L
33012	1	0.4	0.4			
33013	2	0.3	0.4			
33014	1	0.4	0.4	5	0.3	0.7
33015	2	0.9	1.3			
33016	1	0.4	0.4			
33030	9	1.5	4.7	3	3.3	5.3
33032	3	1.1	1.8			
33055				9	0.4	1.3
33056				1	0.2	0.2
33126				1	1.2	1.2
33133				3	0.3	0.4
33134	2	0.8	1.3	1	3.6	3.6
33138	1	0.8	0.8	1	0.2	0.2
33140	1	0.6	0.6			
33141	1	0.2	0.2			
33143	1	1.4	1.4	7	0.5	2.2
33144				1	1.9	1.9
33145	1	0.2	0.2			
33149	1	0.2	0.2			
33155				9	0.8	2.3
33156	2	0.7	1.1	3	0.5	0.8
33157	3	1.0	1.1	4	0.5	0.9
33161				5	0.2	0.2
33162				1	0.2	0.2
33165	2	0.3	0.4	4	0.8	2.2
33166	2	0.3	0.4			
33169	3	1.9	3.9	3	0.3	0.4
33172	1	1.1	1.1			
33175				2	0.3	0.4
33176	1	2.2	2.2	2	1.8	2.0
33177	3	2.7	3.9	4	1.8	2.8
33179	2	1.0	1.5			
33183	2	0.9	1.0			
33184	4	0.6	1.4			
33186	3	1.3	1.8	2	2.1	2.5

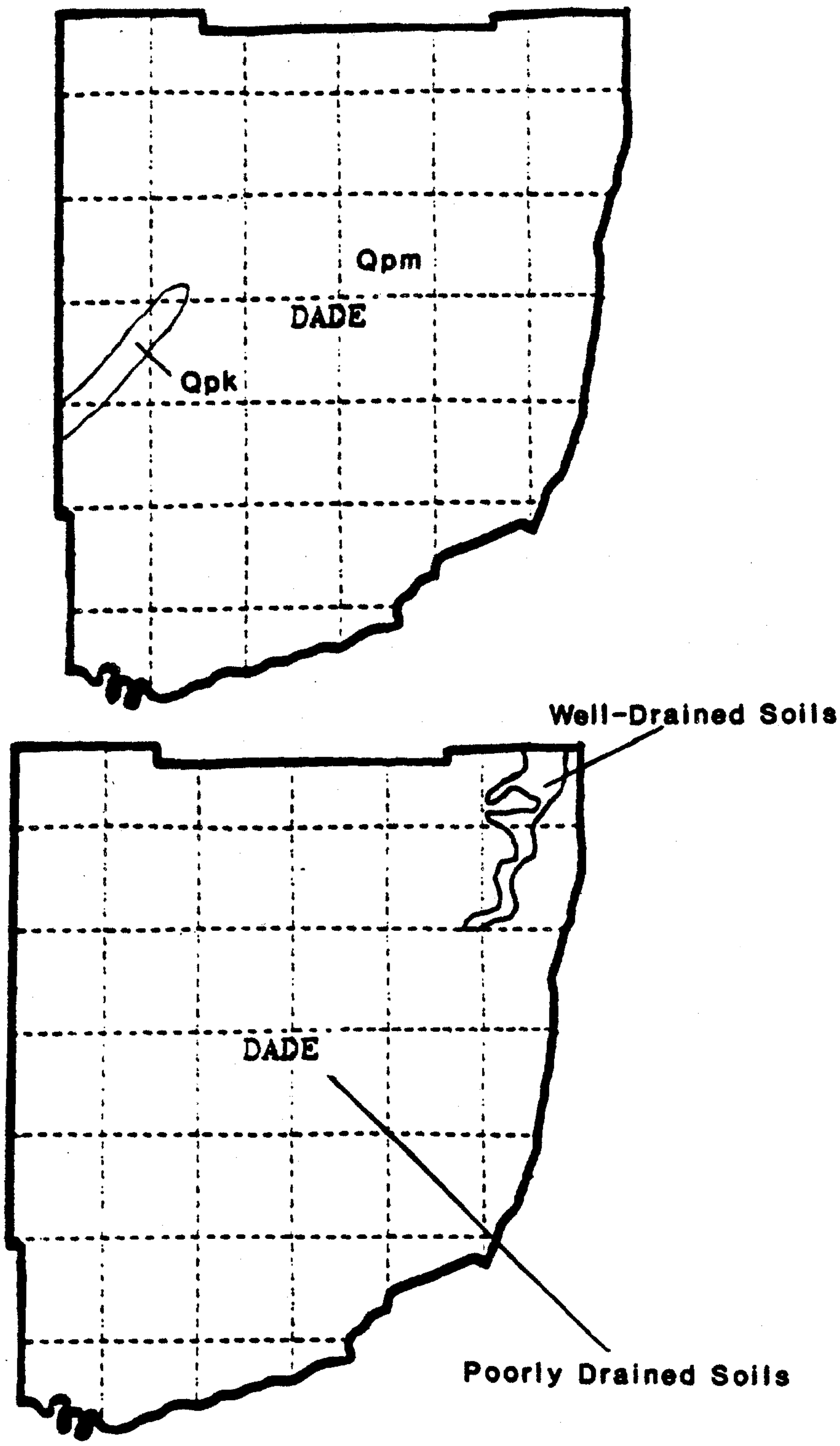


Figure 5-10. Bedrock Geology and Associated Soil Groups for Dade County

5.6 GILCHRIST COUNTY

There were no elevated uranium readings for Gilchrist County (Figure 5-11). Land-based indoor radon and soil radon data indicated one quadrangle as having elevated potential; this quadrangle, which contains parts of Gilchrist and Levy Counties, also had a high soil reading for the part in Levy County. Both land-based and population-based indoor radon results (Table 5-6) were elevated for one zip code--32693; the area covered by this zip code includes the quadrangle with the highest land-based readings as well as adjoining quadrangles mainly to the north and west that were not well covered by the land-based survey.

The bedrock geology of Gilchrist County is dominated by carbonate rocks of the Crystal River Formation (Tecr), as shown in Figure 5-12. In the western portion of the county the carbonates are capped by sandy sediments of the Cypress Head Formation (Tpch). Both well drained and poorly drained soil types occur in the county. Well-drained phosphatic soils occur in the southern portion near Trenton, Florida.

The shaded area in southern Gilchrist County is mapped as part of the Crystal River Formation and includes some phosphatic soils. NURE data suggest that uranium averages are relatively low (1.0 ppme), with the high extremes reaching only 1.5 ppme.

Both the NURE data and bedrock geology would seem to contradict the observation of high radon levels. However, the occurrence of phosphatic soils suggests, at least locally, that there is enough uranium present in the soil to produce the observed high levels of radon. These localized areas of high uranium need only be smaller than 200 m^2, the minimum sample area of a single NURE data point, to escape detection by NURE survey instruments.

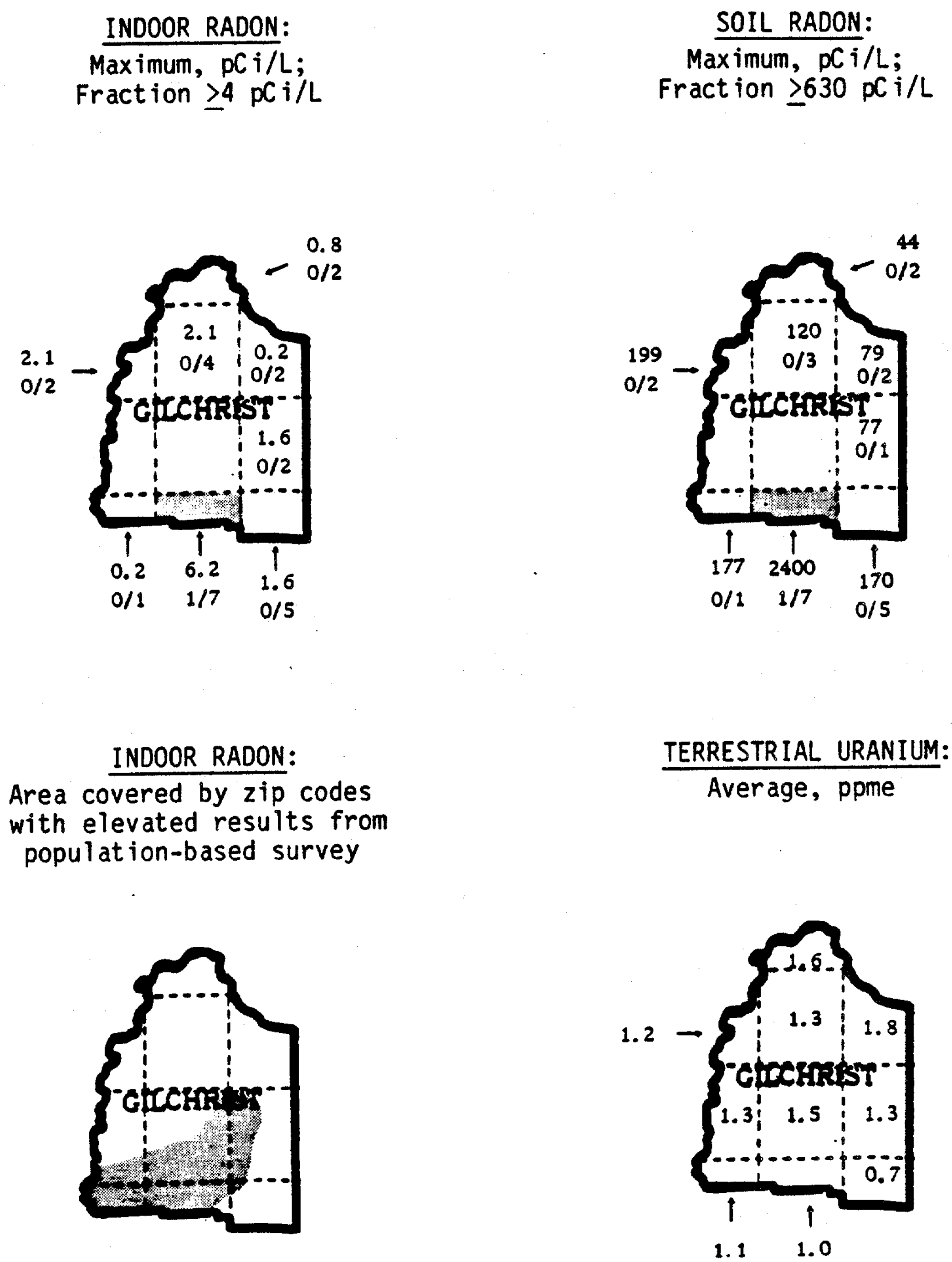
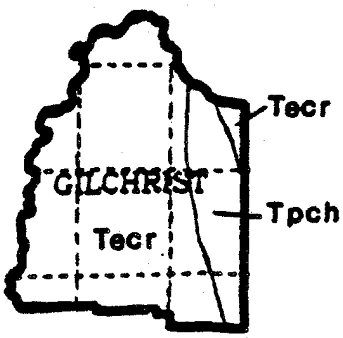


Figure 5-11. Radon and Uranium Results by 1:24,000 Quadrangle for Gilchrist County

Table 5-6. Indoor Radon Concentrations for Gilchrist County, by Zip Code

Zip Code	Land-Based Survey Number of Homes	Land-Based Survey Mean, pCi/L	Land-Based Survey Maximum, pCi/L	Population-Based Survey Number of Homes	Population-Based Survey Mean, pCi/L	Population-Based Survey Maximum, pCi/L
32008	2	0.7	0.8			
32619	6	1.4	2.1	1	0.2	0.2
32643	2	0.2	0.2			
32669	2	0.6	0.8			
32693	13	1.9	6.2	14	1.9	7.2



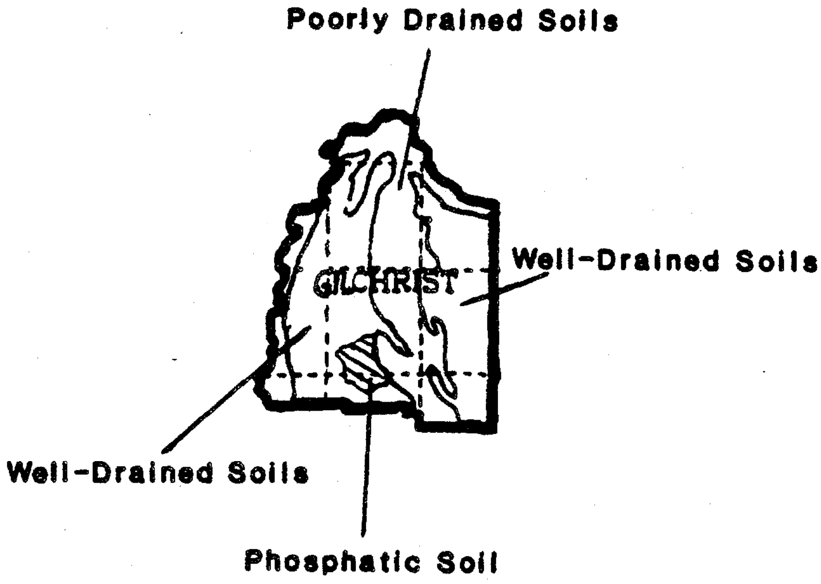


Figure 5-12. Bedrock Geology and Associated Soil Groups for Gilchrist County

5.7 HARDEE COUNTY

Two adjacent quadrangles in the central part of Hardee County had elevated soil readings (Figure 5-13), and one of these also contained a home with a land-based indoor concentration above 4 pCi/L. The elevated uranium readings indicated for the small partial quadrangles in the northern portion of the county may reflect data that are from Polk County. There were no indoor radon concentrations above 4 pCi/L from the population-based survey (Table 5-7), but the highest reading (3.9 pCi/L) was from the same zip code as that with the highest indoor reading from the land-based survey--33873.

As Figure 5-14 shows, Hardee County is also characterized by exposures of Hawthorn (Tmh) and Bone Valley (Tmbv) sediments. As in adjacent Manatee County, the associated soil types are predominantly poorly drained; well-drained types occur in the northwest portion of the county. NURE data suggest that the highest concentrations of uranium (2.3 to 2.8 ppme) are associated with river sands in western Hardee County. In contrast, the shaded quadrangles in southern Hardee County have low concentrations of surface uranium and have associated soils that are poorly drained.

Geology, at first glance, would appear to contradict the expected occurrence of radon in Hardee County. It is inferred that uranium exists in Hawthorn and Bone Valley sediments beneath the surface in sufficient concentrations to account for elevated concentrations of soil radon in the shaded quadrangles.

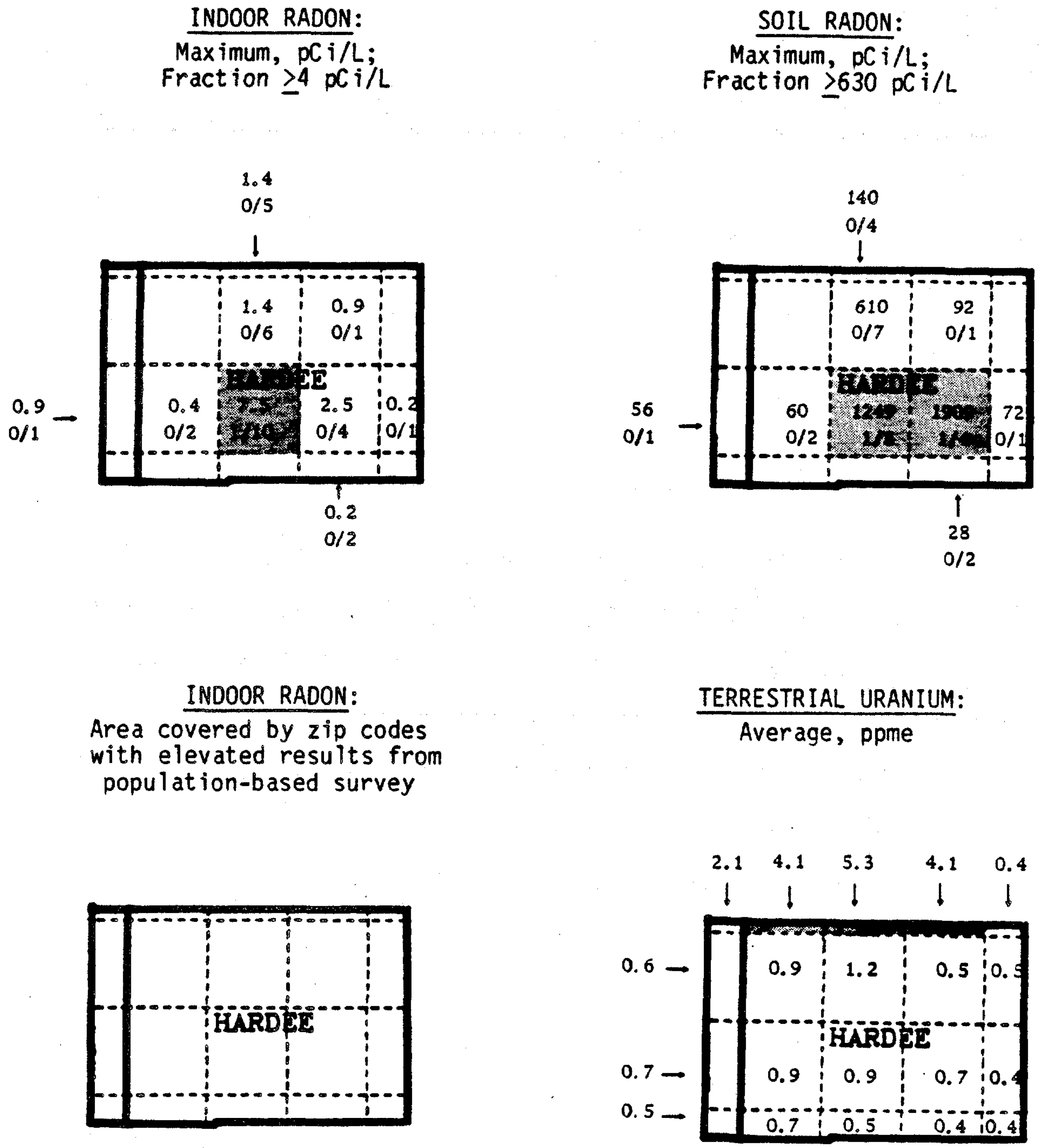


Figure 5-13. Radon and Uranium Results by 1:24,000 Quadrangle for Hardee County

Table 5-7. Indoor Radon Concentrations for Hardee County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
33834	5	0.5	1.4			
33865	3	0.5	0.9	2	0.2	0.2
33873	14	1.3	7.5	13	0.9	3.9
33890	10	0.6	2.5			

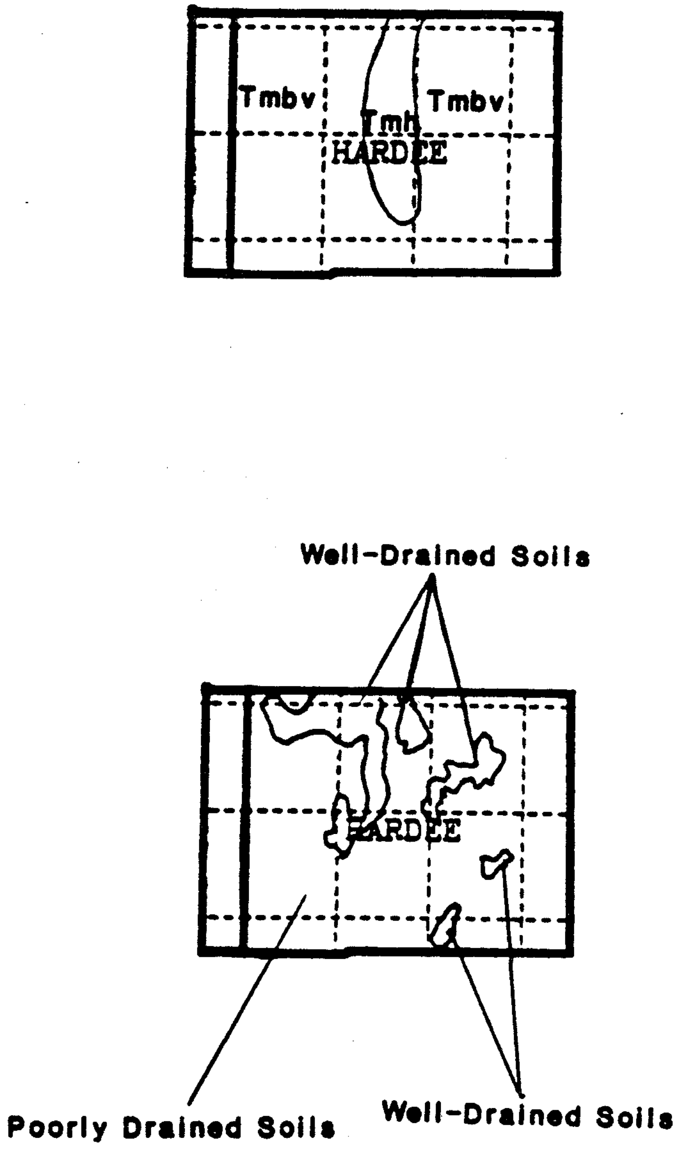


Figure 5-14. Bedrock Geology and Associated Soil Groups for Hardee County

5.8 HILLSBOROUGH COUNTY

Results for indoor radon, soil radon, and terrestrial uranium are summarized by quadrangle for Hillsborough County in Figure 5-15. In this case, the respective results are not as complementary as for Polk county. Elevations of indoor radon from the land-based survey are confined to parts of the northern half of the county, but elevations from the population-based survey include some southwestern parts as well. Some indications of elevations in various parts of the county are given by the soil radon or uranium data. For one quadrangle in the west central part of the county with elevated uranium results, there is supporting evidence from the population-based survey. Results by zip code, presented in Table 5-8, show that concentrations at or above 4 pCi/L were measured by both surveys in zip codes 33511 and 33594; zip codes with elevated concentrations measured by one of the two surveys were 33566, 33570, 33584, 33598, and 33624.

As shown in Figure 5-16, the bedrock geology of Hillsborough County is characterized by carbonates of the Suwannee Limestone (Tos) and the Saint Marks Formation (Tmsm), siliciclastic clays, sands and carbonates of the Hawthorn Formation (Tmh) and pebbly clays and sands of the Bone Valley Formation (Tmbv). The associated soils are mixed, with isolated exposures of phosphatic soils in northeastern Hillsborough County. Poorly drained soils predominate in southern Hillsborough County. NURE data, although lacking for extreme western Hillsborough County, suggest elevated concentrations of uranium in sediments of the Saint Marks Formation (3.3 to 5.5 average ppme) in western Hillsborough County and in sediments of the Hawthorn Formation (2.3 to 7.5 ppme) in eastern Hillsborough County.

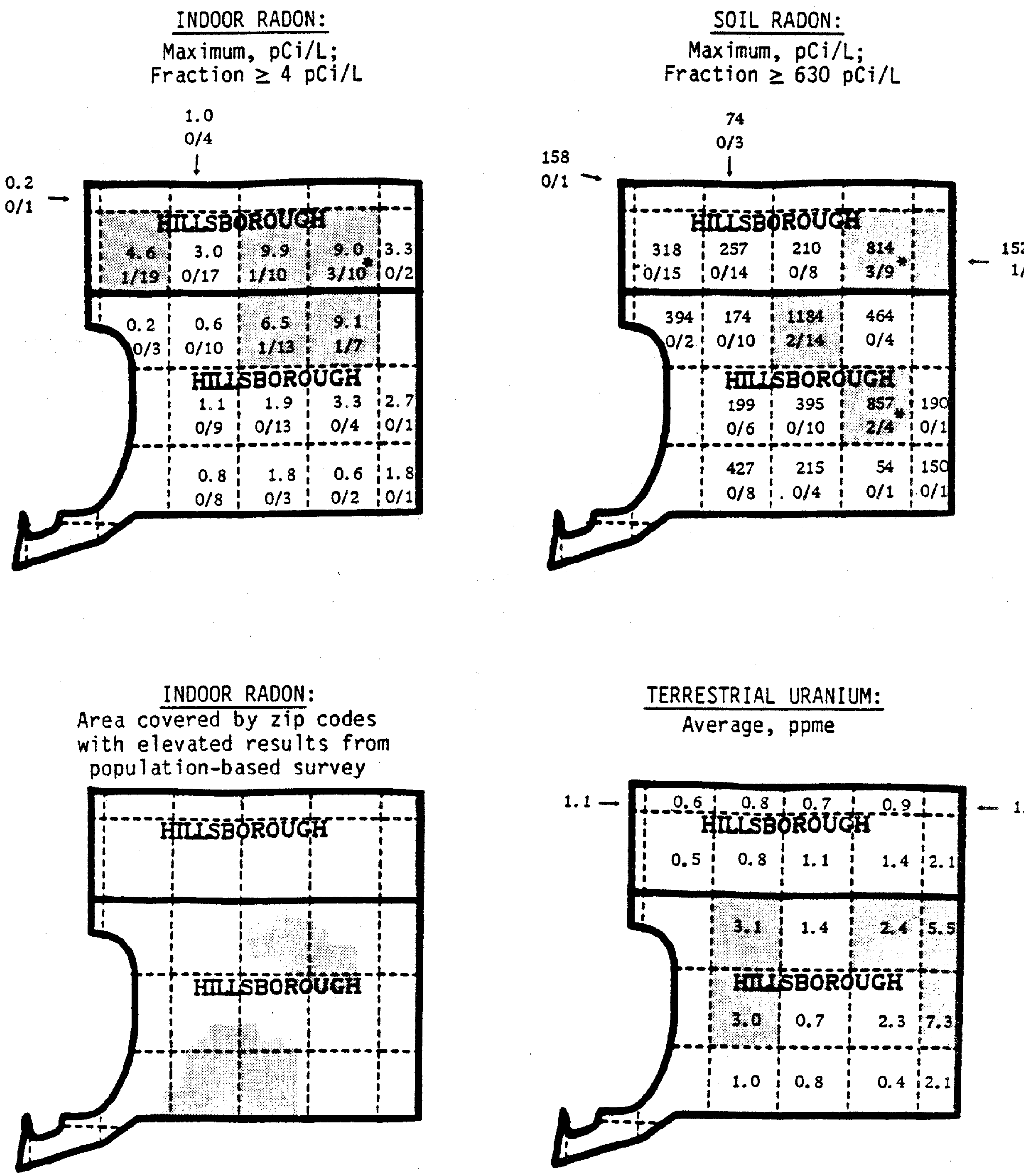


Figure 5-15. Radon and Uranium Results
by 1:24,000 Quadrangle for Hillsborough County

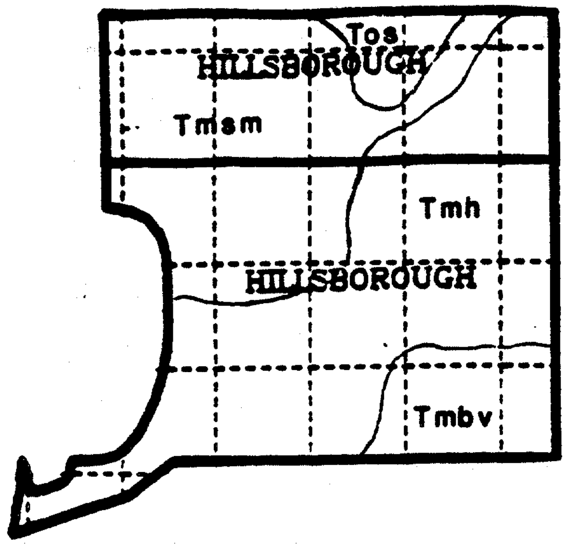
Table 5-8. Indoor Radon Concentrations for Hillsborough County, by Zip Code

Zip Code	Land-Based Survey			Population-Based Survey		
	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
33511	12	1.6	6.5	15	2.2	17.8
33527	4	0.7	1.0			
33534	2	0.3	0.4	1	1.3	1.3
33537	1	0.2	0.2			
33547	7	1.8	3.3			
33549	7	0.4	1.0			
33556	3	0.2	0.2	3	0.3	0.4
33566	11	2.9	9.0	15	1.1	3.6
33569	12	0.8	1.9			
33570	10	0.4	0.8	17	1.5	4.3
33584	4	3.3	9.9			
33592	2	1.3	1.8			
33594	4	3.6	9.1	2	6.7	10.1
33598	1	0.8	0.8	5	1.9	5.4
33602	1	0.2	0.2			
33603				1	0.2	0.2
33604	1	0.2	0.2	5	0.3	0.5
33605				1	0.2	0.2
33606	1	0.2	0.2			
33607				1	0.2	0.2
33609				6	0.2	0.4
33610	2	0.7	1.1	8	0.6	1.3
33611	9	0.6	1.1	1	0.2	0.2
33612	4	0.9	3.0			
33613	4	0.2	0.2	6	0.5	0.7
33614	2	0.9	1.5	6	0.2	0.2
33615	3	0.2	0.2	5	0.8	1.8
33616	1	0.2	0.2	10	0.3	0.5
33617	3	0.6	0.8	6	0.2	0.2
33618	2	0.5	0.8	1	1.3	1.3
33619	2	0.5	0.6	3	0.2	0.2
33623	1	0.2	0.2			
33624	13	0.7	4.6	3	0.4	0.8
33625	1	0.2	0.2			
33629				1	0.2	0.2

(Continued)

Table 5-8. Indoor Radon Concentrations for Hillsborough County, by Zip Code (Concluded)

Zip Code	Land-Based Survey Number of Homes	Land-Based Survey Mean, pCi/L	Land-Based Survey Maximum, pCi/L	Population-Based Survey Number of Homes	Population-Based Survey Mean, pCi/L	Population-Based Survey Maximum, pCi/L
33634				5	0.4	0.7
33635				1	0.5	0.5
33637	1	2.0	2.0	6	0.4	0.6
33706	2	0.2	0.2			
33834	1	1.8	1.8			
34253	2	0.9	1.2			
34258	1	2.0	2.0			



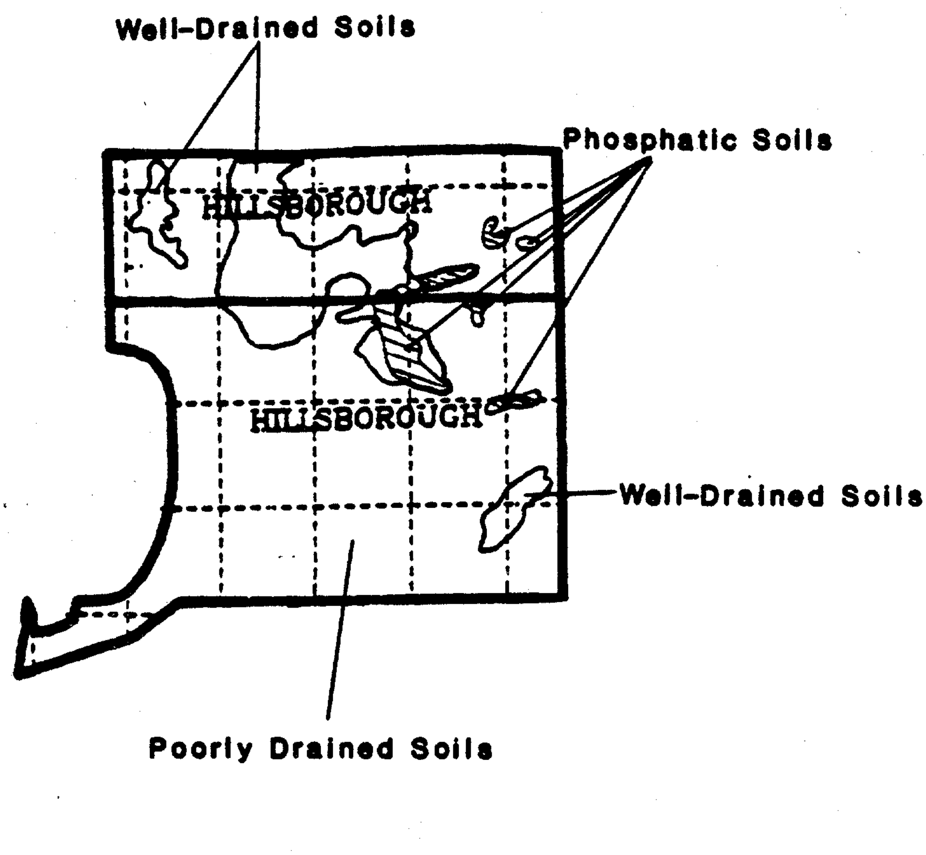


Figure 5-16. Bedrock Geology and Associated Soil Groups for Hillsborough County

The shaded quadrangles in central and eastern Hillsborough all include areas of phosphatic soils within their boundaries. The shaded quadrangle in southwestern Hillsborough County has poorly drained soils that probably inhibit the migration of radon.

5.9 LEE COUNTY

As shown in Figure 5-17, the land-based indoor radon results for Lee County point to two quadrangles with elevated potential, and soil radon results show elevated potential in one isolated quadrangle. The uranium readings are relatively low throughout the county. Elevated areas indicated by the population-based survey include the quadrangles with the high land-based indoor and soil radon readings. However, the data by zip code presented in Table 5-9 generally show inconsistent results; the land-based survey yielded results above 4 pCi/L for zip codes 33903, 33907, and 33909, whereas population-based survey results were elevated for zip codes 33904, 33905, and 33920. The collective results appear to be indicative of highly localized areas of elevated radon potential.

As Figure 5-18 shows, the geology of Lee County is characterized by the occurrence of unconsolidated sands of the Anastasia Formation (Qpa) and carbonates of the Tamiani Formation (Tpt). Associated soils are all poorly drained. Uranium concentrations are uniformly low, with the highest values (2.2 ppme) occurring in association with sediments of the Anastasia Formation, The isolated elevated concentrations of soil radon could reflect the occurrence of high concentrations that have migrated from the Hawthorn sediments beneath the surface. It is interpreted that conditions exist locally in the poorly drained soils that allow the accumulation of elevated amounts of soil and indoor radon. The sediments of the Hawthorn Formation, buried beneath the surface veneer of sediments of the Anastasia Formation, could provide the source for this radon.

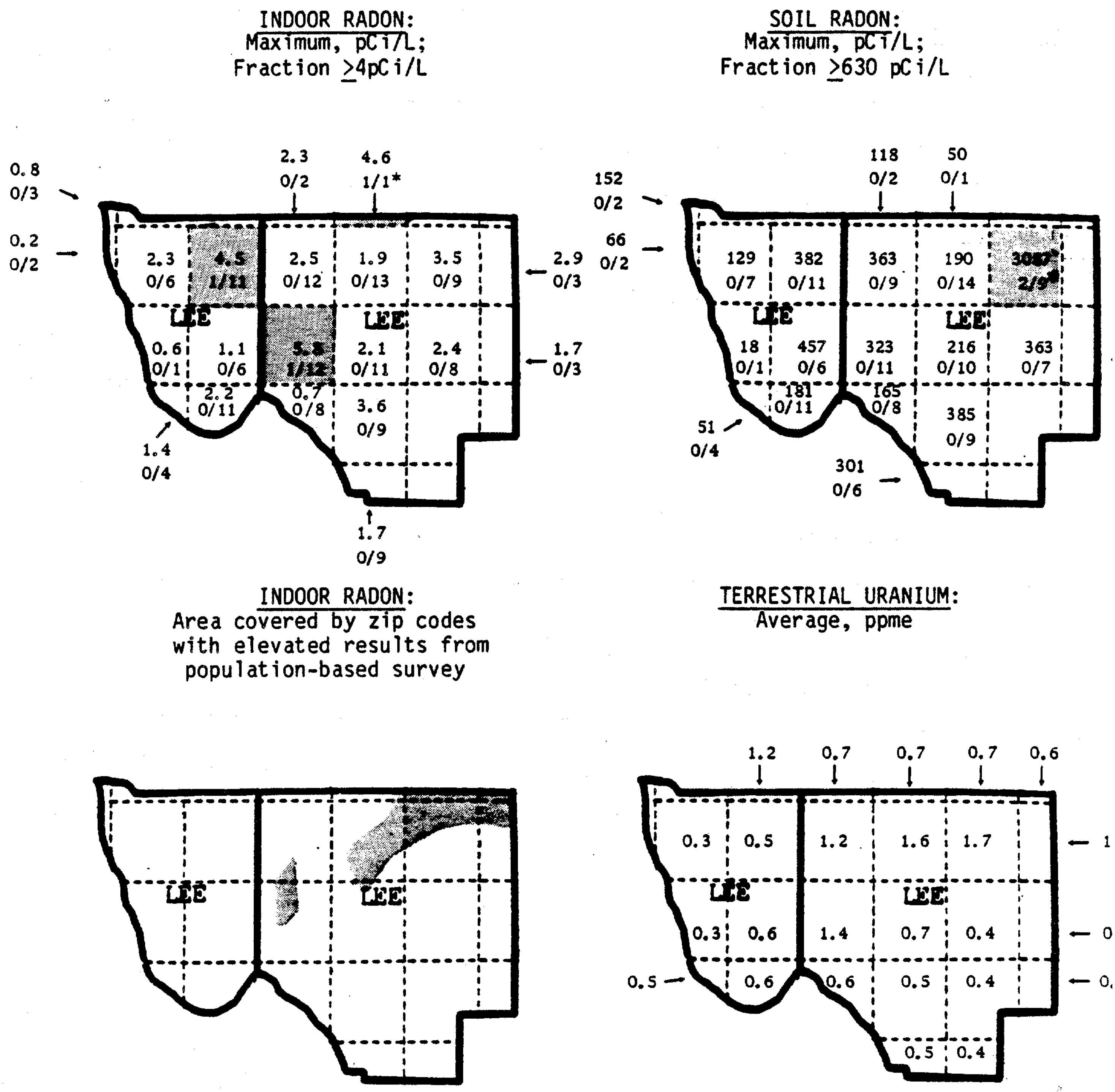


Figure 5-17. Radon and Uranium Results by 1:24,000 Quadrangle for Lee County

Table 5-9. Indoor Radon Concentrations for Lee County, by Zip Code

Zip Code	Land-Based Survey			Population-Based Survey		
	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
33901	9	0.4	1.4	12	0.8	3.5
33903	8	1.8	4.6	5	1.2	2.4
33904	5	1.2	1.3	11	1.4	4.8
33905	16	1.3	3.5	11	3.2	13.6
33907	8	1.7	5.8	28	1.0	2.3
33908	3	1.1	1.7	6	1.6	3.7
33909	9	1.4	4.5			
33912	9	1.2	3.6	17	1.0	3.2
33914	6	1.1	2.8			
33916	1	0.7	0.7			
33920	1	0.9	0.9	2	16.4	28.2
33921	5	0.4	0.8			
33922	9	0.7	1.7			
33923	10	0.7	1.7			
33924	2	0.6	0.6			
33928	2	1.2	1.4			
33931	8	0.3	0.7	1	0.2	0.2
33936	13	1.2	2.9	8	1.4	3.1
33945	3	1.6	2.3			
33956	9	0.7	2.2			
33957	8	0.8	1.8			

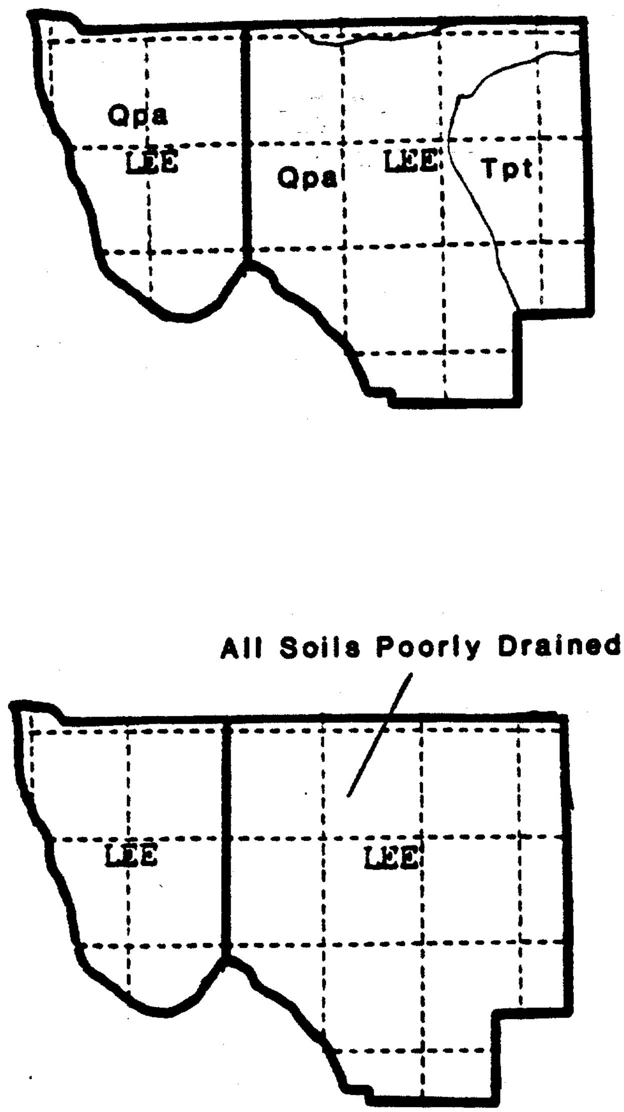


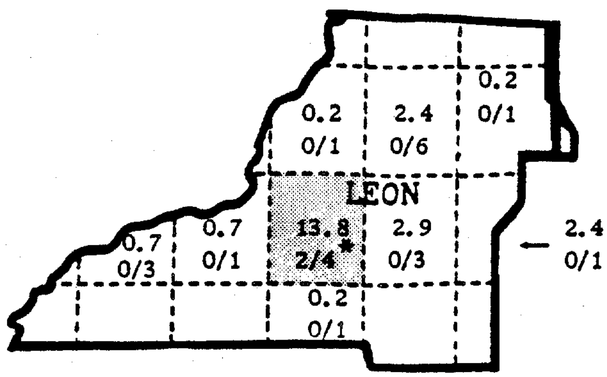
Figure 5-18. Bedrock Geology and Associated
Soil Groups for Lee County

5.10 LEON COUNTY

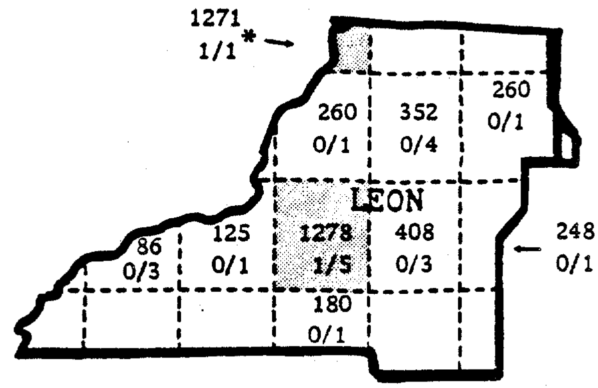
As shown in Figure 5-19, both indoor and soil radon results indicate the same quadrangle in Leon County as having significant radon potential. An adjacent quadrangle with 2.4 ppme uranium had elevated readings from the population-based survey. Population-based results also included elevated results for a zip code covering the western part of the county, where the land-based survey had sparse coverage. Both the land- and population-based surveys measured concentrations above 4.0 pCi/L for zip code 32301 (Table 5-10). However, the results from the two surveys are not in total harmony for other cases; the land-based survey found elevated concentrations for zip code 32303, but the population-based survey did not, whereas the population-based survey found elevated concentrations for zip codes 32304 and 32312, but the land-based survey did not.

As shown in Figure 5-20, Leon County has exposures of river sands (Qal); sands and shelly marls of the Jackson Bluff Formation (Tpjb); sands, clays, and phosphatic sandy carbonates of the Hawthorn Formation (Tmh); the silica-rich chalky limestones of the Saint Marks Formation (Tmsm) in the south; and the surficial clayey quartz sands of the Miccosukee Formation (Tpmi) that cover the highlands in the northeast. Soils that cover the bedrock are mapped sandy and well drained over most of the county, with the exception of relatively small areas to the southwest and southeast that are mapped as poorly drained. No phosphatic sands are mapped within the county.

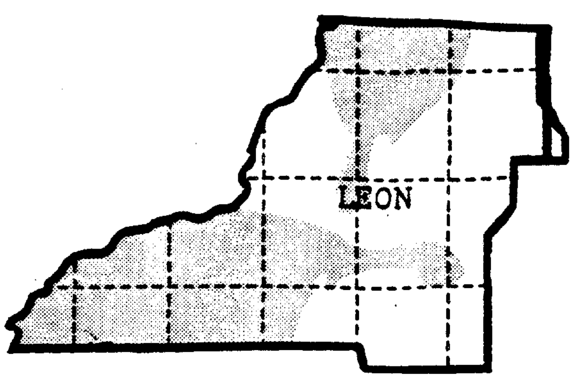
INDOOR RADON:
Maximum, pCi/L;
Fraction ≥ 4 pCi/L



SOIL RADON:
Maximum, pCi/L;
Fraction ≥ 630 pCi/L



INDOOR RADON:
Area covered by zip codes
with elevated results from
population-based survey



TERRESTRIAL URANIUM:
Average, ppme

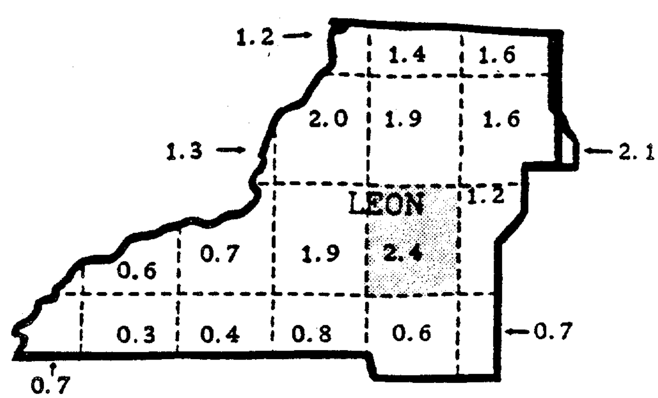
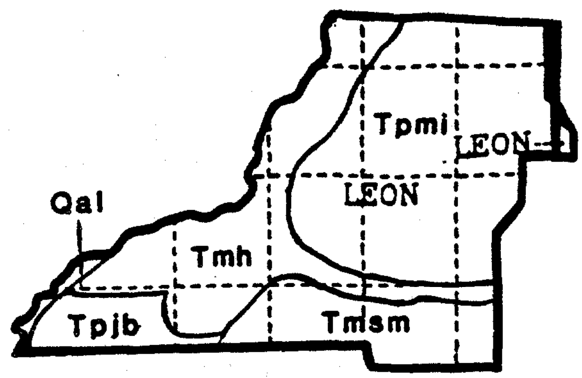


Figure 5-19. Radon and Uranium Results
by 1:24,000 Quadrangle for Leon County

Table 5-10. Indoor Radon Concentrations for Leon County, by Zip Code

Zip Code	Land-Based Survey			Population-Based Survey		
	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
32301	5	2.3	6.5	14	1.7	5.3
32303	3	5.2	13.8	10	0.6	1.6
32304	4	0.5	0.7	6	2.5	5.5
32308	5	0.9	2.4	4	2.5	2.7
32312	3	0.8	1.4	17	1.9	7.0
33201	1	2.4	2.4			



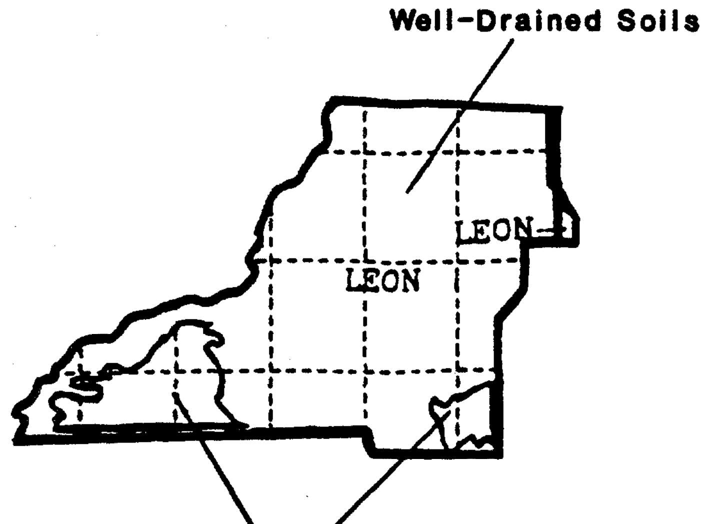


Figure 5-20. Bedrock Geology and Associated Soil Groups for Leon County

The shaded quadrangles are located where there are exposures of Hawthorn or Miccosukee sediments. NURE data suggest that there are elevated levels of uranium (up to 3.1 ppme) in areas mapped as part of the Miccosukee. In contrast, areas mapped as Hawthorn show less than 1 ppme uranium. The Hawthorn sediments of the entire Florida panhandle generally exhibit lower amounts of uranium as compared to areas mapped as Hawthorn in the peninsula.

Geology thus confirms the observed occurrence of high levels of radon in Leon County. The shaded whole quadrangles, although having moderate average levels of uranium, contain a lithologic unit (Miccosukee), which shows elevated levels of uranium and is capable of producing elevated levels of radon in the soil.

5.11 LEVY COUNTY

As shown in Figure 5-21, one quadrangle at the northeast edge of Levy County was identified by land-based indoor and soil radon data as having elevated potential; this quadrangle borders on areas in Alachua and Marion Counties that also had elevated radon potential. Quadrangles to the south and southwest of this quadrangle are covered by a zip code with elevated population-based results. One additional quadrangle in the northern part of the county had an elevated soil reading of 923 pCi/L, but the highest indoor concentration was 2.7 pCi/L. Two quadrangles in the northern part of the county had elevated uranium readings, but no homes could be sampled because the area is predominantly swampland. Elevated readings from the population-based survey occurred in a zip code near but not including these quadrangles.

As shown in Table 5-11, radon results at or above 4 pCi/L from the land-based survey were confined to one zip code (32696), but the elevated readings obtained from the population-based survey covered two other zip codes--32649 and 32668.

The bedrock geology of Levy County is characterized by exposures of carbonate rocks including the Crystal River Formation (Tecr), Inglis Formation (Tei), Williston Formation (Tew), and the Avon Park Limestone (Teap) (Figure 5-22). The carbonates are covered by the sands, clays, and sandy clays of the Cypress Head Formation (Tpch) in eastern Levy County.

Soils in Levy County are mixed and include well-drained and poorly drained types. Isolated areas of phosphatic soils occur in eastern Levy County. NURE data suggest that uranium values are low to moderate over

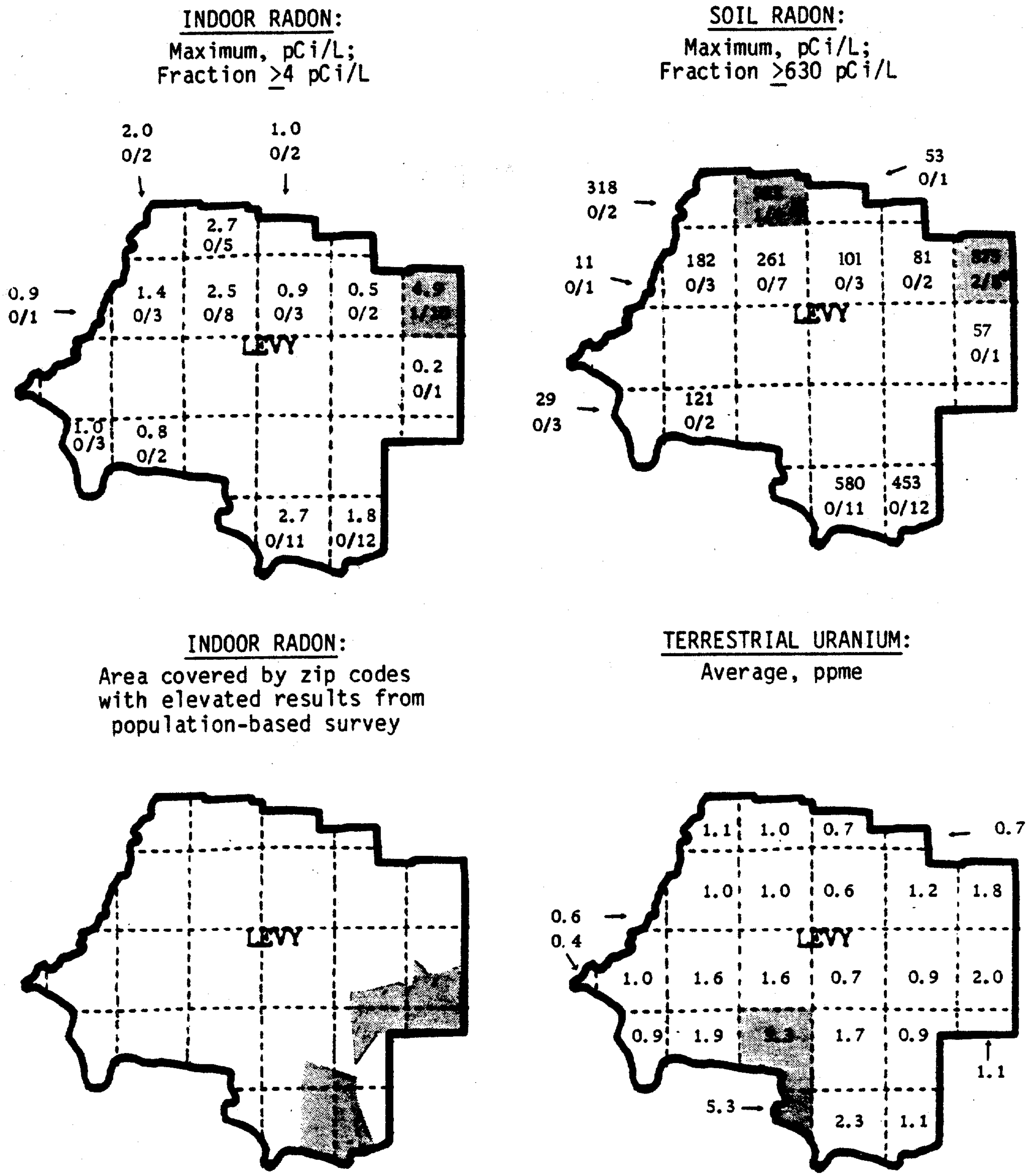


Figure 5-21. Radon and Uranium Results by 1:24,000 Quadrangle for Levy County

Table 5-11. Indoor Radon Concentrations for Levy County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
32621	5	0.5	0.9			
32625	4	0.7	1.0	1	0.2	0.2
32626	12	1.0	2.5			
32630	10	0.8	1.8			
32649	11	1.3	2.7	6	1.5	4.1
32668	1	0.2	0.2	3	5.0	14.0
32669	1	1.0	1.0			
32693	7	1.3	2.7			
32696	11	1.9	4.9	1	0.2	0.2
32698	2	0.9	1.1			
33575	1	0.2	0.2			

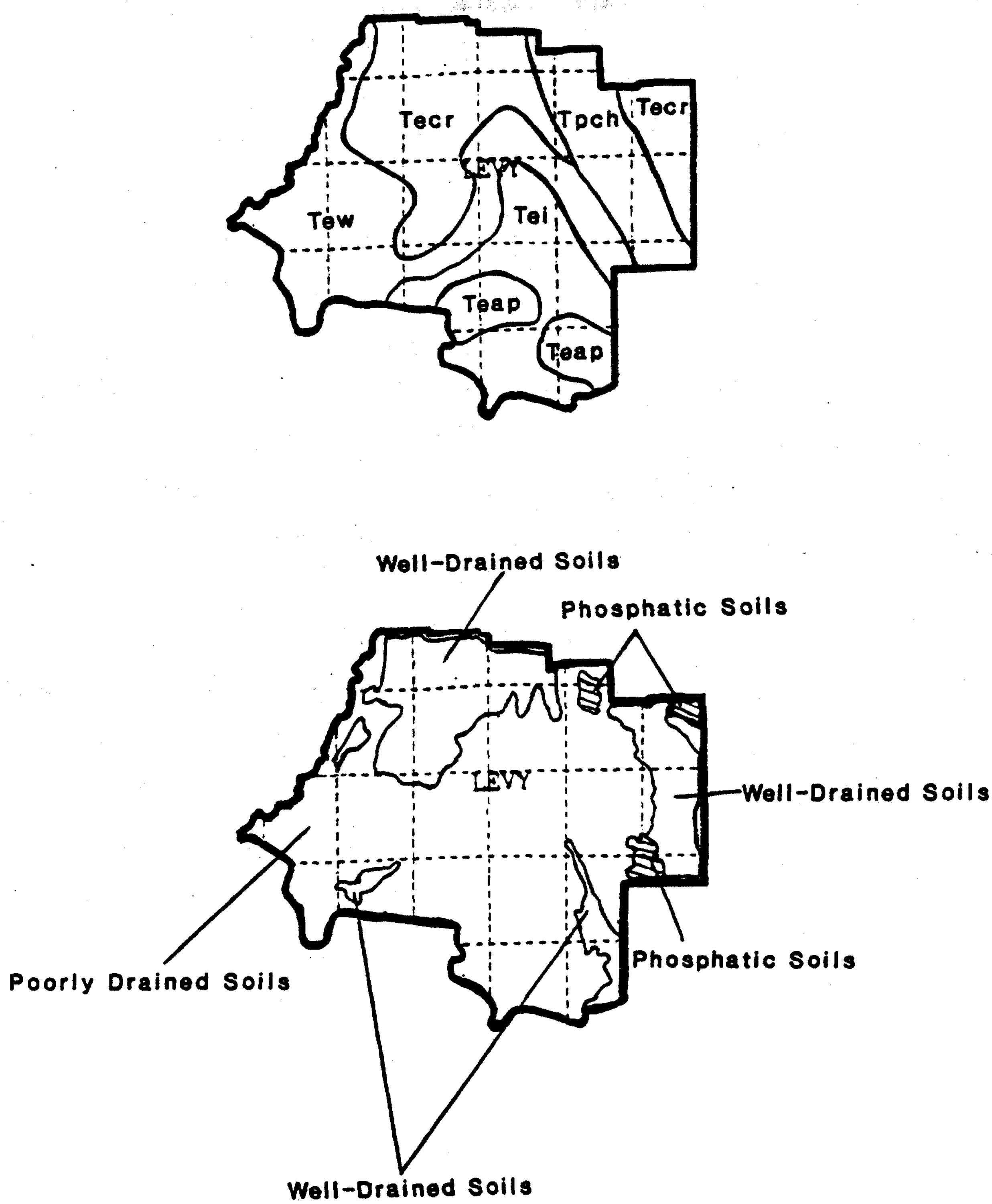


Figure 5-22. Bedrock Geology and Associated Soil Groups for Levy County

most of Levy County, with the highest concentrations (3.5 to 6.1 ppme) associated with exposures of the Inglis Formation in southwestern Levy County.

The shaded quadrangle in northeastern Levy County includes a small area of phosphatic soil. The highest concentrations of uranium in the quadrangle approach 3.0 ppme in sediments of the Alachua Formation, which contain lenses of phosphatic pebbles enclosed in a matrix of sandy clay. These phosphatic sediments are erosional remnants of the Hawthorn Formation that once covered the county.* Thus, the geology of Levy County generally confirms the occurrence of high concentrations of radon in the northeastern portion of the county.

The occurrence of uranium in the shaded quadrangle to the southwest is more enigmatic. Nowhere else does the Inglis Formation show elevated concentrations of uranium. The uranium may be associated with phosphatic pebbles washed downstream along the numerous creeks that flow through the Inglis Formation to empty into the Gulf of Mexico. Alternatively, the uranium may be added to the carbonates through precipitation from groundwaters.

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* Sellards, E.H. 1983. Origin of hard rock phosphates of Florida, Fla. Geol. Survey, 5th Ann. Rept., pp. 23-80.

5.12 MANATEE COUNTY

Indoor radon results from the land-based survey in Manatee County do not suggest elevated potential (Figure 5-23), but results pertaining to soil radon and terrestrial uranium indicate some potential in the southwest part of the county. Much of the inland part of the county could not be sampled in the land-based survey, but a zip code (33564) from the population-based survey with elevated results spans a large area in the northeastern part of the county, extending as far west as the quadrangle with the highest uranium reading. An additional zip code (34243) with elevated population-based results covers an area that includes a quadrangle with elevated soil results. As shown in Table 5-12, of the two zip codes with elevated results from the population-based survey, one (34243) was not covered by the land-based survey and the other (33564) had very low land-based results.

As Figure 5-24 shows, siliciclastic sediments of the Hawthorn (Tmh) and Bone Valley (Tmbv) Formations characterize the bedrock geology of Manatee County. The associated soil types are predominantly poorly drained, with a few isolated well-drained soils, mostly in the eastern portion of the county. NURE measurements of uranium are uniformly low (less than 1.0 ppme), with the exception of one quadrangle in northwest Manatee County with a concentration of 3.8 ppme uranium associated with the Hawthorn Formation. No elevated levels of radon were observed in this quadrangle; this lack is attributed to the moderating effects of the poorly drained soils in the quadrangle.

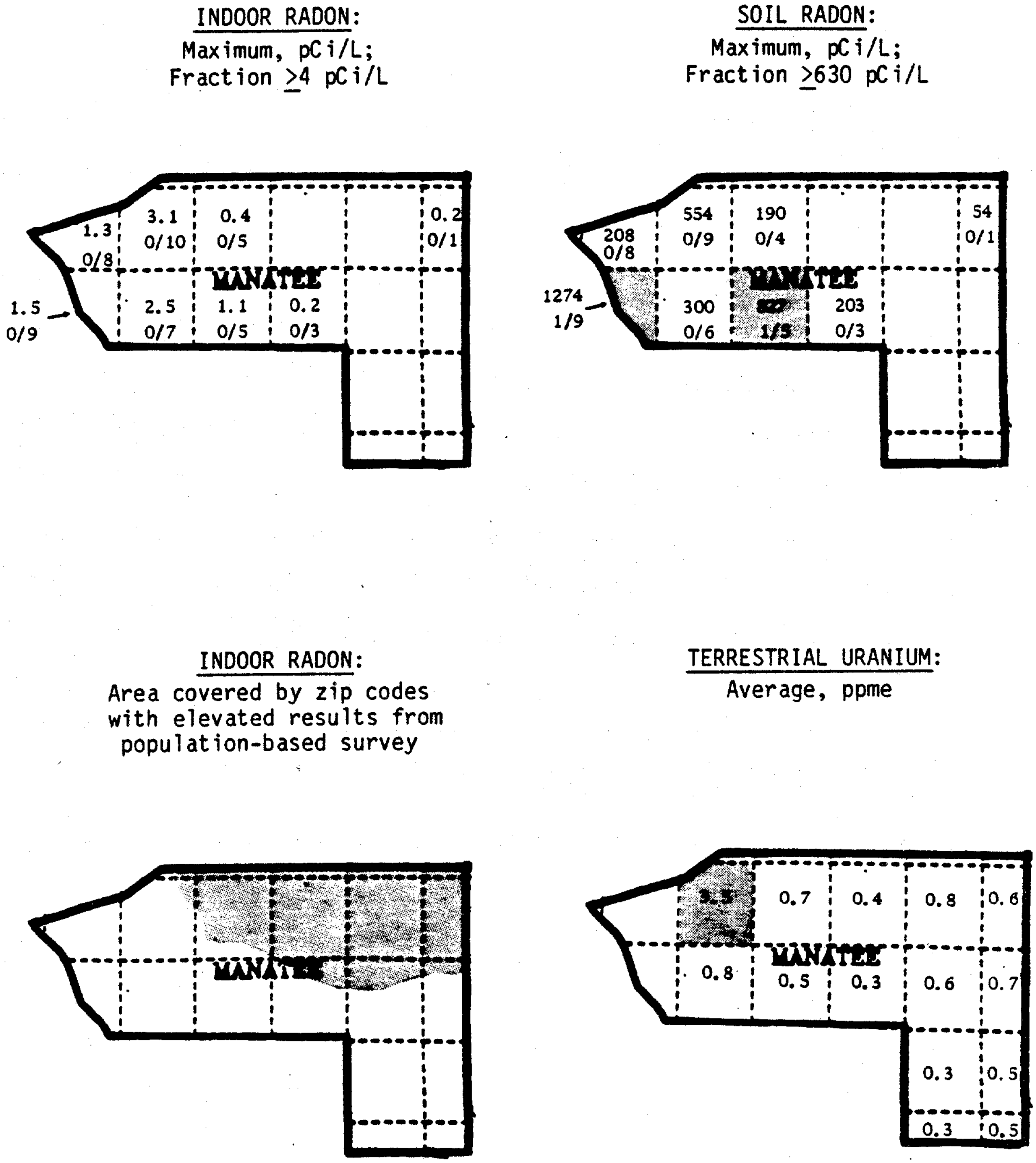

Figure 5-23. Radon and Uranium Results by 1:24,000 Quadrangle for Manatee County

Table 5-12. Indoor Radon Concentrations for Manatee County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
33501	2	0.2	0.2	2	0.2	0.2
33505	1	0.2	0.2	11	0.6	2.0
33507				13	0.3	0.8
33508	3	0.5	1.1	7	1.0	2.3
33510	4	0.5	1.2	7	0.4	1.2
33522				1	0.2	0.2
33529	9	0.4	1.3	11	0.4	1.5
33532	1	1.6	1.6			
33548	2	0.9	1.5	2	0.2	0.2
33551	1	0.2	0.2			
33561	10	0.7	3.1	3	0.6	1.5
33564	4	0.3	0.4	2	6.9	13.3
33581				1	1.0	1.0
33834	1	0.2	0.2			
34202	4	0.2	0.2			
34203	6	1.0	2.5	3	0.8	2.0
34243				6	1.3	4.1

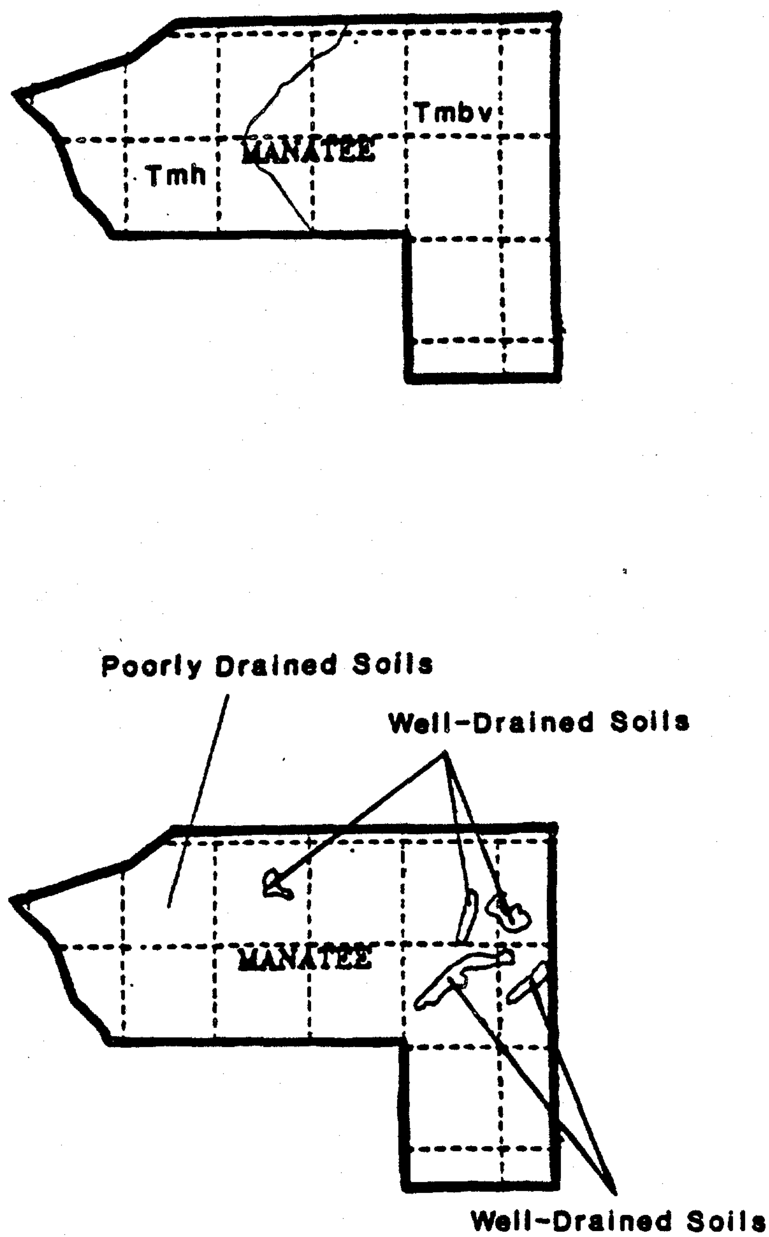

Figure 5-24. Bedrock Geology and Associated Soil Groups for Manatee County

The shaded quadrangles are located in areas mapped as part of the Hawthorn Formation. Both quadrangles have poorly drained soils. The absence of high indoor radon concentrations and the few elevated soil, concentrations are interpreted to also reflect the effects of poorly drained soils on the emanation of radon as well as the low observed concentrations of uranium in the county.

5.13 MARION COUNTY

Results for indoor radon, soil radon, and terrestrial uranium in Marion County are summarized by quadrangle in Figure 5-25. The indoor and soil concentration results are very complementary, indicating that elevated radon potential exists virtually throughout the western portion of the county i.e., that part contained mainly in the Gainesville 1:250,000 quadrangle). The uranium data are not as elevated in all the western 1:24,000 quadrangles, but do confirm that there is not elevated potential in the eastern part of the county.

Indoor radon results by zip code are given in Table 5-13. Most zip codes with elevated indoor radon measurment from the land-based survey also had high readings from the population-based survey. Of the 31 zip codes in which at least 1 home was sampled, 14 had results at or above 4.0 pCi/L from one or both surveys--32617, 32620, 32627, 32630, 32634, 32663, 32664, 32670, 32671, 32674, 32675, 32676, 32686, and 32691.

In western Marion County, Hawthorn sediments (Tmh) overlie older carbonates of the Crystal River Formation (Tecr), as shown in Figure 5-26. In eastern Marion County, sands of the Cypress Head Formation (Tpch) overlie both the Hawthorn and Crystal River Formations. Well-drained phosphatic sands are widespread in western Marion County. NURE data suggest that elevated levels of uranium (2.6 to 3.8 ppme) occur in sediments of the Hawthorn and Crystal River Formations and their associated soils in western Marion County. Geology confirms that western Marion County, like Alachua County, has conditions that favor the production of large amounts of radon in the soil.

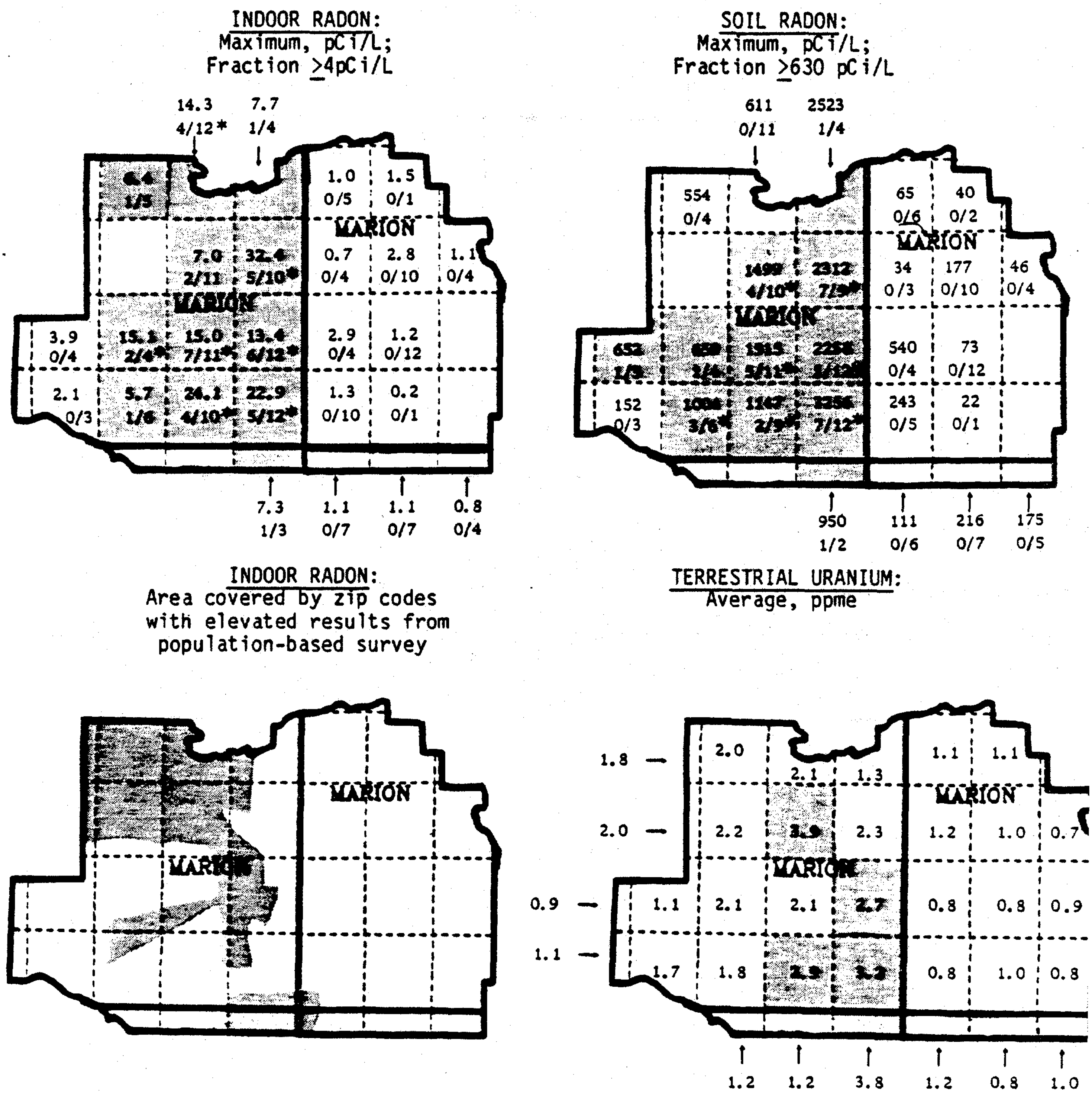

Figure 5-25. Radon and Uranium Results by 1:24,000 Quadrangle for Marion County

Table 5-13. Indoor Radon Concentrations for Marion County, by Zip Code

Zip Code	Land-Based Survey: Number of Homes	Land-Based Survey: Mean, pCi/L	Land-Based Survey: Maximum, pCi/L	Population-Based Survey: Number of Homes	Population-Based Survey: Mean, pCi/L	Population-Based Survey: Maximum, pCi/L
32617	5	11.3	32.4	1	4.6	4.6
32620	9	4.9	17.7			
32627	11	4.2	14.3	1	1.2	1.2
32629	1	0.4	0.4			
32630	13	2.2	5.7	4	1.6	2.1
32632	1	0.5	0.5			
32633	1	0.2	0.2			
32634	3	3.1	6.4			
32637	18	0.8	2.8			
32640	3	0.4	0.5			
32663	3	1.4	2.8	2	9.2	15.5
32664	2	4.2	6.4			
32670	8	6.1	11.3	4	2.4	4.6
32671	6	5.6	13.4	6	7.6	25.4
32673	5	0.9	1.8	1	0.7	0.7
32674	14	6.8	24.1	1	0.2	0.2
32675	4	6.4	15.1			
32676	5	4.1	5.9	9	4.3	18.5
32679	6	1.2	2.9			
32682	4	0.4	1.0	1	0.5	0.5
32684	1	2.1	2.1			
32686	8	2.7	7.0	2	8.0	12.1
32688	18	0.8	2.6			
32690				1	1.3	1.3
32691	9	4.6	22.9	6	3.9	8.7
32695	5	0.5	1.1			
32702	1	0.5	0.5			
32765	1	0.8	0.8			
32784	5	0.5	0.8			
33526	1	0.2	0.2			
33670	1	3.5	3.5			

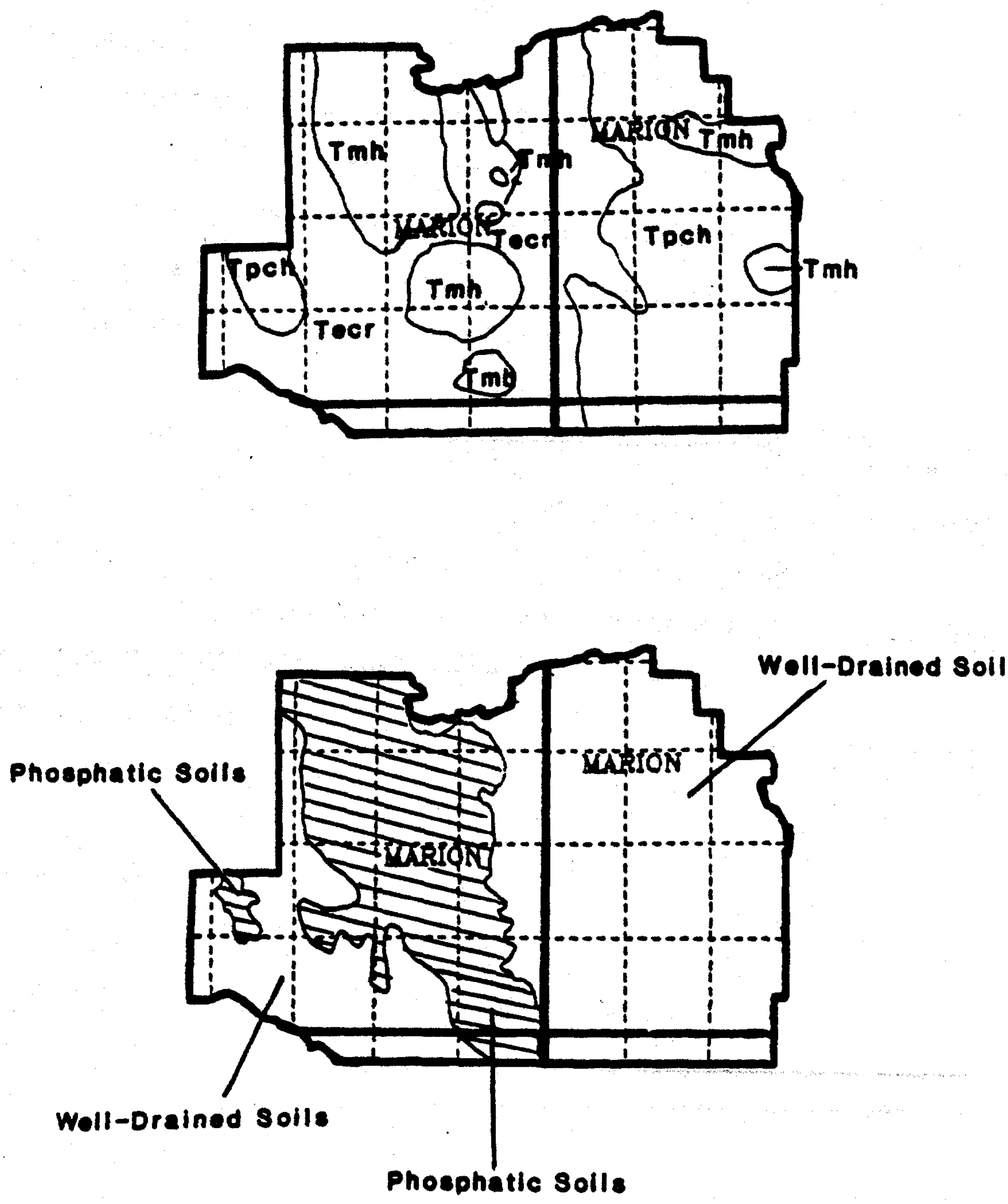

Figure 5-26. Bedrock Geology and Associated Soil Groups for Marion County

5.14 PASCO COUNTY

As shown in Figure 5-27, both the land-based indoor and soil radon results indicate elevated radon potential in two adjacent quadrangles in the eastern part of Pasco County. The elevated readings from the population-based survey also included these quadrangles. The terrestrial uranium readings were slightly elevated in these quadrangles but were not above 2.4 ppme for any quadrangle in the county. The indoor radon results from the population-based survey were at or above 4 pCi/L for two zip codes--33525 and 34248 (Table 5-14). One of these (33525) was also identified through the land-based survey as having elevated potential.

As shown in Figure 5-28, the bedrock geology of Pasco County is characterized by exposures of the Saint Marks Formation (Tmsm), the Suwannee Limestone (Tos), the Hawthorn Formation (Tmh) in northeast Pasco, the Crystal River Formation (Tecr), and the Fort Preston Formation (Tmf) of Vernon and Puri (1964). Soils include both poorly drained and well-drained types, with phosphatic soils covering the Hawthorn Formation in eastern Pasco County. NURE data suggest only low to moderate amounts of uranium in the sediments of Pasco County, with relatively elevated values (1.9 to 2.1 ppme average) associated with sediments mapped as part of the Hawthorn Formation. The shaded quadrangles both coincide with exposures of Hawthorn and its associated phosphatic soils.

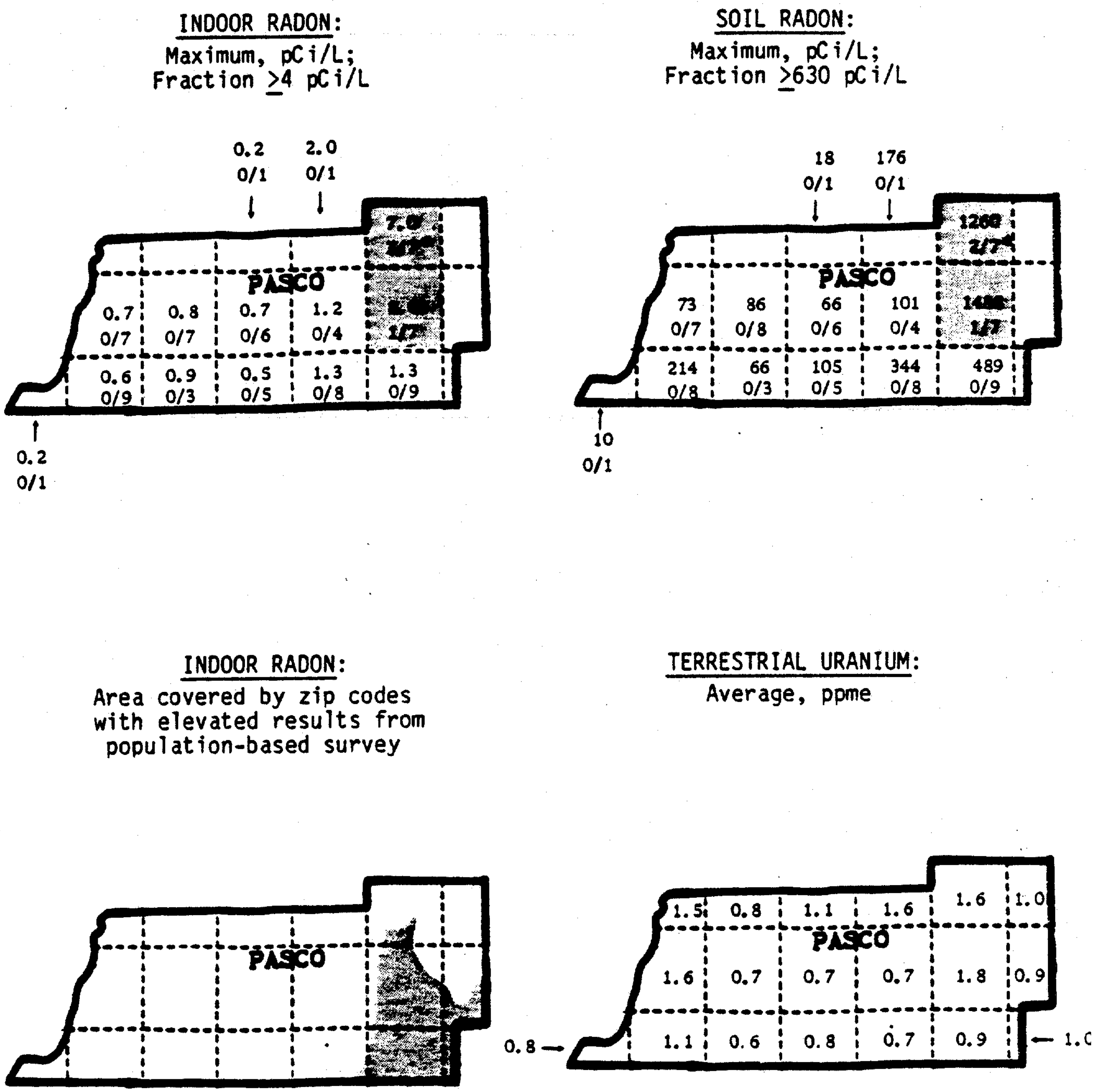

Figure 5-27. Radon and Uranium Results by 1:24,000 Quadrangle for Pasco County

Table 5-14. Indoor Radon Concentrations for Pasco County, by Zip Code

Zip Code	Land-Based Survey			Population-Based Survey		
	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
33525	14	2.8	8.0	14	1.6	5.9
33526	4	0.2	0.2	2	0.2	0.2
33539	9	0.3	0.7	1	0.8	0.8
33549	2	0.7	0.9			
33552	9	0.3	0.6	12	0.4	0.8
33553	2	0.6	0.7	7	0.4	1.0
33556	2	0.4	0.5			
33562	4	0.5	0.8	2	1.7	2.6
33567				28	0.4	1.5
33568	5	0.3	0.6	10	0.6	1.7
33590	2	0.2	0.2	21	0.4	1.2
34248	5	0.5	1.3	23	1.8	8.0
34249	11	0.5	1.3	1	0.5	0.5
34266	4	0.7	1.2			
34297	1	0.2	0.2			

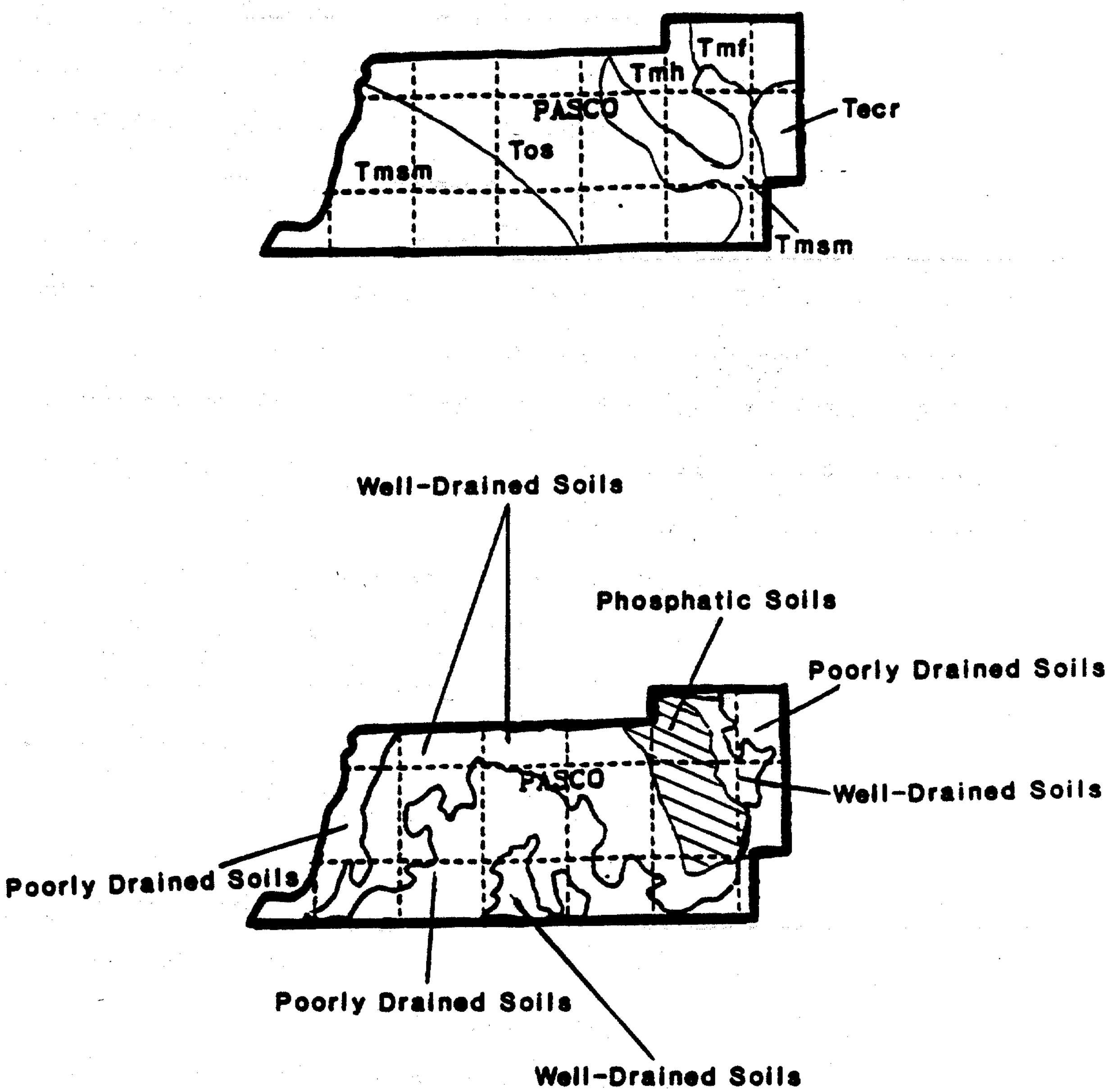

Figure 5-28. Bedrock Geology and Associated Soil Groups for Pasco County

5.15 PINELLAS COUNTY

Results for indoor radon, soil radon, and terrestrial uranium are shown by quadrangle in Figure 5-29. The NURE data files did not include records for most of these quadrangles; those that were included do not have elevated uranium readings. The indoor and soil-radon results indicate elevated potential in two nonadjacent quadrangles; the quadrangle in the northern part of the county with the highest soil reading is also covered by a zip code with elevated population-based results. The data by zip code (Table 5-15) indicate that most areas had very low concentrations. Two zip codes were indicated as having readings at or above 4 pCi/L--33542 (land-based survey) and 33572 (population-based survey).

Carbonates of the Saint Marks Formation (Tmsm) and siliciclastic sediments of the Hawthorn Formation (Tmh) crop out in Pinellas County, as shown in Figure 5-30. In southern Pinellas County, sediments of the Hawthorn are covered by unconsolidated sands and clays of the Penholoway (Qtpe) and Pamlico (Qtpa) terrace deposits. Associated soils are mixed and include both well-drained and poorly drained types. No phosphatic soils are present.

The NURE data, available only for northern Pinellas County, suggest low to moderate levels of uranium (0.8 to 2.0 ppme average) for the sediments of the Saint Marks Formation.

The northern shaded quandrangle covers an area mapped as part of the Saint Marks Formation. Although little surface uranium is apparent in the NURE data (0.9 average ppme), the Hawthorn Formation underlies the Saint

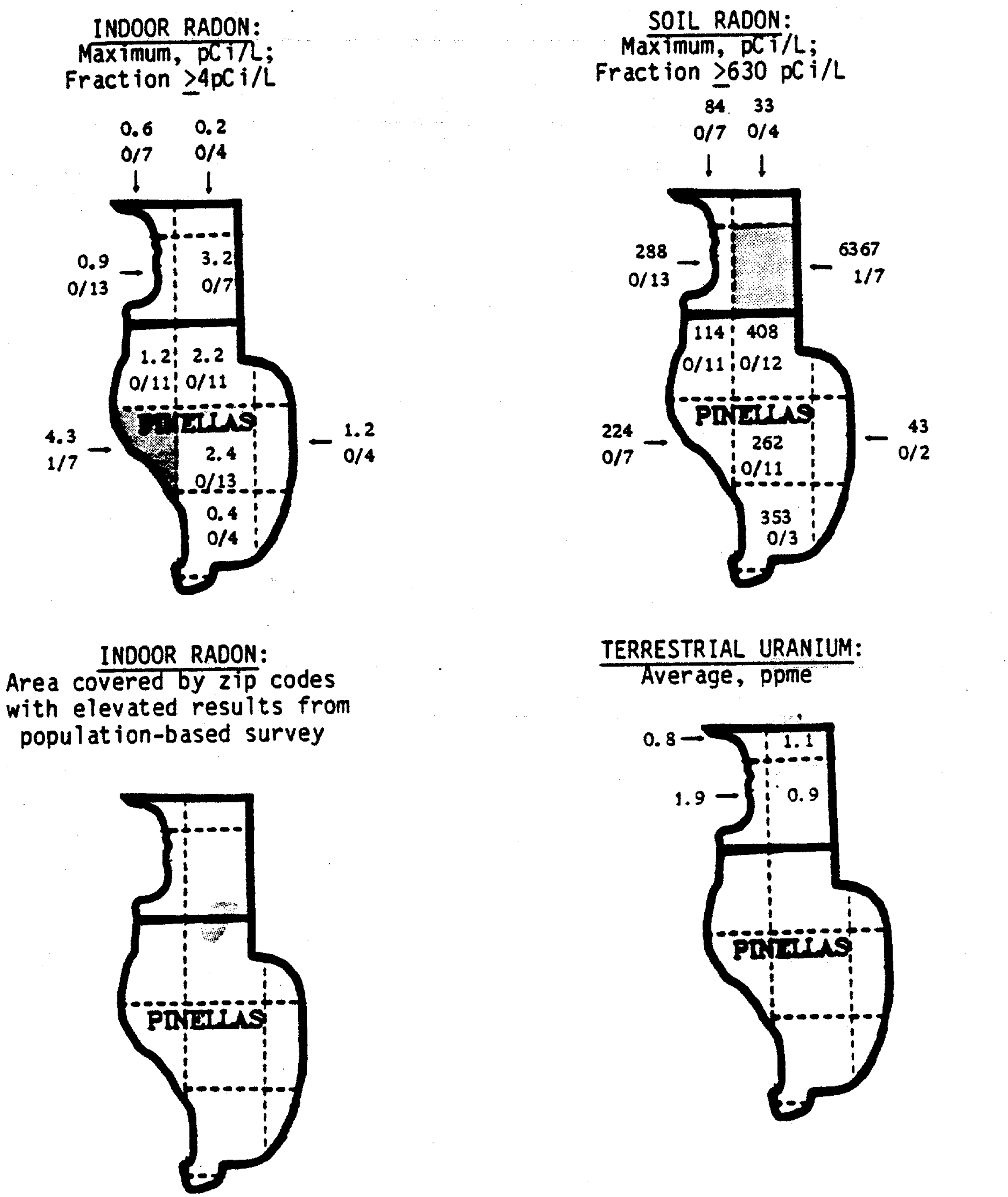

Figure 5-29. Radon and Uranium Results by 1:24,000 Quadrangle for Pinellas County

Table 5-15. Indoor Radon Concentrations for Pinellas County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
33514	1	0.8	0.8			
33515	3	0.2	0.2	12	0.3	0.9
33516	3	0.3	0.5	13	0.3	0.8
33519	5	0.4	0.7	7	0.3	1.0
33520	4	0.3	0.4			
33528	5	0.4	0.9	3	0.3	0.5
33540				5	0.5	1.8
33541				1	0.2	0.2
33542	4	1.7	4.3	20	0.3	1.0
33543	2	0.2	0.2	7	0.3	0.9
33544				9	0.2	0.5
33546	2	0.7	1.2	6	0.5	0.7
33557	1	0.2	0.2	2	0.6	0.9
33563	9	0.3	0.5	7	0.5	1.5
33565	1	0.2	0.2	20	0.2	0.8
33572	7	1.2	3.2	13	0.9	4.4
33589	10	0.3	0.6	4	0.3	0.5
33590	1	0.2	0.2			
33702				5	0.2	0.4
33703	4	0.5	1.2	9	0.2	0.2
33704				7	0.6	2.6
33705	1	0.4	0.4			
33706	3	0.2	0.2	3	0.3	0.4
33707				4	0.2	0.2
33708	1	0.8	0.8	1	1.3	1.3
33709	1	0.9	0.9	4	0.3	0.4
33710	2	0.2	0.2	6	0.2	0.4
33711	2	0.2	0.2	1	1.4	1.4
33712	9	0.5	2.4	2	0.4	0.5
33713				11	0.3	0.9
33714				3	0.2	0.2

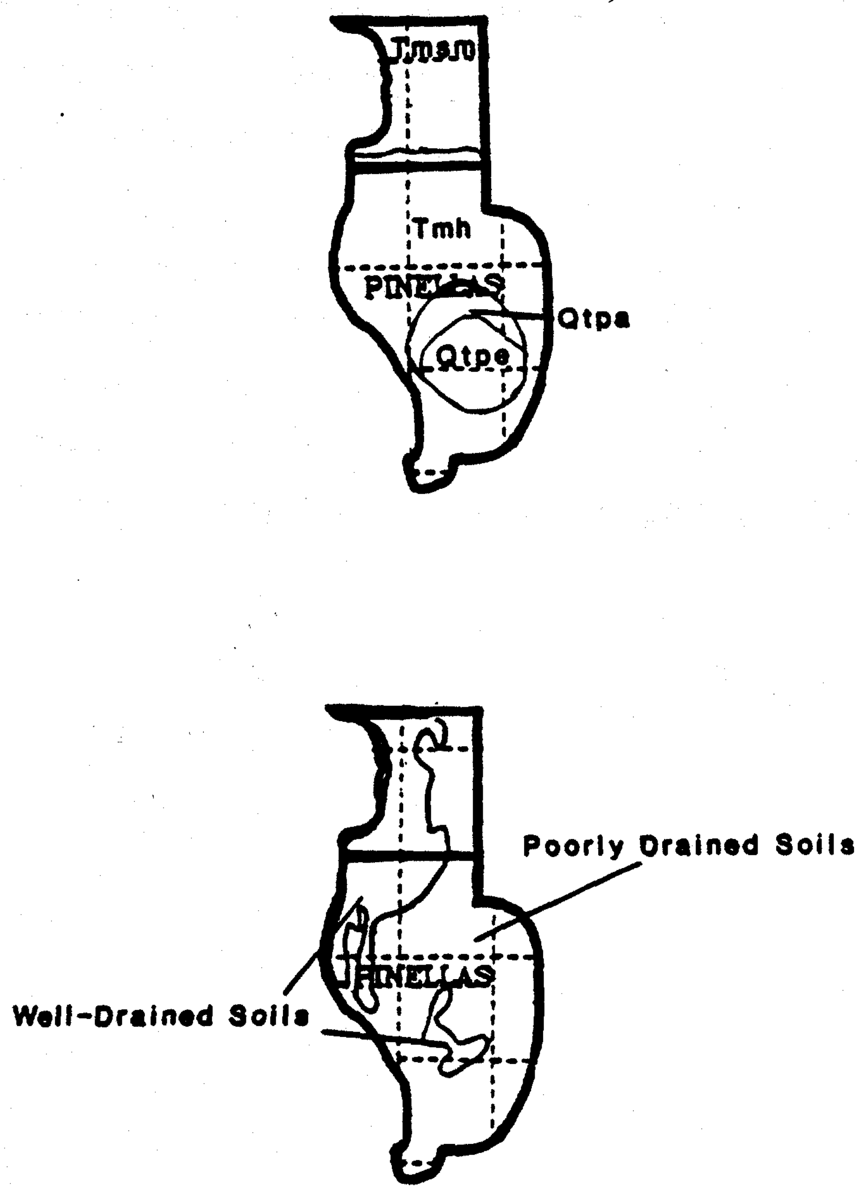

Figure 5-30. Bedrock Geology and Associated
Soil Groups for Pinellas County

Marks Formation.* It is possible that radon is originating from sediments of the Hawthorn Formation, and is migrating into the Saint Marks Formation. The few elevated radon values in the northern shaded quadrangle likely reflect the moderating influence of the somewhat poorly drained soil groups on the upward moving radon.

The shaded quadrangle in southern Pinellas County is located in an area mapped as part of the Hawthorn Formation. No phosphatic soils are reported in this area. Thus, the observed lack of elevated values of soil radon suggests that uranium concentrations, and by inference, available radon in the Hawthorn, are also low in western Pinellas County.

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* Scott, T.M. and P.L. MacGill. 1981. Geology of the Hawthorn Formation in Central Florida, Florida Bureau of Geology Rept. of Inves. No. 91, pp. 1-57.

5.16 POLK COUNTY

The results from the three data sets from the land-based survey--indoor radon, soil radon, and terrestrial uranium-are quite complementary (Figure 5-31), indicating that elevated potential is essentially confined to the southern and western parts of Polk county. In one isolated quadrangle in the northwest part of the county, one of three homes had elevated readings both for indoor radon and soil radon. Elevated results from the population-based survey were similarly confined to the southern and western areas of the county.

In Table 5-16, indoor radon results from both surveys are summarized by zip code in terms of the number of homes with valid results and average and maximum concentrations. The results from the two surveys are comparable but some differences exist. Both surveys measured the highest concentration in zip code 33830. Varying sample size by zip code for the two surveys does not allow for a strict comparison, but in two zip codes (33844 and 33881) with five or more homes for both surveys, the results matched quite well. On the other hand, for zip code 33803 the averages and highest concentrations were different for the two surveys. In addition to zip code 33830, others with maximum levels at or above 4.0 pCi/L were 33803, 33809, 33811, 33835, 33846, and 33860.

Siliciclastic clays, sands, and sandy carbonates of the Hawthorn (Tmh) and Bone Valley (Tmbv) Formations characterize the bedrock geology of Polk County, as shown in Figure 5-32. In eastern Polk County, Hawthorn and

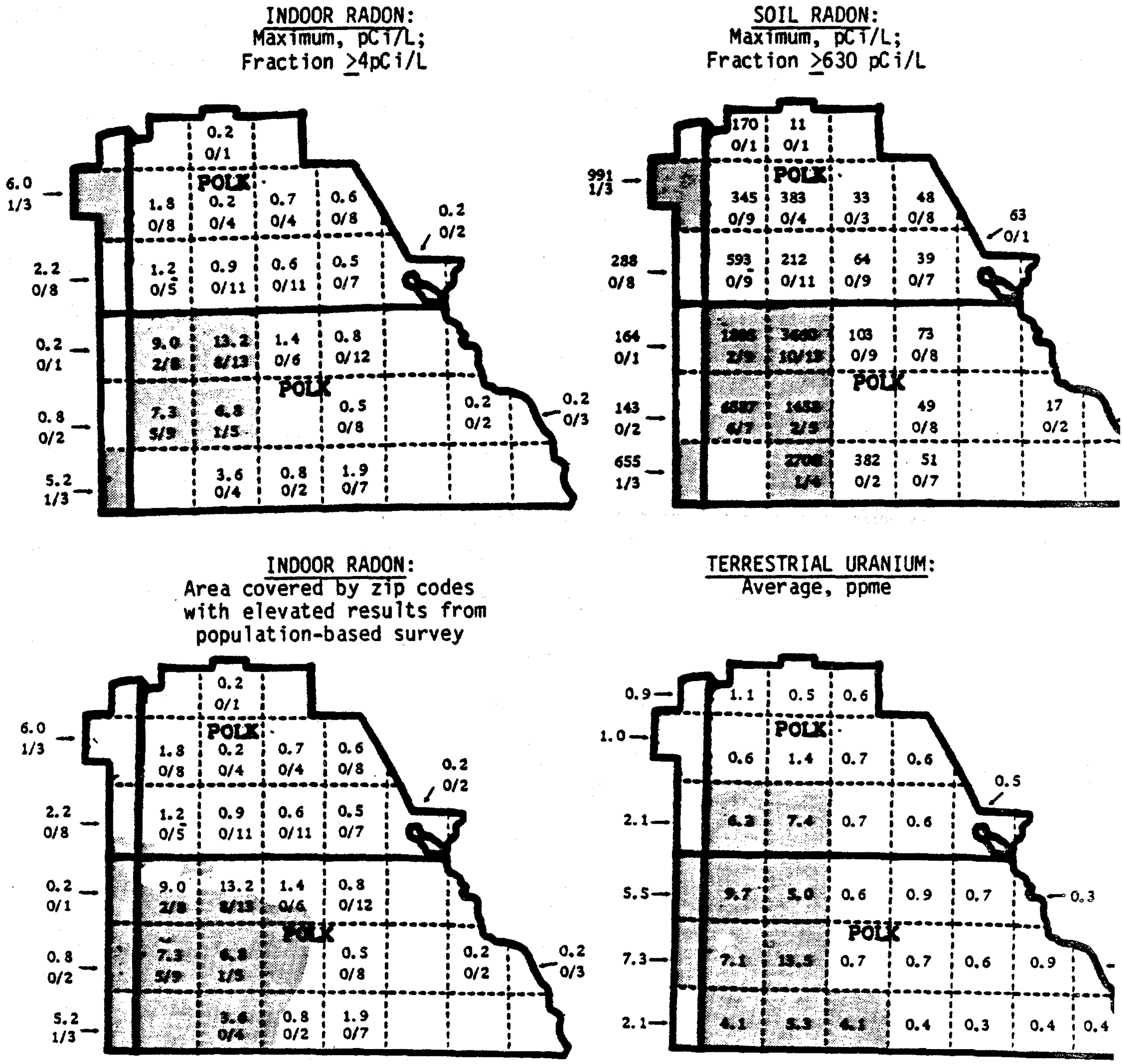
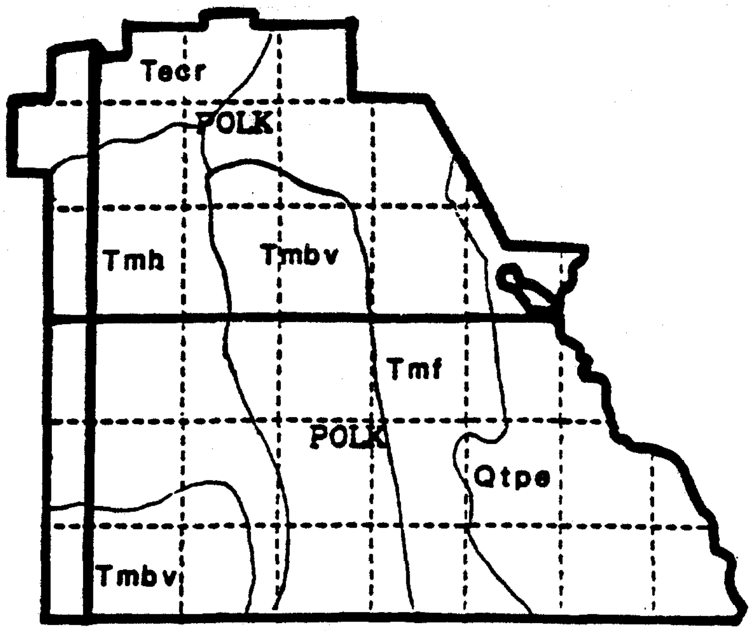


Figure 5-31. Radon and Uranium Results by 1:24,000 Quadrangle for Polk County

Table 5-16. Indoor Radon Concentrations for Polk County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
32758	1	0.2	0.2	4	0.2	0.2
33566	1	0.2	0.2			
33801	3	0.9	1.2	24	0.4	1.2
33803	5	1.2	2.3	19	2.5	9.0
33805	2	0.4	0.6	9	0.6	1.1
33809	18	1.1	6.0	2	0.7	1.0
33811	1	4.9	4.9	1	1.2	1.2
33813	1	3.9	3.9	1	0.2	0.2
33823	7	0.5	0.9	3	0.5	0.7
33827	3	0.2	0.2			
33830	15	4.9	13.2	4	4.9	15.1
33835	3	2.2	4.9	3	0.3	0.4
33837	4	0.3	0.6			
33838	1	0.2	0.2	1	0.2	0.2
33839	1	0.2	0.2			
33841	6	1.8	3.6	3	1.1	1.8
33843	11	0.4	1.9			
33844	13	0.3	0.7	8	0.3	0.6
33846	1	4.9	4.9			
33847	2	2.8	3.3			
33850	5	0.2	0.4			
33851	1	0.2	0.2			
33853	12	0.3	0.7	4	0.2	0.2
33855	2	0.2	0.2			
33858	1	0.2	0.2			
33860	14	3.5	9.0	4	1.2	2.7
33863	3	0.4	0.7			
33868	6	0.2	0.2	1	0.2	0.2
33877	1	0.2	0.2			
33880	6	0.5	0.8	9	0.4	1.2
33881	6	0.4	0.7	28	0.3	1.4
33883	1	0.2	0.2			



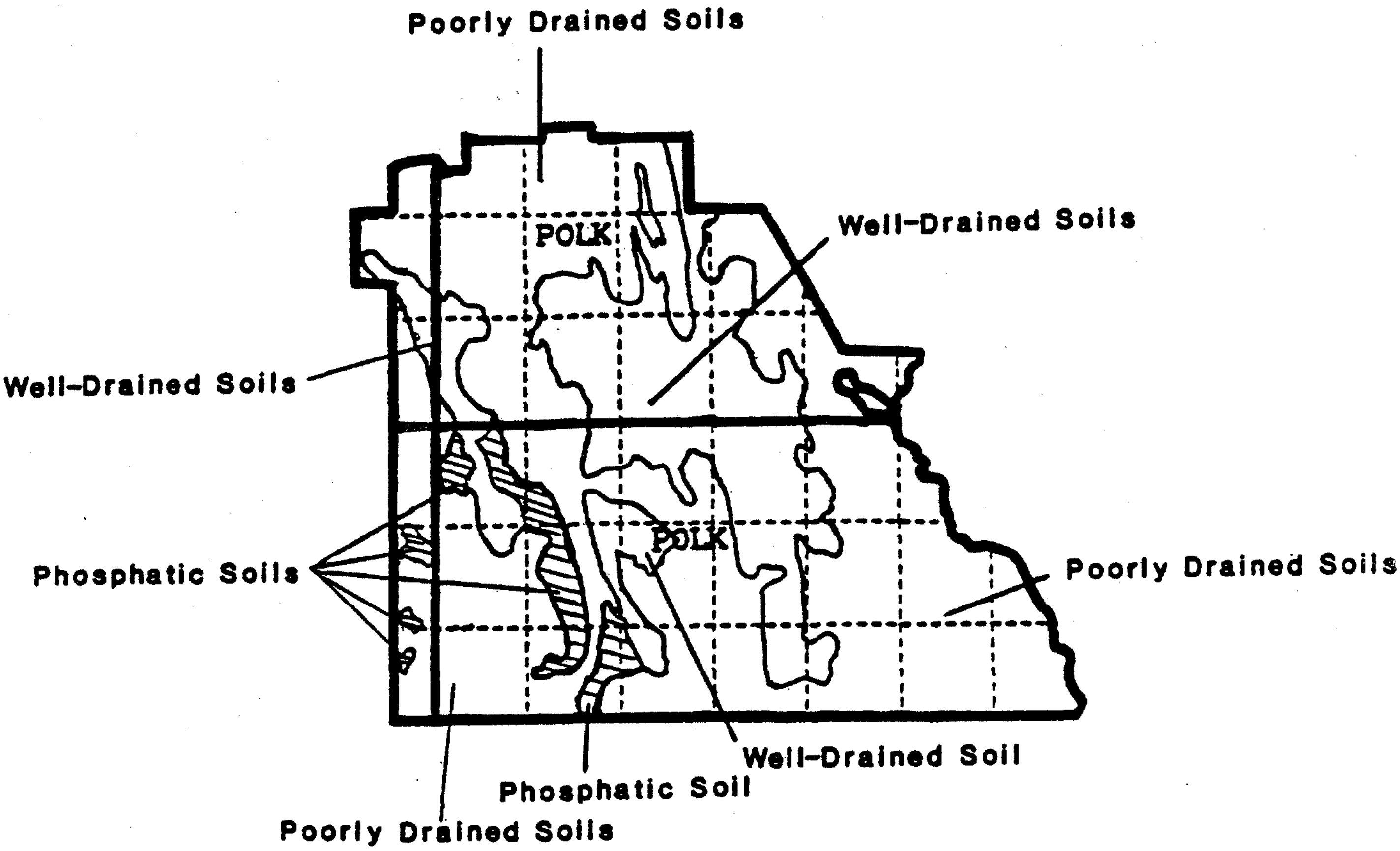


Figure 5-32. Bedrock Geology and Associated Soil Groups for Polk County

Bone Valley sediments are covered by unconsolidated sands of the Fort Preston (Tmf) formation of Vernon and Puri* and Penholoway terrace deposits (Qtpe). In northwest Polk County carbonates of the Crystal River Formation (Tecr) are exposed. Soils in central and western Polk County are well drained and include phosphatic soils. Soils in eastern and southern Polk County are predominantly poorly drained.

The highest average concentrations of uranium are associated with the Hawthorn (7.6 to 18.6 ppme) and Bone Valley (2.1 to 13.1 ppme) Formations in western Polk county. The shaded quadrangles in western Polk County coincide with exposures of the Hawthorn and Bone Valley Formations, exposures of phosphatic soil, and areas with high concentrations of uranium, as defined in the NURE data set. The relatively high concentrations of ppm equivalent uranium observed in southwestern Polk County as compared with the remainder of the State suggest that conditions in Polk County favor the highest radon emanation rates in Florida. However, the presence of poorly drained soils over much of southwestern Polk County could inhibit the migration of radon in these soils.

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* Vernon, R.O. and H.S. Puri. 1965. Geologic Map of Florida. Division of Geology, Florida Board of Conservation.

5.17 SARASOTA COUNTY

There were no substantially elevated readings for Sarasota County in terms of land-based indoor radon results or terrestrial uranium (Figure 5-33). A single home with a soil concentration above 630 pCi/L was located in the southeastern part of the county, but some moderately elevated soil readings (400 to 600 pCi/L) were found both in the northwestern and southern parts of the county. Indoor radon concentrations above 4 pCi/L were measured by the population-based survey (Table 5-17) in two zip codes--33555 and 33559. The area covered by these zip codes is essentially confined to a single quadrangle in the western part of the county, for which the maximum soil reading was 606 pCi/L.

The bedrock geology of Sarasota county is characterized by siliciclastic sediments of the Hawthorn Formation (Tmh), the Bone Valley Formation (Tmbv), shelly marls of the Anastasia Formation (Qpa), and shelly carbonates of the Caloosahatchee Formation (Qpcm) (see Figure 5-34). Associated soils are all poorly drained. NURE data suggest that concentrations of uranium are low in Sarasota County, reaching a maximum of 3.0 ppme in the Caloosahatchee Formation in southeastern Sarasota County.

The shaded quadrangle occurs in southeastern Sarasota in association with Caloosahatchee sediments that show the highest concentration of ppme uranium. The occurrence of only one elevated soil radon value and no elevated indoor radon concentrations is attributed to the moderating effects of poorly drained soils in the quadrangle.

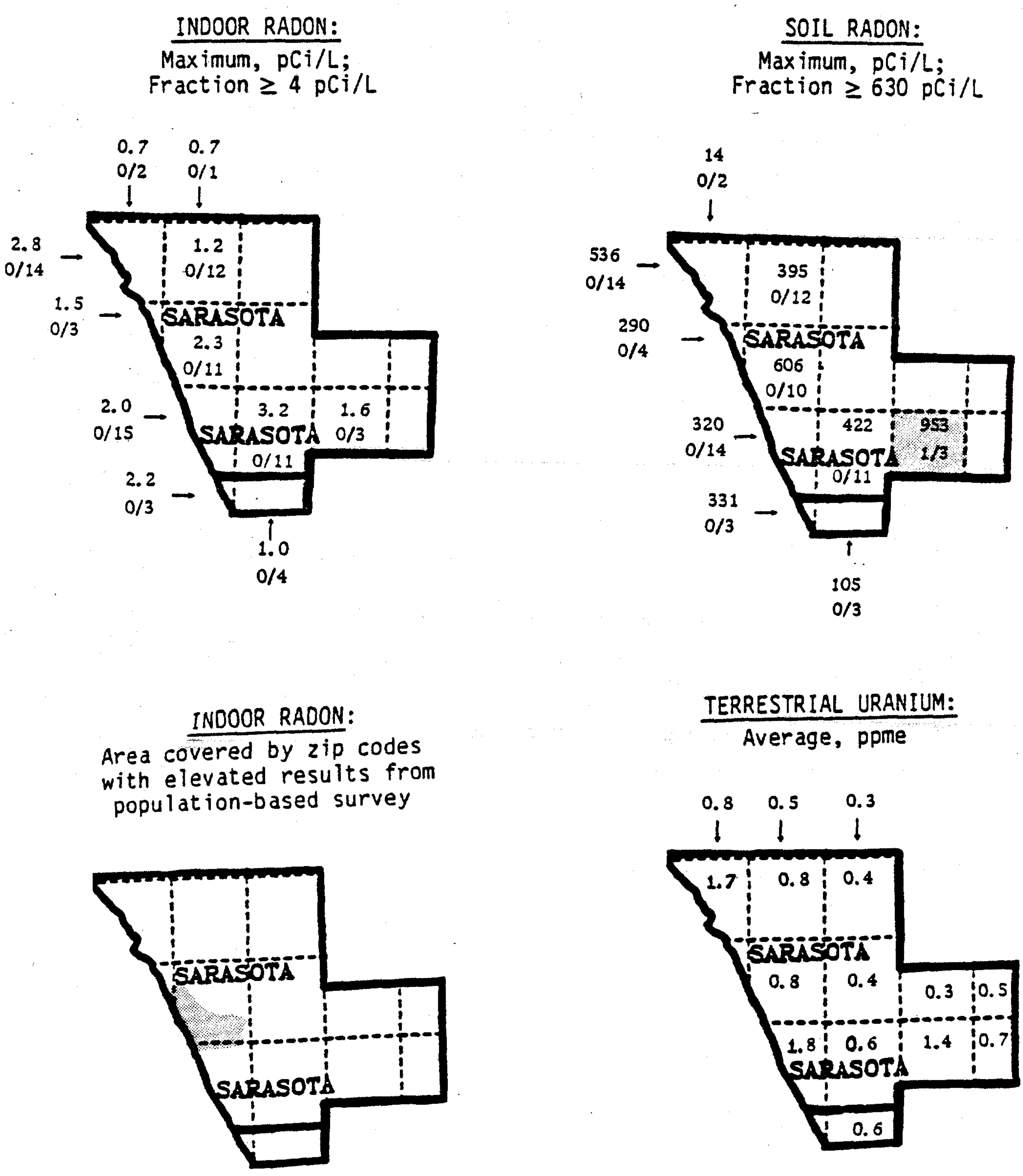


Figure 5-33. Radon and Uranium Results
by 1:24,000 Quadrangle for Sarasota County

Table 5-17. Indoor Radon Concentrations for Sarasota County, by Zip Code

	Land-Based Survey			Population-Based Survey		
Zip Code	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
33533	9	0.8	2.2	4	1.2	3.1
33548				2	0.3	0.4
33555	6	1.1	1.8	4	2.2	4.2
33559	3	1.0	1.4	3	2.2	5.6
33577	6	0.7	2.3	8	0.5	1.2
33579	1	0.4	0.4	6	0.6	2.0
33580	5	0.6	1.4	15	0.4	1.3
33581	6	1.1	2.8	11	0.7	1.7
33582	2	1.0	1.0	18	0.8	2.5
33583	5	1.1	2.2	10	0.7	1.3
33585	1	0.2	0.2			
33595	21	1.0	3.2	22	0.6	1.7
33596	4	1.2	1.6	18	0.8	2.8
34240	1	0.7	0.7	1	0.2	0.2
34241	6	0.5	1.1	2	0.5	0.8
34242	1	1.5	1.5	8	0.3	1.3
34243	1	0.7	0.7	3	1.4	2.7

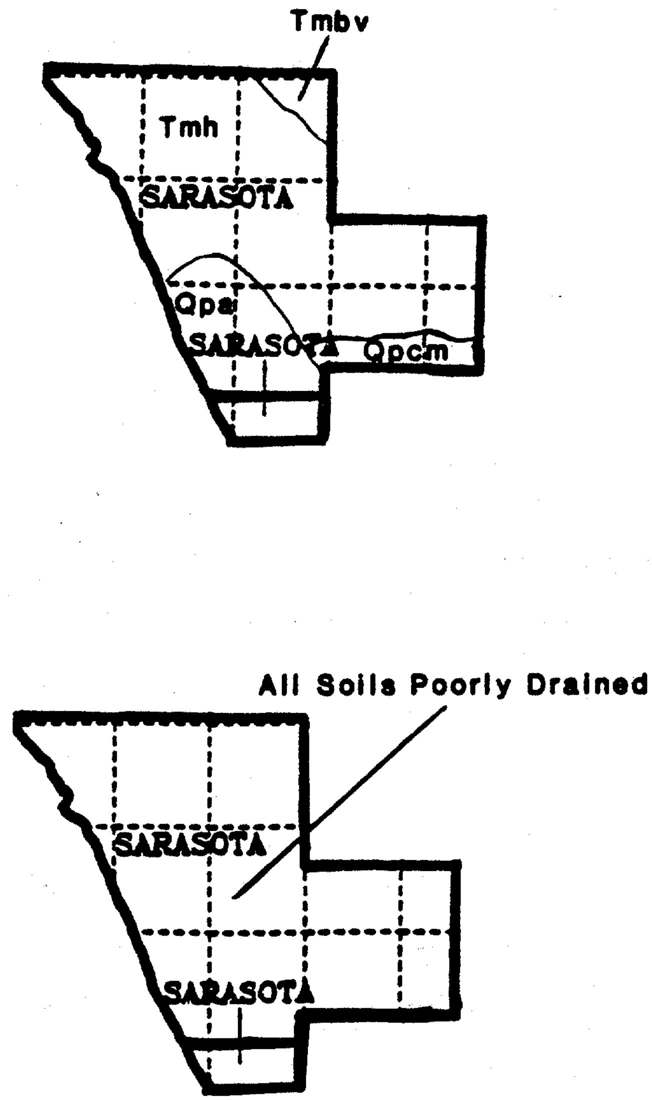


Figure 5-34. Bedrock Geology and Associated
Soil Groups for Sarasota County

5.18 SUMTER COUNTY

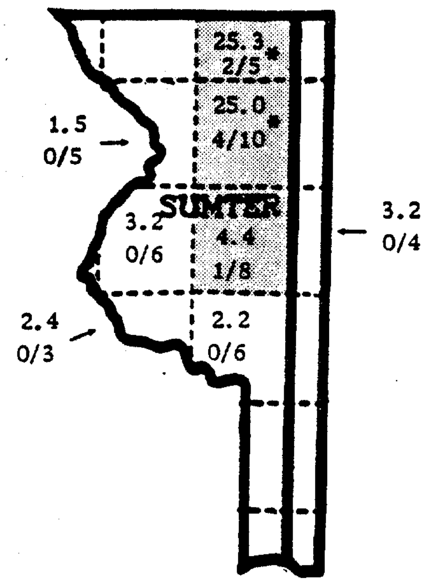
Results for indoor radon, soil radon, and terrestrial uranium for Sumter County are summarized in Figure 5-35. The collective results point to parts of the county bordering Marion County to the north and Lake County to the east as areas of elevated radon potential. One particular quadrangle, located in the upper-right corner of the Tarpon Springs 1:250,000 quadrangle, is indicated by all three land-based data sources in addition to population-based results.

As shown in Table 5-18, there were four zip codes--32659, 32684, 32785, and 33513--with elevated readings from the land-based survey. Zip code 32684 also had elevated readings from the population-based survey and the other three were not covered by that survey. No other zip codes had population-based results at or above 4.0 pCi/L.

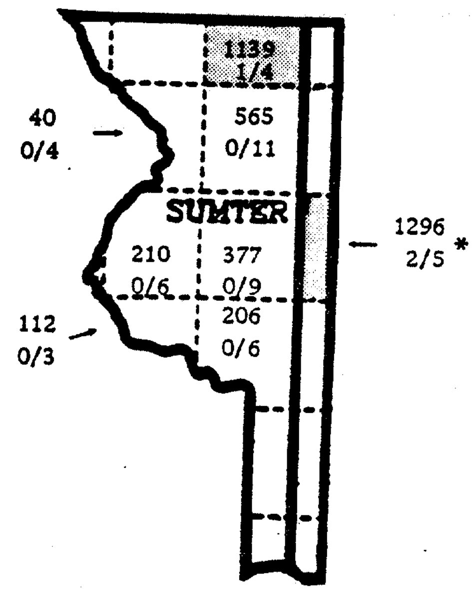
The bedrock geology of Sumter County is dominated by carbonate rocks of the Crystal River Formation (Tecr), the Williston Formation (Tew), and the Suwannee Limestone (Tos) (see Figure 5-36). Sands and clays of the Cypress Head Formation (Tpch) are exposed in the northeast portion of the county. Well-drained soil types predominate in north and central Sumter County, with small areas of phosphatic soil in the northeastern portion of the county. Poorly drained soil types predominate in southern Sumter County and along stream channels in western Sumter County. The highest uranium values (3.9 ppme average) occur in association with carbonates of the Crystal River Formation and Suwannee Limestone in northeast Sumter County.

Shaded quadrangles are located in northeast Sumter County in association with the phosphatic soils. It is inferred that the phosphatic soils are derived from erosional remnants of the Hawthorn Formation that now are incorporated in the carbonates as sinkhole and depression fill.

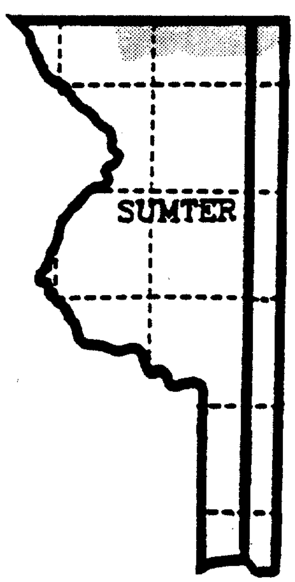
INDOOR RADON:
Maximum, pCi/L;
Fraction ≥ 4 pCi/L



SOIL RADON:
Maximum, pCi/L;
Fraction ≥ 630 pCi/L



INDOOR RADON:
Area covered by zip codes
with elevated results from
population-based survey



TERRESTRIAL URANIUM:
Average, ppme

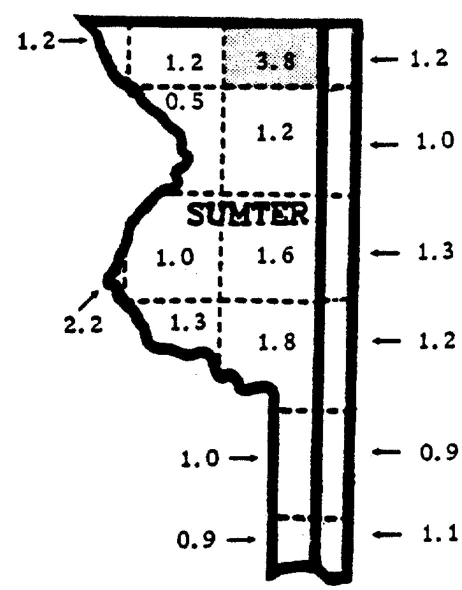


Figure 5-35. Radon and Uranium Results
by 1:24,000 Quadrangle for Sumter County

Table 5-18. Indoor Radon Concentrations for Sumter County, by Zip Code

Zip Code	Land-Based Survey			Population-Based Survey		
	Number of Homes	Mean, pCi/L	Maximum, pCi/L	Number of Homes	Mean, pCi/L	Maximum, pCi/L
32535	2	1.1	1.6			
32659	1	5.0	5.0			
32684	2	14.4	25.3	6	3.2	8.5
32785	9	5.6	25.0			
33513	16	1.7	4.4			
33538	5	0.7	1.5	4	0.5	1.2
33597	6	0.9	2.2			
34254	4	2.2	3.2	3	1.6	3.6
34255	1	0.6	0.6	2	1.5	2.8
34267	1	0.4	0.4			

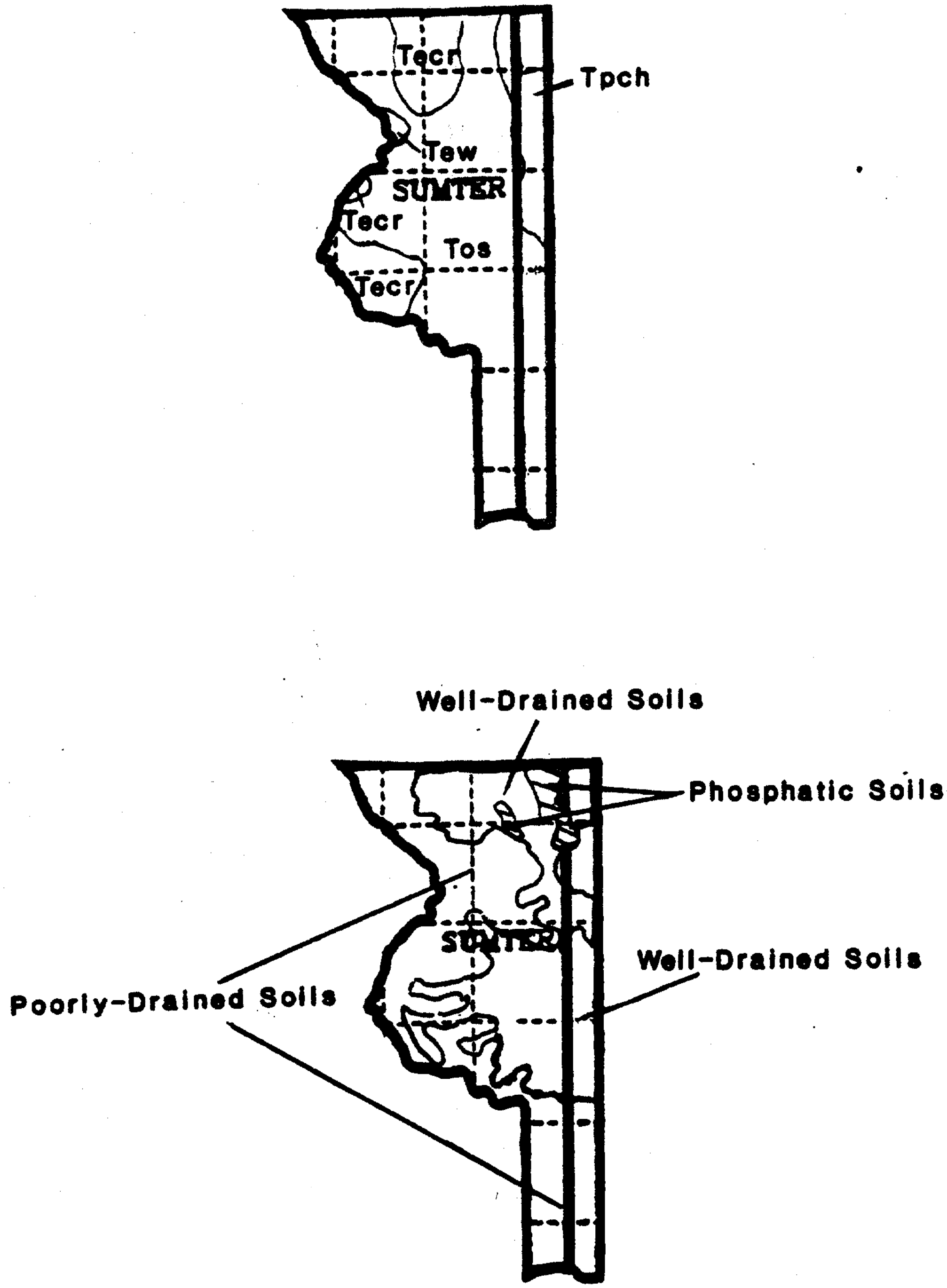


Figure 5-36. Bedrock Geology and Associated Soil Groups for Sumter County

Section 6.0

SYNTHESIS AND DISCUSSION

Section 6.0

SYNTHESIS AND DISCUSSION

In this section, the detailed results presented in Section 5.0 are used as a basis for identifying land areas that should be subject to the environmental radiation rule. Areas not currently designated, but with considerable uncertainty, are discussed in light of supporting geologic and soils information and the extent of survey coverage.

6.1 IDENTIFICATION OF LAND AREAS SUBJECT TO THE RULE

6.1.1 Criteria for Identification

Within the 18 counties identified as having elevated radon potential, 1:24,000 quadrangles have been selected as the geographic unit for identifying land areas to which the environmental radiation rule should apply, for two reasons:

- The quadrangle boundaries will remain fixed over time.
- The coordinates needed to identify quadrangle boundaries are available on various types of maps that are accessible, such as those prepared by the U.S. Geological Survey and the Florida Department of Transportation.

Other boundaries such as tip codes, census tracts, or enumeration districts can and do vary over time and are not appropriate for this purpose. Should more detailed results at a later time permit, finer divisions such as range and township boundaries could be considered as a tool for identifying land areas.

In designating areas subject to the rule, the following evidence was sought: (1) confirmation from two or more data sources that elevated radon potential exists or (2) stronger indication of elevated potential if given only by one data source. Consequently, the criteria for designating quadrangles based on multiple data sources were the same as those used to shade quadrangles in Section 5.0--a reading of 4 pCi/L or higher for indoor radon, 630 pCi/L or higher for soil radon, or 2.4 ppme or higher for terrestrial uranium. If only one data source indicated elevated potential, then the criteria for designation were raised by 50 percent--a reading of 6 pCi/L or higher for indoor radon, 945 pCi/L or higher for soil radon, or 3.6 ppme or higher for terrestrial uranium. An alternative criterion for designation in the case of one data source was a significant proportion of homes at or above 4 pCi/L for indoor radon or 630 pCi/L for soil radon. Because the zip code boundaries used to indicate areas with elevated results from the population-based survey often crossed quadrangle boundaries, they were used as a confirming indicator, but not the sole indicator, for designating quadrangles.

6.1.2 Designation of Areas

Based on the above criteria, the number of quadrangles in each of the 18 counties is shown in Table 6-1, together with the number identified as subject to the rule. For each county, distinction is made between whole and part quadrangles. Part quadrangles are those that are partly covered by ocean, that are contained in more than one county, or both. In total, 45 whole quadrangles and 29 part quadrangles (unduplicated count) have been identified. The designated quadrangles represent about 7 percent

Table 6-1. Number of Quadrangles Designated for the Environmental Radiation Rule, by County

County	Whole Quadrangles: Total Number	Whole Quadrangles: Number Designated	Part Quadrangles: Total Number	Part Quadrangles: Number Designated*	Part Quadrangles: Number Also Designated in Other Counties
Alachua	8	7	17	2	0
Charlotte	5	2	15	3	1 (Sarasota)
Citrus	5	3	12	0	0
Columbia	6	1	17	2	0
Dade	22	4	18	0	0
Gilchrist	2	0	8	1	0
Hardee	6	2	14	3	3 (Polk)
Hillsborough	10	6	22	3	2 (Polk)
Lee	9	2	19	1	0
Leon	3	2	17	1	0
Levy	7	0	18	2	0
Manatee	5	0	17	2	0
Marion	15	8	23	4	1 (Sumter)
Pasco	4	1	15	1	0
Pinellas	1	0	12	1	0
Polk	17	6	23	7	5 (3 Hardee, 2 Hillsborough)
Sarasota	4	0	13	1	1 (Charlotte)
Sumter	2	1	16	2	1 (Marion)
Total, all 18 Counties	131	45	296	29**	

* For quadrangles contained in more than one county, only the county-specific portions with evidence of elevated radon potential are counted here.

** Unduplicated count across counties; duplicated count is 36 part quadrangles.

of those covering the entire State. Within the 18 counties, 34 percent of whole quadrangles (45 of 131) and 12 percent of part quadrangles (36 of 296) were designated.

The specific quadrangles designated as subject to the rule are highlighted on the county-specific maps shown in Figures 6-1 to 6-6. The counties are grouped for presentation by geographic proximity as follows:

- Leon (Figure 6-1)
- Columbia, Gilchrist, and Alachua (Figure 6-2)
- Levy, Marion, Citrus, and Sumter (Figure 6-3)
- Pasco, Pinellas, Hillsborough, and Polk (Figure 6-4)
- Manatee, Hardee, Sarasota, Charlotte, and Lee (Figure 6-5)
- Dade (Figure 6-6).

In the case of designated quadrangles that cross county boundaries, all portions of such quadrangles lying within the 18 counties are highlighted in Figures 6-1 to 6-6. However , county-specific portions of such quadrangles with no evidence of elevated radon potential are indicated by an asterisk in the figures and are not counted in the "Number Designated" column for part quadrangles in Table 6-1.

The 1:24,000 quadrangles covering the Sate of Florida are listed and shown on maps in Appendix B. Indoor and soil radon results from the land-based survey are listed by county and quadrangle in Appendix C. Indoor radon results from the population-based survey are listed by county and zip code in Appendix D.

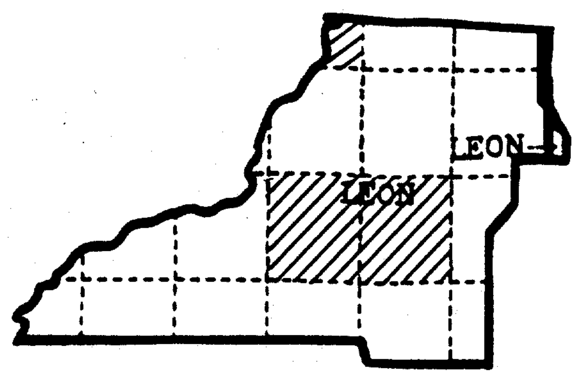


Figure 6-1. Designated Quadrangles for Leon County

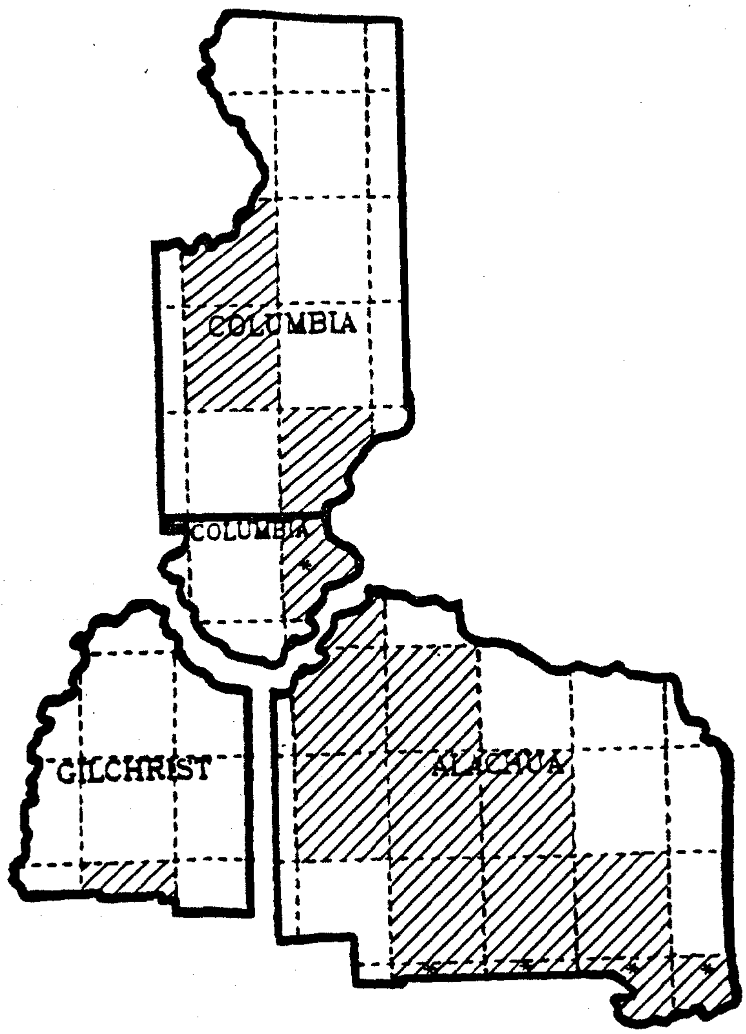


Figure 6-2. Designated Quadrangles for Columbia, Gilchrist, and Alachua Counties.

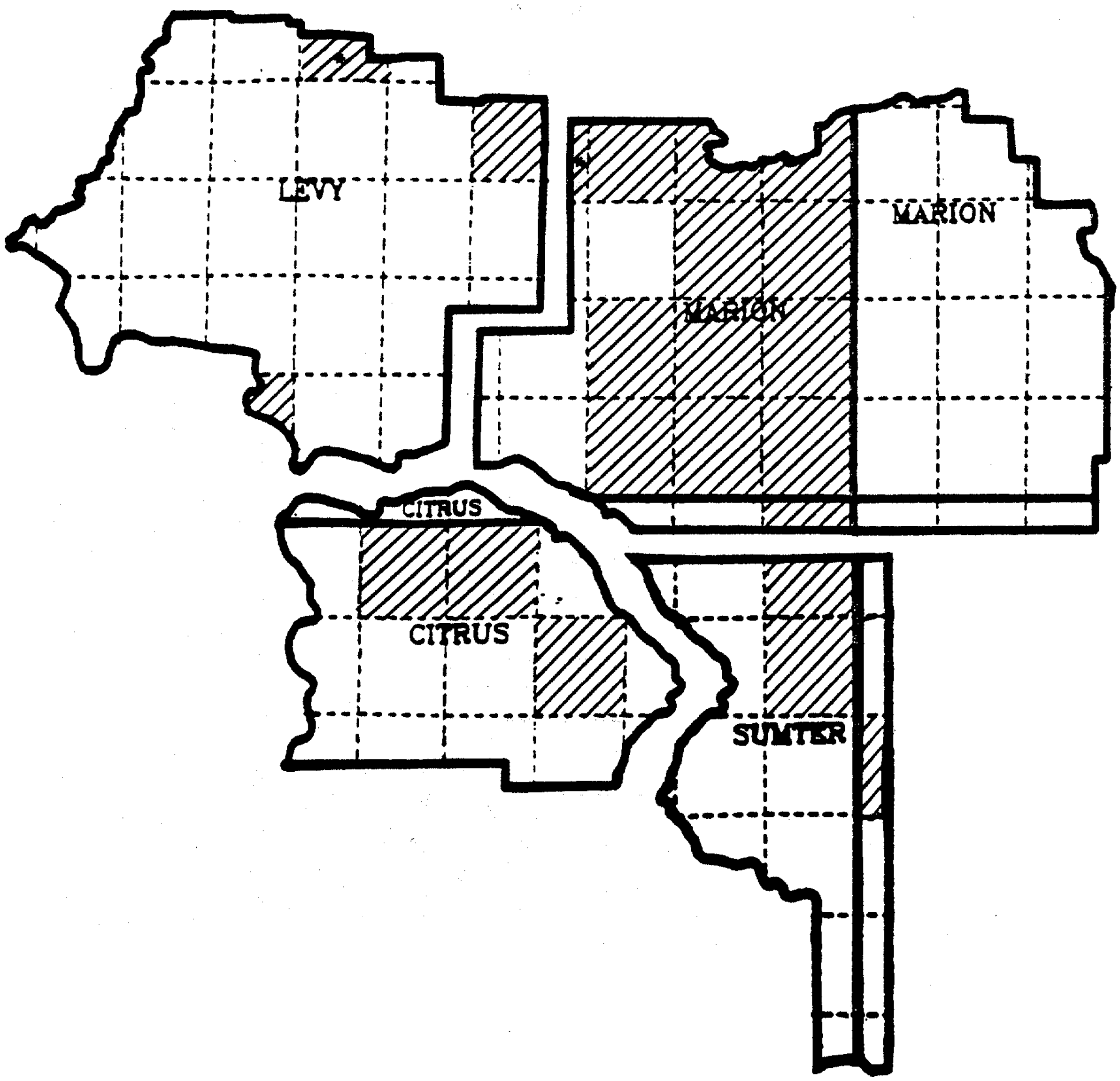


Figure 6-3. Designated Quadrangles for Levy, Marion, Citrus, and Sumter Counties

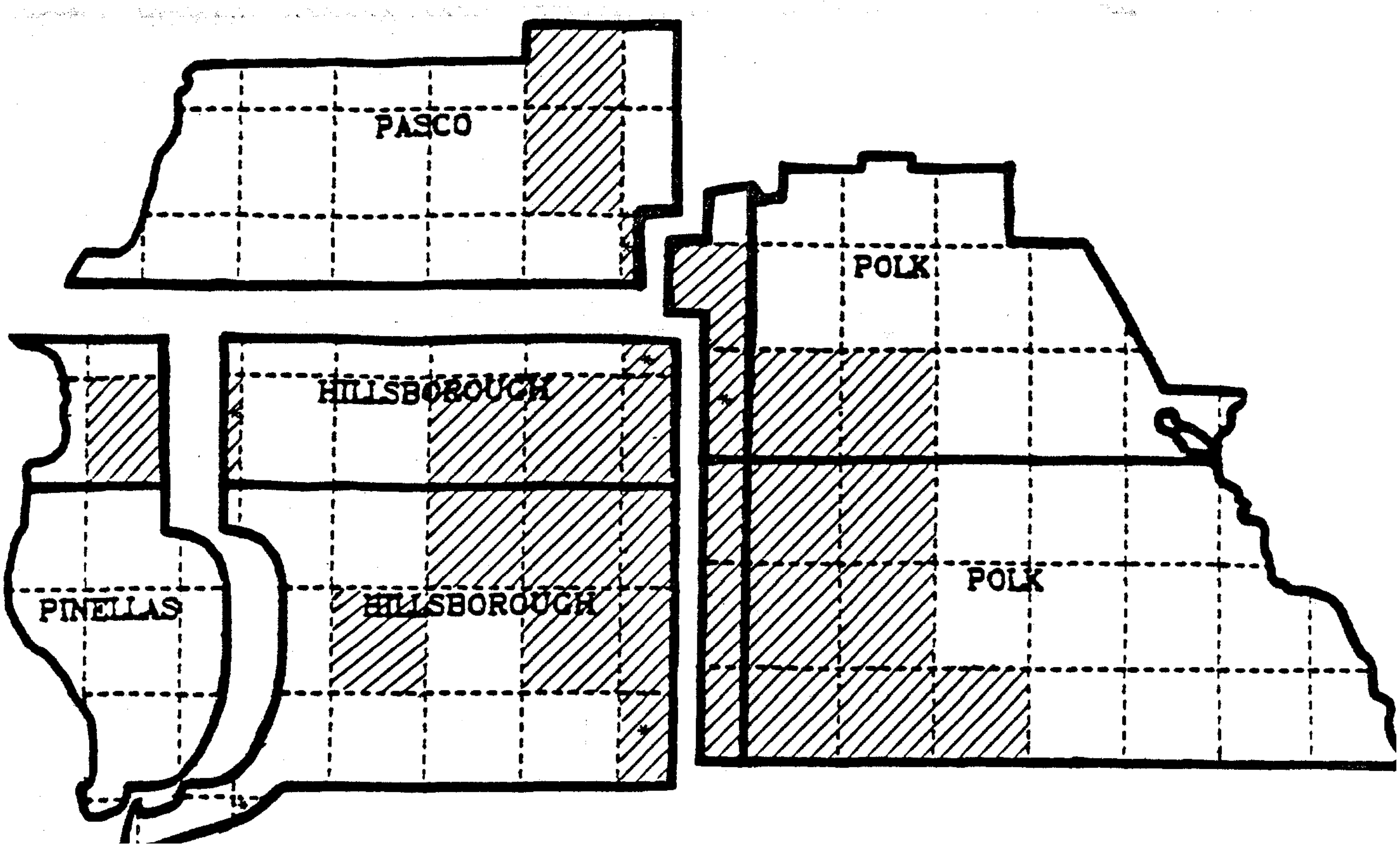


Figure 6-4. Designated Quadrangles for Pasco, Pinellas Hillsborough, and Polk Counties

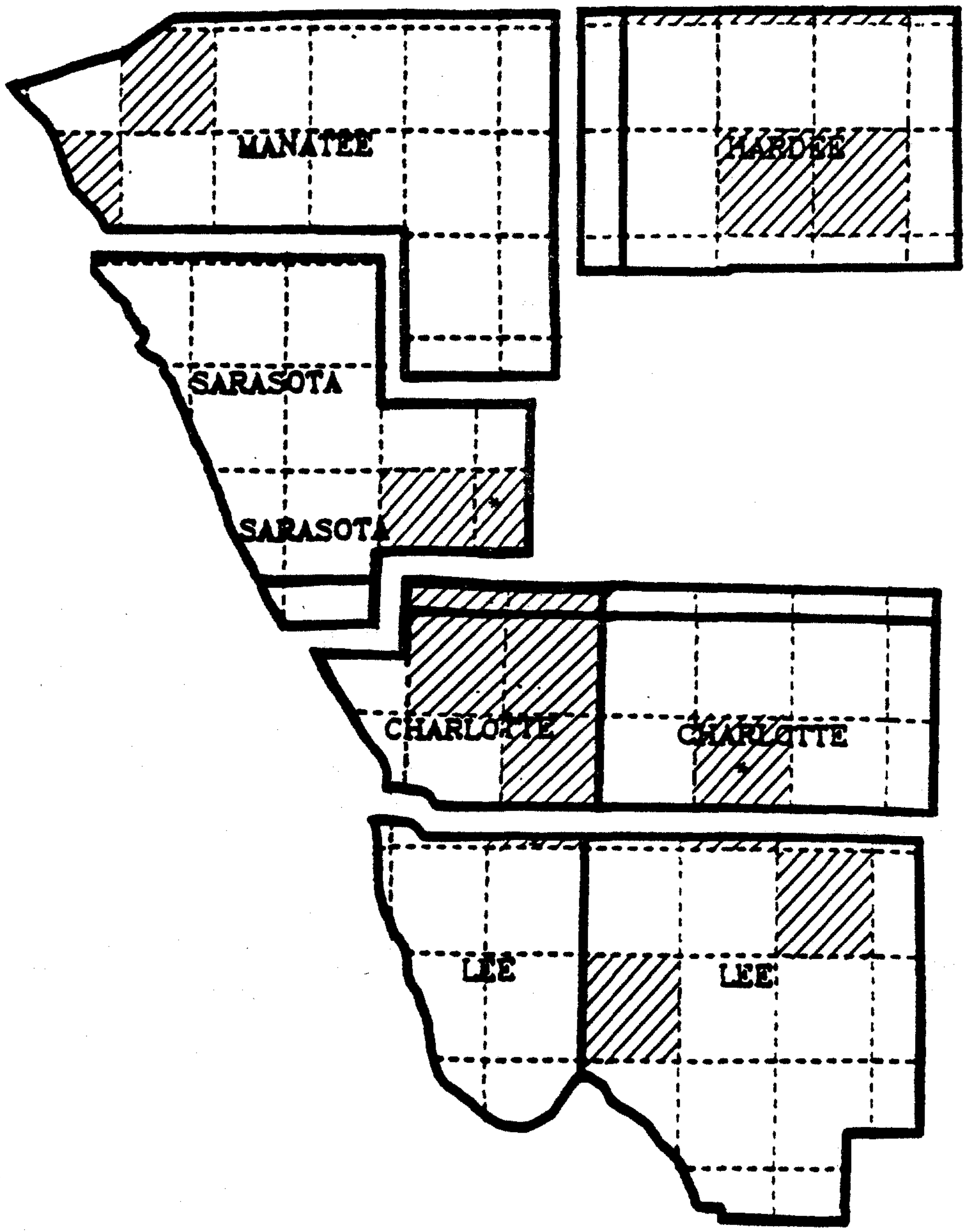


Figure 6-5. Designated Quadrangles for Manatee, Hardee, Sarasota, Charlotte, and Lee Counties

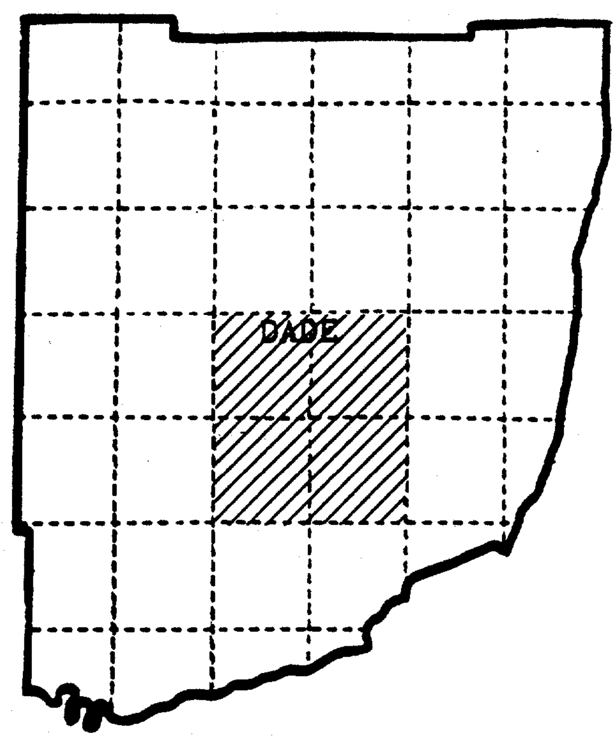


Figure 6-6. Designated Quadrangles for Dade County

6.2 DISCUSSION

The 74 quadrangles (46 whole and 29 part) indicated in Table 6-1 and identified in Figures 6-1 to 6-6 represent areas with evidence from this study that elevated radon potential exists. In some cases, elevated radon potential may be confined to selected subareas within a designated quadrangle. However, until more detailed evidence is available, the areas identified in Figures 6-1 to 6-6 should be considered uniformly high as a public health protective measure.

One difficult issue in the designation of land areas is the case of quadrangles that lie in more than one county. Such quadrangles have been designated in entirety only if all counties covered by a quadrangle are among the 18 counties with definite evidence; otherwise, only the portions lying in counties with definite evidence have been designated.

If a decision were also made to designate quadrangles that cross county boundaries in entirety in all cases, then additional part quadrangles would be designated in the following counties:

- Counties with limited evidence of elevated radon potential

  Hamilton (1 quadrangle)
  Union (2 quadrangles)
  Hernando (1 quadrangle)
  DeSoto (1 quadrangle)

- Counties with no evidence of elevated radon potential

  Gadsden (1 quadrangle)
  Putnam (1 quadrangle)
  Lake (1 quadrangle)

Such an approach may be reasonable for counties with limited evidence of elevated radon potential, but could cause unnecessary concern in counties with no evidence. The three counties with no evidence, for which indoor radon concentrations averaged about 0.5 pCi/L and were below 4 pCi/L in all cases, would be unnecessarily penalized by such a decision.

The current designation of 74 quadrangles should not be construed as meaning that there are no other areas of elevated potential in the State. Inadequate sampling coverage in some sparsely populated areas may have caused us to miss some localized areas of elevated potential. The lower coverage is of particular concern should such areas become targets for future building construction.

More than half of the currently designated quadrangles are associated with the four counties having the highest average index values for radon potential--Alachua, Hillsborough, Marion, and Polk. For discussion purposes, the remaining 14 counties with definite evidence have been placed into two groups--seven counties (Citrus, Columbia, Gilchrist, Leon, Levy, Pasco and Sumter) north of Polk and Hillsborough Counties, and seven counties (Charlotte, Dade, Hardee, Lee, Manatee, Pinellas, and Sarasota) to the east or south. An important distinction between these two groups is that those to the north tend to have a higher prevalence of near-surface, uranium-bearing geologic formations and phosphatic soils, whereas for those to the south, the formations of consequence for radon generally are covered by other formations and there is a higher prevalence of poorly drained soils.

Among counties in the group north of Polk and Hillsborough Counties, Columbia County is one with significant uncertainties due to low coverage by both the land- and population-based surveys. For Leon, Levy, and Gilchrist Counties, there were a number of quadrangles with low coverage by the land-based survey for which elevated potential was indicated through the population-based survey; however, the zip code boundaries generally are too large to readily permit identification of the specific quadrangles with elevated potential. Among the southern group of counties, some elevations were indicated by the population-based survey in the northeast part of Manatee County and in the west central part of Sarasota County. For Sarasota County, a planned county-wide survey may reduce uncertainties.

As indicated in Section 4.3, there were also 14 counties with limited evidence of radon potential. Among these, Taylor and Union warrant further investigation because (1) they are in areas with some geological occurrences that favor radon production, (2) each had elevated potential indicated by two or more indexes, and (3) survey coverage generally was low. Four additional counties in the northern part of the State--Jefferson, Madison, Hamilton, and Wakulla--should require further investigation for similar reasons; each of these counties had one index indicating elevated potential. Sampling coverage in both surveys was very low for Jefferson County due to a paucity of slab-on-grade homes. Hernando County merits further attention because phosphatic soils have been mapped in the eastern portion of the county. Among counties in the southern part of the State, Collier, DeSoto, and Hendry may require further investigation.

No evidence of elevated radon potential was found for 35 counties. Based on the statistics presented in Section 4.0 (Tables 4-6 and 4-9), the likelihood of occurrence of indoor radon contractions as high as 4 pCi/L is less than 0.01 percent in these counties. By comparison, for the counties with definite evidence of radon potential, the average likelihood is 7.7 percent. It is possible that localized areas of elevated radon potential were missed in the counties with no evidence. Assuming that elevated potential exists in any of these counties, a sample of about 30 homes per county is needed* to have a relatively high likelihood of seeing some evidence of that potential. Of the 35 counties with no evidence, only three--Glades, Lafayette, and Liberty--had substantially fewer than 30 homes sampled in the two surveys (land-based and population-based) combined.

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* If the probability of finding one or more home at or above 4 pCi/L is denoted as P (≥1 home), then binomial theory can be used to show that

$$P(\geq 1 \text{ home}) = 1 - P(0 \text{ homes})$$

$$= 1 - \left[\frac{n!}{0!n!} p^0 q^n \right]$$

$$= 1 - q^n$$

where p is the probability (0.077) that any given home is at or above 4 pCi/L,
q is equal to 1 minus p,
and n is the number of homes sampled.

Thus, n must be at least 29 homes for P (≥1 home) to exceed 90 percent.

Section 7.0

CONCLUSIONS AND RECOMMENDATIONS

Section 7.0

CONCLUSIONS AND RECOMMENDATIONS

7.1 CONCLUSIONS

1. *Definite evidence of elevated radon potential was found for 18 of the 67 counties in Florida.* Limited evidence was found for 14 counties and no evidence was found for the remaining 35 counties. Counties in each of these three groups are listed in Table 7-1.

2. *Definite evidence of elevated radon potential was found for 74 USGS 1:24,000 quadrangles.* These quadrangles, located within the 18 counties with definite evidence, account for approximately 7 percent of the land area across the State of Florida. The names of the quadrangles and the counties associated with each quadrangle are listed in Table 7-2, starting with the northernmost quadrangle.

3. *Limited evidence of elevated radon potential was found for 14 counties.* Additional measurements will be required to find definite evidence, if it exists, for any of these counties.

4. *No evidence of* elevated *radon potential was found for 35 counties.* Based on the results of measurements taken in this study, the likelihood of finding a residence with elevated indoor radon levels in any of these counties is less than 1 percent.

Table 7-1. Classification of Florida Counties by Evidence of Elevated Radon Potential

1. <u>Definite Evidence of Elevated Potential</u>

Alachua	Hardee	Marion
Charlotte	Hillsborough	Pasco
Citrus	Lee	Pinellas
Columbia	Leon	Polk
Dade	Levy	Sarasota
Gilchrist	Manatee	Sumter

2. <u>Limited Evidence of Elevated Potential</u>

Bradford	Hernando	Seminole
Collier	Jackson	Taylor
DeSoto	Jefferson	Union
Hamilton	Madison	Wakulla
Hendry	Orange	

3. <u>No Evidence of Elevated Potential</u>

Baker	Glades	Okeechobee
Bay	Gulf	Osceola
Brevard	Highlands	Palm Beach
Broward	Holmes	Putnam
Calhoun	Indian River	St. Johns
Clay	Lafayette	St. Lucie
Dixie	Lake	Santa Rosa
Duval	Liberty	Suwannee
Escambia	Martin	Volusia
Flagler	Monroe	Walton
Franklin	Nassau	Washington
Gadsden	Okaloosa	

Table 7-2. USGS Quadrangles with Definite Evidence of Elevated Radon Potential

Name of USGS Quadrangle	Counties with Definite Evidence
Calvary	Leon
Tallahassee	Leon
Lafayette	Leon
White Springs East	Columbia
Lake City West	Columbia
Ellisville	Columbia
Mikesville	Alachua, Columbia
High Springs	Alachua, Columbia
Alachua	Alachua
Newberry	Alachua
Gainesville West	Alachua
Gainesville East	Alachua
Trenton	Gilchrist, Levy
Arredondo	Alachua
Micanopy	Alachua
Rochelle	Alachua
Williston	Alachua, Levy, Marion
Flemington	Alachua, Marion
McIntosh	Alachua, Marion
Citra	Alachua, Marion
Reddick	Marion
Anthony	Marion
Cotton Plant	Marion
Ocala West	Marion
Ocala East	Marion
Withlacoochee Bay	Levy
Dunnellon SE	Marion
Shady	Marion
Belleview	Marion
Crystal River	Citrus
Holder	Citrus
Oxford	Marion, Sumter
Inverness	Citrus
Wildwood	Sumter
Center Hill	Sumter
Lacoochee	Pasco
Dade City	Pasco

(Continued)

Table 7-2. USGS Quadrangles with Definite Evidence of Elevated Radon Potential

Name of USGS Quadrangle	Counties with Definite Evidence
Socrum	Hillsborough, Pasco, Polk
Oldsmar	Hillsborough, Pinellas
Thonotasassa	Hillsborough
Plant City West	Hillsborough
Plant City East	Hillsborough, Polk
Lakeland	Polk
Auburndale	Polk
Brandon	Hillsborough
Dover	Hillsborough
Nichols	Hillsborough, Polk
Mulberry	Polk
Bartow	Polk
Gibsonton	Hillsborough
Lithia	Hillsborough
Keysville	Hillsborough, Polk
Bradley Junction	Polk
Homeland	Polk
Duette NE	Hardee, Hillsborough, Manatee, Polk
Baird	Hardee, Polk
Bowling Green	Hardee, Polk
Bereah	Hardee, Polk
Palmetto	Hillsborough, Manatee
Bradenton Beach	Manatee
Zolfo Springs	Hardee
Sweetwater	Hardee
Murdock	Charlotte, Sarasota
Murdock SE	Charlotte, Sarasota
El Jobean	Charlotte
Punta Gorda	Charlotte
Punta Gorda SE	Charlotte, Lee
Tuckers Corner	Charlotte, Lee
Olga	Lee
Fort Meyers SW	Lee
Grossman Hammock	Dade
Goulds	Dade
Royal Palm Ranger Station	Dade
Homestead	Dade

7.2 RECOMMENDATIONS

1. *The environmental radiation rule should be applied to the 74 USGS quadrangles for which definite evidence of elevated radon potential was found in this study.* All portions of these quadrangles lying in the 18 counties with definite evidence should be designated for application of the rule. Portions lying in counties with either limited or no evidence should not be designated unless definite evidence is found in such counties through subsequent sampling efforts.

   A possible alternative to this recommendation is to apply the rule county-wide in any county with definite evidence of radon potential. This approach, which will err in the direction of overprotecting public health, is not as precise as that based on specific quadrangle boundaries, but may facilitate administration of the rule by counties.

2. *Conduct supplemental sampling in selected counties with limited or no evidence of elevated radon potential that were not adequately covered by* the *surveys conducted as part of this study*. The counties with lowest survey coverage include three with limited evidence--Jefferson, Madison, and Wakulla--and three with no evidence--Glades, Lafayette, and Liberty. Such supplemental efforts should use sampling methods and protocols for indoor and soil radon that are similar to those used in this study.

3. *Conduct supplemental sampling in selected quadtangles that may have potential for elevated radon levels.* The highest priority should be given to (1) currently undesignated portions of quadrangles that have been designated in part and (2) quadrangles that are adjacent to currently designated quadrangles. Six to ten locations should be sampled per quadrangle, including the locations already surveyed as part of this study. Ultimately, every quadrangle in the 18 counties with definite evidence or the 14 counties with limited evidence should be sampled at six or more locations.

4. *Conduct mote detailed sampling in currently designated quadrangles to help pinpoint localized areas of elevated radon potential.* Criteria similar to those used in this study could be applied to smaller geographic areas defined, for example, by range and township boundaries. Because slab-on-grade structures will not exist at all locations to be sampled, a heavier reliance would need to be placed on sampling soil radon levels.

5. *Conduct indoor radon sampling in all schools in the 18 counties with definite evidence of elevated radon potential to characterize the radon task for children.* Elevated radon levels were measured in several of the limited number of schools sampled under this study. Children may be at greater risk of radon-induced health effects than adults.

6. *Conduct indoor radon sampling in selected schools in counties with limited or no evidence of elevated radon potential.* The schools selected should cover different geographic areas in each county. If elevated indoor radon levels are found in any county subarea, then all surrounding schools should be sampled.

7. *Conduct sampling to characterize the radon potential of borrow pits.* A home built in an area with low radon potential in the native soil could have unexpectedly high indoor radon levels if the fill dirt is from a location, with elevated radon potential. Some experimentation with sampling methods may be required to determine the. best way of characterizing the radon potential in soil from borrow pits.

8. *Develop a predictive tool that can be used as a basis for dedicating variances in areas where the rule is to be applied.* Research is needed to determine whether a scientific basis can be developed for a variance procedure that can be applied to individual building lots. The data base assembled under this study is the logical starting point for assessing the feasibility of developing such a tool. Although preliminary analyses performed under this study indicated, for example, that soil radon levels are a more reliable predictor of indoor radon levels at an aggregate level (e.g., quadrangle) than at the level of individual lots, there may be specific circumstances (e.g., very low soil reading) that render elevated indoor levels a highly unlikely event.

9. *Notify the public about areas with elevated radon potential so that occupants in existing homes ate aware of the possible risks they face.* Public awareness can be heightened through mass media, local organizations, and one-on-one approaches. To properly educate the segments of the public facing the highest risks, brochures containing facts about radon and indicating quadrangles with elevated radon potential should be sent to every residence in the 18 counties with definite evidence. Agencies or individuals involved in real estate transactions (e.g., realtors, lending institutions, and building inspectors) should also be informed.

10. *Ensure that quality radon measurement and mitigation services are made available to residents.* Lists of approved or certified vendors of such services should be developed and circulated to local agencies such as county health departments and realty firms. One criterion for measurement services should be successful completion of the most recent round of the RMP conducted by EPA. For mitigation services; criteria should include (1) appropriate training and equipment and (2) documentation of effectiveness through pre- and postmitigation measurements of adequate duration.

Appendix A

RADON POTENTIAL IN FLORIDA: AN ASSESSMENT BASED ON EXISTING RADIATION DATA AND GEOLOGICAL INFORMATION

RADON POTENTIAL IN FLORIDA

An Assessment Based on
Existing Radiation Data and Geological Information

A Report Submitted to:

GEOMET Technologies, Inc.
20251 Century Boulevard
Germantown, MD 20874

By:

University of Florida
Gainesville, FL 32811

Work Performed Under the University of Florida Subcontract
Florida Statewide Radiation Study

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January 29, 1987

RADON POTENTIAL IN FLORIDA

An Assessment Based on
Existing Radiation Data and Geological Information

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INTRODUCTION

In accordance with a directive of the 1986 Florida Legislature, the Florida Institute of Phosphate Research has contracted with GEOMET Technologies, Inc. to conduct a statewide study of naturally-occurring terrestrial radiation in Florida. As a subcontractor, the University of Florida has the task of identification and assessment of existing relevent radiation data.

Functions served by the existing data include:

- Provide additional kinds and quantities of information to aid in interpretation of newly-collected data; and
- Provide a means to make early, preliminary assessments in advance of the time necessary to develop an adequate data base from prospective sampling, as well as provide guidance for directing and adjusting programs to collect new data.

This study concentrates on what is believed to be the major source of indoor radon* in Florida, the entry of radon directly from the soil underlying the structure. From the radon source standpoint, lands are of importance because they:

1) Present a current radon source due to radium-226 quite near the surface (in situ radium) - either as a natural occurrence or as a result of human activities such as mining, other excavation, earth moving and recontouring, placement of fill, waste product storage or disposal, etc.;

2) Represent a future source of near-surface radium because of the presence of mineral resources which will eventually lead to mining and land reclamation;

3) Contain radium-bearing material that can be adventitiously exposed or placed on the surface through recontouring or borrow for fill; or

4) Host radium-bearing aquifers which provide a potential for radon entry to structures via drinking water.

This report addresses primarily category 1, contemporary radon sources. It is beyond the scope of this effort to catalog mineral resources or reserves, to specifically identify potential problems from future recontouring, borrow, and fill practices, or to

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*For the purposes of this report, the terms "radon" and "radon-222" both mean radon-222 and the terms "radium" and "radium-226" both mean radium-226.

specifically identify potential sources of drinking water radon. However, some of the more imminent possibilities may be obvious from the data reviewed.

EXISTING FLORIDA RADIATION DATA SOURCES

There are a number of existing data sources containing information potentially relevent to describing the potential for elevated indoor radon and/or gamma radiation.

Six categories of existing data were utilized:

1. Indoor radon/radon progeny,
2. Soil gas radon/radon flux,
3. Soil radium profile,
4. Gamma-ray well log,
5. Gamma radiation survey, and
6. Radon in water.

Category 1 represents the parameters of interest in assessing the indoor radon/radon progeny exposure route; however, the coverage is not Sufficiently comprehensive to serve as the sole source for performing a statewide assessment of the probability of elevated indoor radon. The other categories are various steps removed from the primary parameter of interest but provide further depth and/or geographic extent of coverage.

Indoor radon/radon progeny - The indoor radon progeny concentration is the parameter of significance for the airborne radon exposure route. Florida radon progeny data are intensive for several counties but limited in geographic extent. The radon data for Florida are more extensive in geographic coverage. Radon measurements are a cost-effective means of screening for and estimating radon progeny concentrations - radon is the direct source of radon progeny, radon concentrations generally exhibit less variability than radon progeny concentrations, and radon is more amenable to integrated measurements.

Soil gas radon/radon flux - Under the hypothesis that a major radon entry route into houses is from the soil by the flow of radon-bearing air, soil gas radon concentration is a direct indication of the potential for indoor radon. In the absence of existing houses, this parameter should be a predictor of future indoor radon potential, especially when applied on a regional basis. Radon flux is another indicator of available radon at the soil-air interface.

Soil radium profile - Since it is the origin of the radon that appears in the soil gas at the surface, the radium in the near surface profile is the next-step predictor of soil gas radon and the next least-removed predictor of indoor radon. In fact, if the soil radium profile could be expeditiously weighted for depth and the factors that affect radon release and transport, this parameter should be a very good predictor of radon originating in the soil.

The soil radium profile also identifies locations where elevated radium occurs sufficiently near the surface that it would be exposed and/or redistributed by recontouring or removal of fill.

Where only the surface soil radium concentration has been measured, this still indicates a potential near-surface radon source. The surface concentration alone may not always provide an adequate prediction of radon source term on a site-specific basis. However, radium-bearing formations sufficiently near the surface to produce a soil gas radon problem are likely to have out-croppings and the presence of anomalies is useful in making regional classifications and assigning radon potential ratings to the associated geological formations.

Gamma-ray we11 log - Gamma-ray well logs do not report radium concentrations directly. However, for those logs that include information for the radon-significant near-surface depth, the relative count rate is a direct indication of the presence of material with elevated radioactivity. These are particularly useful in extrapolating surface soil measurements to a deeper profile and in some counties are the only radiation measurement available for use in conjunction with geological information in assigning a radon likelihood rating.

Gamma radiation survey - Gamma radiation measurements provide estimates of surface soi1 radioactivity, thus indicating the potential for radium. When measurements have been made of mine cuts, spoils, and/or mined rock, they also provide information from which to deduce the near-surface radioactivity profile. This category may provide information for areas where other categories are limited.

Radon in Water - If radon in shallow ground water reflects radon production in the near-surface depth, concentrations should be proportional to soil gas radon concentrations. Thus radon in shallow well water is potentially another predictor of the likelihood of indoor radon.

In addition, radon in water can be a direct entry route for indoor radon through emission of the radon during water use such as cooking or showering. This is more likely for houses with private wells in which there is no storage or treatment than it is for public systems where there is greater likelihood of storage and treatment and hence a greater chance for radon decay or radon loss by aeration and off-gasing. According to Hess's rule of thumb (Hess, et al. 1985), a radon concentration in domestic water of 10,000 pCi/L might be expected to contribute on the order of 1 pCi/L to indoor radon.

The specific data sources used in this assessment are listed in Table 1.

Aerial gamma radiation surveys represent an additional category of existing Florida radiation data. Aerial surveys provide vision of broad areas with a perspective difficult to achieve by ground-based surveys. Terrestrial gamma radiation anomalies detected by aerial survey identify areas where ground-level gamma radiation anomalies, and hence surface soil radioactivity anomalies, would be suspected. Aerial gamma radiation surveys were performed in Florida as a part of the National Uranium Resource Evaluation (NURE) program. While time did not permit use of the data category for this report, the NURE reports and a small number of other aerial survey reports are available for future use if desired.

METHODOLOGY

Two types of assessment were performed - evaluation of existing radiation data and assessment on the basis of geology. For each radiation data category, the existing information sources were reviewed, the information useful to this project was merged into a data pool, and the result was evaluated. Counties were assigned a qualitative rating of Low, Medium Low, Medium High or High on the basis of the data and the rating was coded as to "strength" on the basis of the number of data points available to support the rating. All counties were independently rated on the basis of geology. Then each county was given a final rating on the basis of the available radiation data, the geological rating, and judgment of the investigators.

Indoor Radon/Radon Progeny

As indicated in Table 1, indoor radon data were obtained from six sources. Two major contributors to this data pool were organizations (University of Pittsburgh and Terradex Corporation) that offer radon monitoring as a commercial service. On request, these organizations supply public officals with readings from their jurisdictions and thus data were made available to this project. Individual results are identified only by county and/or ZIP code and thus anonymity of the individual householder is preserved. Additional data for five counties was obtained from four smaller projects.

The pool of data was first examined to determine the statewide distribution of levels and to aid in establishing criteria for possible elevated radon levels. The data were then sorted by county, and for each county, arithmetic mean, geometric mean, and fraction exceeding 4 pCi/L* was calculated. Each county for which there were results was assigned a qualitative rating on the basis of the percentage expected to exceed 4 pCi/L.

Several prominent data sets were considered separately without merging into the common data pool. First of all, radon progeny measurements in Polk County by the U.S. Environmental Protect ion Agency, the Florida Department of Health and Rehabilitative Services (HRS) and the University of Florida in the mid-1970's have already been assessed in several publications (HRS 1978, Guimond, et al. 1979, Johnson and Bailey 1983, Roessler, et al. 1983). These reports indicate:

1) The likelihood of elevated indoor radon, at least in slab-on-grade houses, is higher for mined lands than for unmined, non-mineralized lands,

* A radon concentration of 4 pCi/L, under the assumption of 50% radon progeny/radon equilibrium, corresponds to a radon progeny concentration at the Florida standard of 0.02 WL.

2) Concentrations in houses on mined lands can be highly variable but values as high as 20 pCi/L (inferred from 0.1 WL) may be found in slab-on-grade houses, and
3) Unmined, mineralized lands may also present a likelihood of elevated indoor radon, but the number of houses sampled in this category was insufficient to draw statistically significant conclusions.

Another data set not included in the data pool summarized in this report are the screening measurements using early etched track techniques in 59 Hillsborough County and 938 Polk County houses as part of the 1970's study by HRS (HRS 1978). Because of problems inherent in the early detector design, the results could only be interpreted in terms of upper limits of concentration. While informative in assessing likelihood of elevated indoor radon, these results cannot be merged with other measurements.

Soil Gas Radon/Radon Flux

The limited available results were summarized by county. Where there was a sufficient number of soil gas radon samples, the distribution was determined according to the three categories of the Swedish criteria (Swedjemark 1986):

<270 pCi/L	Low	(Use conventional construction)
270-1350 pCi/L	Normal	(Use radon-protective construction)
>1350 pCi/L	High	(Use radon-safe construction)

Each county was then given a rating according to the distribution of results among the three categories.

Radon flux measurements for a limited number of counties were available and were summarized. No criteria exist for classifying radon flux measurements; therefore, counties were given ratings on the basis of a subjective evaluation of the mean and range of values reported for each.

Soil Radium Profile

The available soil radium data consist of both surface soil determinations (within the first foot) and profile data from cores or mine cut sampling. Some 19 references have been surveyed and incorporated into a computer spreadsheet that includes county identification, reference code, coordinates, flags for surface and/or profile data, flags for virgin or disturbed areas, concentration of radium at l-ft increments from the surface to 10 ft and 2-ft increments from 10 to 20 it, and a soil type legend. Data are currently grouped alphabetically by county.

Literature data sets present radium concentration, pCi/g, uranium-236 concentration, pCi/g, or uranium concentration, ppm. The latter two cases were converted to radium concentration by assuming equilibrium between radium-226 and uranium-238 and applying the relationships:

Conc(radium-226), pCi/g = Conc(uranium-238), pCi/g; or

Conc(radium-226), pCi/g = 0.333 Conc(uranium), ppm,

since the specific activity of uranium-238 is 3.33 x 10^{-7} Ci/g and uranium-238 accounts for 99.3% of all uranium.

The data sets with full profiles are limited but some profile data are available for 11 counties. Much more surface soil radioactivity is available. At this date all possible literature data have not been entered into the worksheet; however, all references have been reviewed for unique counties and all data not in the worksheet are repetitive for counties having a sufficient data set. This format brings to 37 the number of counties for which at least a single measurement is available.

Identity of geological formations according to the system of Brooks (1981) was entered for all samples reviewed by the Department of Geology. It is possible to classify other samples by referencing location to a Florida geology map.

The format of the data spreadsheet allows for calculation of statewide or county averages and geometric means for any depth. Disturbed lands may be omitted from any calculation.

A quantity called the "Effective Radium Concentration" (ERC) was defined to describe profiles in terms of a single parameter. The ERC is the uniform radium concentration projected to deliver the same radon to the surface as the actual profile. The representative ERC for a county was calculated according to the following:

$$ERC = Summation(w_i\ C_i)$$

where: C_i = average concentration in ith layer; and
w_i = weighting factor for ith layer, based on the projected relative contribution of that layer to surface radon in Florida soils.

The relative contribution of a soil layer to the radon at the surface depends upon a variety of factors including the physical characteristics of the soil and the actual distribution of radium concentrations with depth. As an approximation, weighting factors were calculated from the relative radon flux contributions of individual 1-ft increments in a homogenous layer of typical Florida soil. Using a radon diffusion transport model developed by Bolch (Roessler et al. 1979), the contributions of the increments were estimated by modeling successively thinner depths of material and observing the difference in each successive step.

As of this date the most comprehensive profile data are between the surface and six ft. However, the model indicates that an "infinite" thickness is on the order of 15 ft and that the first six ft of a uniform infinite profile contribute on the order of 75% of the total radon flux. For the purposes of this assessment, ERC values were obtained by first using the following weighting factors:

w(0- 1 ft)		0.16
w(1- 2 ft)		0.15
w(2- 3 ft)		0.14
w(3- 4 ft)		0.12
w(4- 5 ft)		0.10
w(5- 6 ft)		0.08
	Subtotal	0.75

The results of the summation were then adjusted upward by dividing by 0.75 to provide a final ERC value. This procedure makes the simplifying assumption that the material in the radon-significant layer below six ft has a concentration the same as the weighted average concentration of the first six ft. If desired, alternative calculational procedures could be applied, using additional depth data where available, estimating the concentrations between 6 and 15 ft by another means, or by using a different algorithm.

The pooled data were used to compute the overall Florida average depth profile plotted in Figure 1. The apparent high average value in the 6-7 ft increment is probably influenced by a disproportionate number of samples from active phosphate mining areas.

For counties having partial profile data or surface samples only, ERC's were calculated by using the theoretical profile to assign values for the missing depth increments. This approach will over-estimate the radon source For those areas where the concentration profile is uniform from the surface through the first six ft.

Counties were then rated on the basis of their ERC values.

Gamma-ray Well Logs

Selected gamma-ray well log records on file at the Florida Geological Survey were reviewed. In examining the gamma log records, the lowest or "background" value was determined, the depth of major peaks was noted and and various increments of the first 15 feet from the surface were described in terms of background, increases from background, and peaks. Nominal radium-226 concentrations were assigned on the following basis:

Background..............	1 pCi/g
Small peaks.............	1-5 pCi/g
Large, pronounced peaks..	10 pCi/g

In a fashion similar to what was done for the measured soil radium profiles, an ERC was calculated for each log using the weighting factors listed below:

w(0- 2 ft) = 0.30
w(2- 5 ft) = 0.35
w(5-10 ft) = 0.25
w(10-15 ft) = 0.10

A rating was assigned to each county on the basis of the average gamma log ERC.

Gamma Radiation Survey

Selected gamma radiation survey data, usually from unmined, active mining cuts and mined lands in the same area, were evaluated to estimate surface and near-surface radioactivity. The relative surface radium concentrations for undisturbed and disturbed lands were inferred from the gamma radiation levels observed for these two respective land types. The extent to which radioactivity levels increase below the surface layer was inferred from comparison of the mine pit and disturbed land data to the undisturbed surface data. County ratings were assigned on the basis of the inferred surface and near-surface concentrations and on the likelihood that the surface radioactivity would be increased by mining.

Radon in Water

Ground water radon data collected by Florida State University (FSU) investigators and by UF investigators were compiled by the FSU investigators and made available for this report. The available data were summarized by county and the percentages of wells exceeding 10,000 pCi/L (predictor of 1 pCi/L indoor radon) and 40,000 pCi/L (predictor of 4 pCi/L indoor radon) were determined.

Geological Interpretation

Each county was rated on the basis of the surficial and near-surface distribution of geological formations identified as characterized by appreciable concentrations of uranium. First, specific Florida geological formations were classified as to uranium abundance using available radioelement data, primarily gamma spectrometry results. Then, for each county, the percent of the area represented by each formation class was determined by reference to a Florida geology map and formations were assigned a weighting factor inversely related to depth from the surface. Finally, the relative presence of uranium-bearing material was expressed for each county in terms of the "Equivalent Surface", the equivalent per cent of surface area containing >10 ppm

Equivalent Surface = Summation (A_i D_i C_l)

where: A_i = % of county area represented by the ith formation class,

D_i = depth factor for the ith formation class, with
D = 1 for surface occurence,
= 0.75 for 10-30 ft occurence, and
= 0.25 for 30-50 ft occurence; and

C_i = concentration factor for the ith formation class,
C = 1 for >10 ppm uranium,
= 0.5 for 3-10 ppm uranium, and
= 0 for <3 ppm uranium.

This method is useful because it grades areas on the distribution of the probable source of uranium, rather than a reliance on minimum sampling densities or results. It provides a rapid general assessment of an area based on the expectations of geological distributions without detailed field sampling.

Composite Rating

Using a worksheet in the format of Table 9, composite ratings were developed for each county. As a first step, an average rating was derived for each county by giving equal weight to each column with a data entry (0 to six radiation data categories plus the geology columns). These preliminary averages were assigned semi-quantitative ratings of Low, Medium Low, Medium, Medium High or High.

The ratings were then reviewed and adjusted considering the following factors :

1) "Strength" of the contributing data sources,
2) Prior information such as the 1970's Polk and Hillsborough County studies,
3) Other information such as the presence of mining and its likelihood of producing lands with elevated surface radium, and
4) For counties with minimal or no radiation data, interpolation from adjacent counties.

Finally, the investigators sat as a panel for a final adjustment of the ratings. This was a judgement process which considered "strength" of the data sources and other related information and also involved geographic smoothing, based primarily on geology. These reviews resulted in adjustments no more than one step up or down on the rating scale.

RESULTS

The results of reviewing the various data types are summarized in Table 2 and discussed in the following sections.

Indoor Radon/Radon Progeny

As indicated in Table 2, six data sources were pooled to provide a total of 460 data points. These data had an arithmetic mean of 2.4 pci/L and a geometric mean of 1.2 pCi/L. Of these samples, 10.5 % exceeded 4 pCi/L*. Visual inspection of frequency distributions suggest that the data are approximately log-normally distributed. Therefore, the frequency distribution as a function of log concentration is presented in Figure 2.

The data are presented by county in Table 3. Data are available for 40 of Florida's 67 counties. The size of the data set is quite variable from county to county, ranging from only a single data point in some counties to more than 30 sites in five counties.

These data should be interpreted with caution for a number of reasons:

1. Not all counties are represented in the data set;

2. Where data are present, sample sizes for most individual counties are not large enough to draw statistically significant conclusions - in fact some counties are represented by a single result;

3. Because the two largest data sets were the results of commercial services reponding to individual or group requests for radon analyses, there is no attempt at random or representative sampling. This introduces an appreciable chance of bias, particularly if attention has been drawn to a region or neighborhood and a disproportionate number of these residents, have requested radon monitoring; and

4. For the data developed through the commercial services, there is no follow-up of unusual results and thus there are likely to be artifacts.

Results exceeding 4 pCi/L were observed in nine counties. This value has a high degree of uncertainty for counties where the sample size is small. In an attempt to further utilize the information contained in the available data, a second estimate of this percentage for each county was obtained by calculation from the geometric mean and the

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* A radon concentration of 4 pCi/L, under the assumption of 50% radon progeny/radon equilibrium, corresponds to a radon progeny concentration at the Florida standard of 0.02 WL.

assumptions of a log-normaldistribution and a geometric standard deviation of 3. The observed percentage and the predicted value were then averaged to yield an adjusted percentage as a basis for rating the radon potential by county. Each county was assigned to one of four qualitative rating classes, Low (L), Medium Low (ML), Medium High (MH), or High (H), on the basis of the adjusted percentage expected to exceed 4 pCi/L. The criteria for assignment to rating classes are presented in the notes at the end of Table 3. A data "strength", based on number of data points, is also indicated for each county rating.

Soil Gas Radon/Radon Flux

Soil gas radon data are summarized in Table 4. The only significant data set at this time is for Citrus County (27 sites) where a full range of values from low to high were observed. Small numbers of samples from miscellaneous other counties had low values.

Radon flux data are also shown in Table 4. Again only a limited number of counties and land conditions are represented.

Soil Radium Profile

The current worksheet contains 765 entries for 284 sites in 37 counties. The disturbed sites have been excluded from analysis of the general data. Hamilton and Polk County mined areas have been treated separately.

The concentration of radium in surface soil averages 0.6 pCi/g with a minimum of 0.1 pCi/g, a maximum of 2.9 pCi/g, and a geometric mean of 0.4 pCi/g. Visual inspection of frequency distributions suggests that the data are approximately log-normally distributed. The frequency distribution as a function of log concentration is shown in Figure 3.

The average profile data are presented in the Methodology Section (Figure 1). The maximum value in a virgin profile was observed to be 65.5 pCi/g at a 16 to 20 ft increment. The maximum value in a 6-ft core was 25 pCi/g at a 4-5 ft increment.

The county ERC values appear to be log-normally distributed, which is logical since they are based primarily on the surface soil concentrations. The average ERC was observed to be 1.8 pCi/g and the geometric mean was 1.3 pCi/g. The Frequency distribution for 37 counties as a function of the log of the county ERC is shown in in Figure 4.

Soil radium results are summarized by county in Table 5. Fourteen counties had an average surface concentration of less than the statewide geometric mean of 0.4 pCi/g. However, 21 counties had a surface concentration of between 0.4 and 1.0 pCi/g. The two counties with surface concentrations exceeding 1.0 pCi/g were Dade (13 samples) and Lafayette (one sample).

The ERC values ranged from 10 pCi/g for Lafayette County to 0.3 pCi/g for St. Johns County.

Counties were rated for radon potential, primarily on the basis of ERC values with additional judgement applied in recognition of mining and surface radium

Gamma-ray Well Logs

"Equivalent Radium Concentrations" as inferred from the evaluating gamma-ray well logs for 23 counties are presented in Table 5 along with the soi1 radium data. This provides information for 14 counties for which no soi1 radium data were available and for eight counties for which surface but no depth data were available. If necessary, the logs can be examined further in the future to aid in extrapolating from surface radium concentrations where no depth data are available or to obtain information for the seven counties evaluated in this report on the basis of geology alone.

Gamma Radiation Survey

Table 8 summarizes the results and assessment of gamma radiation surveys performed in eight counties. These were primarily of non-phosphate mines. On the basis of these assessments, ratings were assigned to these counties as indicated in the table.

Radon in Water

The available data on radon in water from private wells in Florida are summarized in Table 7. Results were available for 109 wells in nine counties. These data should not be taken to represent the statewide picture because of the small number of counties represented, the small number of samples in some counties, and the fact that the sampling emphasized phosphate mining and immediately adjacent counties. Average concentrations in individual wells ranged from 44 to 41,000 pCi/L; county averages ranged from 90 to 11,000 pCi/L. Ratings for potential contribution as a soil gas source of indoor radon are shown in the last colunm of the table.

The data can be examined also for evidence of radon in water as a direct source of indoor radon. Of the wells sampled, 15 % exceeded 10,000 pCi/L (predictor of 1 pCi/L indoor airborne radon) but only one exceeded 40,000 pCi/L (predictor of 4 pCi/L indoor radon). Four counties had samples exceeding 10,000 pCi/L; one had a sample exceeding 40,000 pCi/L. Two county averages exceeded 10,000 pCi/L; none exceeded 40,000 pCi/L. These limited, preliminary data suggest that, for selected regions of the state, a private well could be a significant co-contributor to indoor radon but that this source is not likely to produce indoor airborne radon concentrations in excess of 4 pCi/L. These data also suggest that radon in water will not be a significant contributor to indoor airborne radon in many areas of the state.

Geological Interpretation

Table 8 presents the results of the geological assessment. Included for each county are the assignment of equivalent uranium-bearing surface ("Equivalent Surface") and a qualitative rating based on the Equivalent Surface. Criteria for assignment to rating classes are presented at the end of the table.

Forty counties were judged to have less than 10% Equivalent Surface, six counties to have between 10% and 24% and 19 counties to have more than 25%; Eleven counties had >39% Equivalent Surface and were assigned to the highest category.

CONCLUSIONS AND DISCUSSION

The ratings from the various types of data categories are compared in Table 9. A composite rating is shown in the last column of the table and in Figure 5. It should be emphasized that the ratings "Low" through "High" are a qualitative expression of the likelihood of some indoor radon levels exceeding 4 pCi/L. A rating of "Medium High" or "High" does not necessarily imply levels elevated highly above this reference value.

With only several exceptions, areas of increased likelihood of indoor radon reflect the near-surface occurrence of the Hawthorn. and related formations in North and North Central Florida and the presence the Bone Valley and Hawthorn formations in Southwest Florida. As a corollary, a low likelihood of elevated indoor radon is projected for the east coast, the far southern, and far western panhandle portions of the state.

As can be seen from the table, the kinds and the "strength" of data available for this preliminary assessment varied considerably from county to county. Some counties were classified totally on the basis of geology and interpolation from adjacent counties. Obviously the currently on-going statewide study is needed to provide the depth and breadth of data base necessary to perform a more definitive assessment.

Assignments are subject to shifting either up or down in the scale as more information becomes available; this is especially true for "transitional" or intermediate areas between regions of high and low radon likelihood.

The county was used as the smallest geographic unit for this assessment and ratings were assigned to entire counties. However, the areas of elevated radon likelihood may be more localized - the near-surface geology may vary significantly across a county and activities such as mining and land reclamation may be confined to specific regions. For example, the whole of Polk and Hillsborough counties were assigned ratings. However, a considerably lower fraction of elevated radon levels would be expected in Eastern Polk and Western Hillsborough than inside the region associated with the Bone Valley formation (Western Polk and Eastern Hillsborough). Similar patterns might be expected in other counties.

The likelihood of elevated indoor radon would be expected to vary considerably within counties in which phosphate mining is being or has been conducted. The highest likelihood would be expected over mined lands because the mining process (at least until recently)* redistributes the radioactivity and generally leaves higher

* A practice identified as "toe-spoiling" has been proposed as a means of greatly reducing the near-surface enhancement of radioactivity in phosphate mining. If this practice proves successful, the radon likelihood presented by recently and future mined lands will be less than for older mined lands.

concentrations near the surface. Next in likelihood would be mineralized lands in which the formations with elevated radium occur within 15 feet of the surface. Finally, undisturbed lands in which the radium-bearing material is more than 15 feet from the surface should present little likelihood of increased radon.

The most notable exceptions to the general pattern described above are Dade and St. Lucie counties. On the basis of geology, these counties should have low likelihoods of elevated indoor radon. However, for Dade county, two of the 22 indoor radon measurements (Table 3) exceeded 4 pCi/L and the geometric mean of these samples was higher than the statewide mean, leading to a prediction of a higher radon likelihood. The available soil radioactivity data (Table 5) indicated a tendency for surface soil radium to be higher than the <l pCi/g found over much of the state. For St. Lucie County, the very limited number (3) of available indoor radon sample results (Table 3) provide a weak basis for suggesting elevated indoor radon likelihood. Surface soil radium samples averaged less than 1 pCi/g but the gamma-ray well logs suggested a slight enhancement of radioactivity near the surface. If soil is contributing to enhancements of indoor radon in these two counties, it appears to be a surface phenomenon; the gamma-ray well logs do not reflect any major radioactivity-bearing deposits or formations in the ground at sufficiently shallow depths to be of significance to surface radon. On the other hand, the observed indoor radon values may be the result of statistical fluctuations in a small sample size, or of some other cause such as building materials or drinking water. The additional sampling of the statewide study currently in progress is needed to clarify the status of these counties.

A parameter not considered to date is water-table surface. This is a potential explanation for data such as seen in Sarasota. The geology rating is high but other ratings are medium low. If one refers back to the definition of the ERC and the weightings for depth increments, it is obvious that a water table (a rather complete barrier to radon transport toward the surface) at a 6-ft depth eliminates 25% of the available radon. Similarly a water table at a 4-ft depth eliminates 43% of available radon.

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REFERENCES

Brooks, H.K. (1981). Geologic Map of Florida (IFAS Publications Distribution Center, University of Florida, Gainesville 32611).

Guimond, R.J., Jr., Ellett, W.H., Fitzgerald, J.E.,Jr., Windham, S.T. and Cuny, P.A. (1979). Indoor Radiation Exposure Due to Radium-226 in Florida Phosphate Lands,EPA 520/4-78-013, (USEPA, Office of Radiation Programs, Washington, DC).

Hess, C.T., Michel, J., Horton, T.R., Prichard, H.M. and Coniglio, W.A. (1985). "The Occurence of Radioactivity in Public Water supplies in the United States", Health Physics, Vol. 48, 553-586 (Pergamon Press, New York).

HRS (1978). Study of Radon Daughter Concentrations in Polk and Hillsborough Counties (Florida Department of Health and Rehabilitative Services, Tallahassee).

Johnson, W.B. and Bailey, P.B. (1983). "Study of Radon Daughter Concentrations in Polk and Hillsborough Counties", Health Physics, Vol 45, 432-435 (Pergamon Press, New York).

Roessler, C.E., Roessler, G.S. and Bolch, W.E. (1983). "Indoor Radon Progeny Exposure in the Florida Phosphate Mining Region: A Review" , Health Physics, Vol 45, 389-396 (Pergamon Press, New York).

Roessler, C.E., Smith, Z.A., Bolch, W.E., and Wethington, J.A. (1979). "Management of Low-level Natural Radioactivity Wastes of Phosphate Mining and Processing", Low Level Radioactive Waste Management, Proceedings of Health Physics Society Twelfth Midyear Topical Symposium, EPA 520/3-79-002 (USEPA, Office of Radiation Programs, Washington, DC).

Swedjemark, G.A. (1986). "Swedish Limitation Schemes to Decrease Rn Daughters in Indoor Air", Health Physics, Vol 51, 569-578 (Pergamon Press, New York).

Table 1. Data Sources Related to Indoor Radon in Florida

Source	Data Type	Counties	Data Points
A. University of Pittsburgh	Indoor radon	39	350
B. Terradex	Indoor radon	15	51
C. UF, 1970s Study	Radon, Radon progeny	1	8
	Radon flux	3	89
	Soil radium	3	42
	Gamma survey	3	53
D. UF, Misc. Studies	Indoor radon	1	27
	Soil gas radon	1	27
	Soil radium	13	45
	Radon in water	2	48
E. Sarasota Co. Study	Indoor radon	1	10
	Soil radium	1	13
F. HRS, Misc. Studies	Soil gas radon	3	4
	Soil radium	1	6
	Gamma survey	5	15
G. New mine EIS's	Soil radium	6	27
	Radon flux	1	1
H. UF Dept. Geology	Soil radium	15	67
I. Nuclear Power Plant Surv.	Soil radium	2	18
J. Radionuc. in Foods Study	Soil radium	2	23
K. U. of Miami	Indoor radon	1	13
	Soil radium	3	9
L. ORNL survey	Soil radium	12	12
M. USGS (Espenshade)	Soil radium	7	13
N. FSU	Radon in Water	7	57
O. FL Geological Survey	Gamma-ray logs	23	140

Notes:

- This table represents the data available as of December 31, 1986 and utilized in this report. This does not necessarily include all available data sources or data sets but represents those most useful to the goals of this report and retrievable within the available time frame.

Table 2. Summary of Florida Radiation Data a)

Data Type	No. of Counties	No. of Sites	Results and Comments
Indoor radon	39	460	Arith. mean = 2.4 pCi/L Geom. mean = 1.2 pCi/L Sites >4 pCi/L = 10.5%
Soil Radium:			
-Surface soil	37	284	Arith. mean = 0.6 pCi/g Geom. mean = 0.4 pCi/g
-ERC b)	13	37	Arith. mean = 1.8 pCi/g Geom. mean = 1.3 pCi/g
Soil Gas Radon	4	31	-- --
Radon Flux	3	89	-- --
Gamma Survey	8	68	-- --
Radon in Water	9	109	Range = 44-41,000 pCi/L 15% of wells >10,000 pCi/L One well >40,000 pCi/L
Geology:			
-Equiv. Surface c)	67	--	Range = 0-10% for 42 counties 10-24% for 6 " 25-39% for 8 " >40% for 11 "

a) Statistics do not necessarily reflect all the available data but rather reflect those data sources selected and analyzed for this report.

b) ERC = Effective Radium Concentration. The uniform radium-226 concentration projected to deliver the same radon to the surface as the actual profile.

c) Equivalent Surface - Denotes presence of uranium-bearing material expressed as equivalent % of surface containing >10 ppm.

Table 3. Indoor Radon by County

County	No. of Sites	Arithmetic Mean, pCi/L	Geometric Mean, pCi/L	>4 pCi/L %	Rating %, Class
Alachua	10	2.0	1.2	20	17 MH***
Bay	1	0.7	0.7	0	2 ML*
Brevard	4	0.8	0.8	0	4 ML**
Broward	11	1.2	1.0	0	5 ML***
Charlotte	3	1.0	0.7	0	3 ML**
Citrus	37	3.2	1.9	22	24 MH****
Clay	2	1.5	1.4	0	9 ML**
Collier	1	1.3	1.3	0	8 ML*
Dade	22	2.3	1.6	9	14 MH***
DeSoto #	1	0.4	0.4	0	1 L *
Duval	34	0.8	0.7	0	3 ML****
Escambia	6	0.8	0.5	0	1 L **
Flagler	1	0.1	0.1	0	<1 L *
Gilchrist	1	2.2	2.2	0	14 MH*
Hamilton ##	1	0.5	0.5	0	2 ML*
Hardee #	1	0.8	0.8	0	4 ML*
Hernando	4	1.4	1.0	0	6 ML**
Highlands	1	1.7	1.7	0	11 MH*
Hillsbor.###	50	1.4	1.1	4	8 ML****
Lake	4	1.2	1.0	0	5 ML**
Lee	2	1.0	0.6	0	2 ML**
Leon	3	5.3	4.4	33	>40 H **
Manatee #	10	1.3	1.0	0	6 ML**
Marion	8	4.0	2.0	25	25 MH**
Nassau	1	0.2	0.2	0	<1 L *

Table 3, continued

County	No. of Sites	Arithmetic Mean, pCi/L	Geometric Mean, pCi/L	>4 pCi/L %	Rating %, Class
Okaloosa	13	1.0	0.5	0	2 ML***
Orange	8	1.1	0.8	0	4 ML**
Palm Beach	11	1.3	0.6	9	7 ML***
Pasco	6	0.5	0.5	0	1 L **
Pinellas	19	2.6	1.1	11	12 MH***
Polk ###	80	5.7	2.5	33	34 H ****
Putnam	1	0.3	0.3	0	<1 L *
St Lucie	3	3.2	1.5	33	26 H **
Santa Rosa	1	1.5	1.5	0	10 ML*
Sarasota	87	1.0	0.8	0	4 ML****
Seminole	2	0.4	0.4	0	<1 L **
Sumter	2	20.8	8.2	50	>50 H **
Suwannee	1	1.4	1.4	0	8 ML*
Volusia	6	0.6	0.5	0	1 L **
Washington	1	1.6	1.6	0	10 ML*
All Counties	460	2.4	1.2	10	-----

Data Sets Utilized: A,B,C,D,E,K (See Table 1)

\# Mining recently begun or planned.
\## Mining has resulted in significant amount of mined lands.
\### Mining/land reclamation; demonstrated indoor radon effect.

Rating, % = Adjusted % expected to exceed 4 pCi/L. Calculated as average of observed % and % predicted from Geometric Mean.

Rating, Class:
L = Low, ≤1% >4 pCi/L
MH = Medium High, 11-25% >4 pCi/L
ML = Medium Low, 2-10% >4 pCi/L
H = High, >25% >4 pCi/L

*'s indicate "Strength" of data:
- * Very weak basis, only single data point
- ** Weak basis, 2-10 data points
- *** Modest basis, 11-30 data points
- **** Strong basis, >30 data points

Table 4. Soil Gas Radon and Radon Flux

County	No. of Sites	Results Avg (Range)	Comments, Rating
Soil Gas Radon, pCi/L			
Citrus	27	371 (34 - 6430)	Distribution: a) Low: 33% Normal: 55% High: 11% Rating - MH****
Hernando	1	70	L*
Nassau	1	40	L*
Orange	2	22(17-29)	L**
Data Sets Utilized: D,F (See Table 1)			
Radon Flux, pCi/m^2-s			
Alachua-unmined	8	0.9 (0.2-3.2)	ML/MH**
Hamilton			
unmined	1	0.1	L*
mined	2	2.1 (1.3-3.0)	MH**
Hardee-unmined	1	0.3	ML*
Polk			
-unmined	17	0.3 (<0.1-1.7)	ML***
-mined	61 b)	1.9 (<0.1-13.7)	H****
Data Sets Utilized: C,G (See Table 1)			

a) Soil gas radon ranges from the Swedish criteria:

Category:	Low	Normal	High
Soil gas radon:	<270 pCi/L	270-1350 pCi/L	>1350 pCi/L
Construction:	Conventional	Radon Protective	Radon Safe

b) Clay disposal areas not included in these data.

Ratings: L = Low; ML = Medium Low; MH = Medium High; H = High

* Very weak basis, only single data point
** Weak basis, 2-10 data points
*** Modest basis, 11-30 data points
**** Strong basis, >30 data points

Table 5. Soil Radium Profile by County

County	Sample Analysis				Gamma Log
	No. of Sites	Surface pCi/g	ERC pCi/g	Rating	ERC pCi/g
Alachua	14	0.7	1.1	MH***	--
Baker	8	0.6	(1.5)@	MH**	--
Bay	--	--	--	--	2
Bradford	7	0.7	5.7	H**	--
Broward	3	0.2	(0.4)	L**	--
Citrus +	33	0.6	1.1	MH****	--
Clay	3	0.4	(1.0)	ML**	--
Collier	3	0.3	(0.7)	ML**	--
Columbia	6	0.8	2.8	MH**	--
Dade	13	1.2	(3.1)	MH***	1
DeSoto #	4	0.9	2.7	MH**	--
Duval	1	0.9	(2.2)	MH*	--
Escambia	1	0.3	0.7	ML*	2
Franklin	--	--	--	--	1
Gadsden	--	--	--	--	3
Gilchrist	7	0.8	(2.1)	MH**	--
Glades	--	--	--	--	2
Hamilton ##					
unmined	10	0.5	1.9	MH**	--
mined	2	8.1	6.0	H**	--
Hardee #	21	0.6	3.7	MH***	--
Hendry	--	--	--	--	3

Table 5, Continued

County	Sample Analysis				Gamma Log
	No. of Sites	Surface pCi/g	ERC pCi/g	Rating	ERC pCi/g
Highlands	1	0.2	(0.6)	ML*	1
Hillsb. ###	14	0.6	(1.4)	MH***	--
Indian River	--	--	--	--	2
Jackson	2	0.6	(1.5)	MH**	5
Jefferson	--	--	--	--	3
Lafayette	1	4.0	(10)	H*	--
Lake	3	0.3	(0.7)	ML**	--
Levy	5	0.2	(0.5)	L**	--
Leon	--	--	--	--	4
Liberty	--	--	--	--	2
Manatee #	8	1.0	2.4	MH**	--
Martin	6	0.6	(1.6)	MH**	2
Monroe	5	0.2	(0.4)	L**	1
Okaloosa	--	--	--	--	2
Okeechobee	--	--	--	--	1
Orange	5	0.4	(0.9)	ML**	--
Osceola	--	--	--	--	2
Palm Beach	1	0.2	(0.5)	L*	1
Pasco	2	0.4	(1.0)	ML**	--
Pinellas	1	0.7	(1.8)	MH*	--
Polk ###					
unmined	48	0.6	0.9	ML****	--
mined	66	5.7	5.3	H****	--
Putnam	8	0.6	(1.4)	MH**	--

Table 5, Continued

County	Sample Analysis				Gamma Log
	No. of Sites	Surface pCi/g	ERC pCi/g	Rating	ERC pCi/g
St Johns	7	0.3	0.3	L**	--
St Lucie	4	0.8	(2.0)	MH**	4
Sarasota	19	0.5	1.0	ML***	--
Sumter	2	0.5	(1.2)	MH**	2
Suwannee	5	0.4	(1.1)	MH**	--
Union	2	0.9	(2.2)	MH**	--
Volusia	1	0.4	(0.9)	ML*	--
Wakulla	--	--	--	--	3
Washington	--	--	--	--	3

Data Sets Utilized for Soil Radium: C,D,E,G,H,I,J,K,L,M
Data Sets Utilized for Gamma-ray well log: O

ERC = Effective Radium Concentration. The uniform radium-226 concentration projected to deliver the same radon to the surface as the actual profile.

@ ( ) indicates ERC extrapolated from single surface value.

Keys:

Rating	Soil Analyses	Gamma Log Score
Low (L)	<0.5 pCi/g	1
Medium Low (ML)	0.5-1 pCi/g	2
Medium High (MH)	1-5 pCi/g	3
High (H)	>5 pCi/g	4 or higher

Strength of Data Basis

- *   Very weak basis, only single data point.
- **   Weak basis, 2-10 data points.
- *** Modest basis, 11-30 data points.
- **** Strong basis, >30 data points.

Physical Disturbance

- #   Mining recently begun or planned.
- ## Mining has resulted in significant amount of mined lands.
- ### Mining/land reclamation; demonstrated indoor radon effect.
- +   Old phosphate mines (prior to 1940s) known to exist.

Table 6. Gamma Radiation Survey
as an Indication of Soil Radium-226

County	Operation or Location	No. of Sites	Gamma, uR/hr Unmined	Gamma, uR/hr Disturbed a)	Rating b)
Alachua	Residential	7	6(5-8)	--	L
	Implication: surface radium low, near-surface radium - no information.				
Clay	Clay & heavy minerals	5	4- 6	4-13	ML
	Implication: surface radium low, near-surface radium low to slightly enhanced.				
Duval	Heavy minerals	3	--	"less than surroundings"	L
	Implications: radioactivity is removed with the mineral, mined lands should not constitute a radon source.				
Gadsden	Clay	3	6- 8	6-12	ML
	Implication: surface radium low, near-surface radium low to slightly enhanced.				
Hamilton					
unmined	Phosphate	1	4	--	L
mined	"	2	--	8-10	ML
	Implications: surface radium low, near surface radium may be elevated, mined lands will have elevated radium.				
Marion	Rock	2	7-9	9(6-17)	MH
	Implications: surface radium may be slightly elevated; near-surface radium elevated; excavation may intrude on radioactivity.				
Nassau		2	?	4-12	ML
	Implication: surface radium, no information; near-surface radium low to slightly elevated.				
Polk					
unmined	Phosphate	9	5(4-7)	--	L - H
mined	"	34	--	6-54	H
	Implications: surface radium usually low in unmined lands, near surface radium may be elevated, mined land expected to have elevated surface and near-surface radium.				

Data Sets Utilized: C,F (See Table 1)

Notes on next page ...

Table 6, Continued

Notes:

a) Disturbed = active mine, mined land, and/or reclaimed land.

b) Rating is rounded average of individual site scores.

For mined land - Base on "disturbed" readings:
Low (L) = 4-7 uR/hr; Medium Low (ML) = 7-12 uR/hr;
Medium High (MH) = 12-20 uR/hr; High (H) = >20 uR/hr.

For unmined land - Assume the "unmined" reading reflects the inital layer and the "disturbed' reading reflects a composite of subsequent depths. Rate according to:

Unmined Reading		Disturbed Reading		Rating
Low	(4- 7 uR/hr)	Low	(4- 7 uR/hr)	L
		Sl Elev	(7-12)	ML
		Elevated	(12-20)	MH
		High	(>20)	H
Sl Elev	(7-12 uR/hr)	Sl Elev	(7-12 uR/hr)	ML
		Elevated	(12-20)	MH
		High	(>20)	H
Elevated	(12-20 uR/hr)	Elevated	(12-20 uR/hr)	MH
		High	(>20)	H
High	(>20 uR/hr)	High	(>20 uR/hr)	H

Table 7. Radon in Private Wells by County

County	No. of Sites	Avg. (Range) pCi/L	Geom. Mean	>10000 pCi/L	Rating
Alachua	26	1100 (93- 6400)	690	0	ML***
Citrus	22	570 (44- 3300)	320	0	L***
DeSoto	9	7500(1100-35000)	4500	1(11%)	MH**
Hardee	8	11000 (640-28000)	6400	3(38%)	H**
Highlands	2	90 (59- 120)	84	0	L**
Hillsbor.	27	11000(1300-41000)	4900	11(41%)#	H***
Manatee	8	2900(1100- 6700)	2500	0	ML**
Polk	2	7900(5000-11000)	7300	1(50%)	MH**
Sarasota	1	2200	2200	0	ML*
Summary:					
Wells	105	-- (44-41000)	--	16(15%)	--
Counties with wells >10000 pCi/L				4(44%)	--
County Avgs.	9	(90-11000)		2(22%)	--

One well >40000 pCi/L (4% of wells sampled in Hillsborough Co, 1% of all wells sampled)

Data sources utilized: D, N (See Table 1).

Rating Scale:
- <1,000 pCi/L Low (L)
- 1,000- 3,000 pCi/L Medium Low (ML)
- 3,000-10,000 pCi/L Medium High (MH)
- >10,000 pCi/L High (H)

*'s indicate "Strength" of data:
- * Very weak basis, only single data point
- ** Weak basis, 2- 10 data points
- *** Modest basis, 11-30 data points
- **** Strong basis, >30 data points

Table 8. Geological Basis for Indoor Radon Potential

County	Equivalent Surface, %	Rating	County	Equivalent Surface, %	Rating
Alachua	49	H	Jefferson	38	MH
Baker	20	ML	Lee	32	MH
Bradford	32	MH	Leon	27	MH
Calhoun	10	L	Levy	21	ML
Charlotte	30	MH	Liberty	5	L
Citrus	34	MH	Madison	63	H
Columbia	53	H	Manatee	51	H
DeSoto	65	H	Marion	15	ML
Gadsden	37	MH	Pasco	12	L
Gilchrist	10	ML	Pinellas	34	MH
Hamilton	53	H	Polk	44	H
Hardee	53	H	Sarasota	51	H
Hernando	14	ML	Suwannee	18	ML
Hillsb.	60	H	Union	65	H
Jackson	7	L	All Others*	<10	L

Equivalent Surface denotes presence of uranium-bearing material expressed as equivalent % of surface area containing >10 ppm.

Equivalent Surface = Summation (A_i D_i C_i)

where: A_i = % of county area represented by ith formation;
D_i = depth factor for ith formation, with
D = 1 for surface occurence,
= 0.75 for 10-30 ft occurence, and
= 0.25 for 30-50 ft occurence; and
C_i = concentration factor for ith formation, with
C = 1 for >10 ppm uranium,
= 0.5 for 3-10 ppm uranium, and
= 0 for <3 ppm uranium.

Rating: Equivalent Surface = 0-10% Low (L)
= 10-24% Medium Low (ML)
= 25-39% Medium High (MH)
= >39% High (H)

*Counties characterized by the absence of significant near-surface formations known or believed to have uranium at $\geq$3 ppm.

Table 9. Preliminary Estimate of Radon Potential by County - Based on Composite Scoring

County	Indoor Radon	Soil Gas or Rn Flx	Soil Radium Profile	Gamma-well Log	Gamma Survey	Rn in Water	Geol-ogy	Final
Alachua	MH***	ML**	MH***	--	L**	ML***	H	MH
Baker	--	--	MH**	--	--	--	ML	M
Bay	ML*	--	--	ML	--	--	L	ML
Bradford	--	--	H**	--	--	--	MH	MH
Brevard	ML**	--	--	--	--	--	L	ML
Broward	ML***	--	L**	--	--	--	L	L
Calhoun	--	--	--	--	--	--	L	L
Charlotte	ML**	--	--	--	--	--	MH	M
Citrus +	MH****	MH****	MH****	--	--	L***	MH	MH
Clay	ML**	--	ML**	--	ML**	--	L	ML
Collier	ML*	--	ML**	--	--	--	L	L
Columbia	--	--	MH**	--	--	--	H	MH
Dade	MH**	--	MH**	L	--	--	L	M
DeSoto #	L*	--	MH**	--	--	MH**	H	MH
Dixie	--	--	--	--	--	--	L	L
Duval	ML****	--	MH*	--	L**	--	L	ML
Escambia	L**	--	ML*	ML	--	--	L	ML
Flagler	L*	--	--	--	--	--	L	L
Franklin	--	--	--	L	--	--	L	L
Gadsden	--	--	--	MH	ML**	--	MH	M
Gilchrist	MH*	--	MH**	--	--	--	ML	M
Glades	--	--	--	ML	--	--	L	L
Gulf	--	--	--	--	--	--	L	L

Table 9, continued ...

County	Indoor Radon	Soil Gas or Rn Flx	Soil Radium Profile	Gamma-well Log	Gamma Survey	Rn in Water	Geology	Final
Hamilton ##	ML*			--		--	H	MH
unmined		L*	MH**		Low*			
mined		MH**	H**		ML**			
Hardee #	ML*	ML*	MH***	--	--	H**	H	MH
Hendry	--	--	--	MH	--	--	L	ML
Hernando	ML**	L*	--	--	--	--	ML	ML
Highlands	MH*	--	ML*	L	--	L**	L	ML
Hillsb. ###	ML****	--	MH***	--	--	H***	H	H
Holmes	--	--	--	--	--	--	L	L
Indian Rvr.	--	--	--	ML	--	--	L	L
Jackson	--	--	MH**	H	--	--	L	M
Jefferson	--	--	--	MH	--	--	MH	MH
Lafayette	--	--	H*	--	--	--	L	M
Lake	ML**	--	ML**	--	--	--	L	ML
Lee	ML**	--	--	--	--	--	MH	M
Leon	H**	--	--	H	--	--	MH	MH
Levy	--	--	L**	--	--	--	ML	ML
Liberty	--	--	--	ML	--	--	L	ML
Madison	--	--	--	--	--	--	H	MH
Manatee #	ML**	--	MH**	--	--	ML**	H	MH
Marion	H**	--	MH**	--	MH**	--	ML	MH
Martin	--	--	--	ML	--	--	L	ML
Monroe	--	--	L**	L	--	--	L	L
Nassau	L*	L*	--	--	ML**	--	L	L
Okaloosa	ML***	--	--	ML	--	--	L	ML

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Table 9, continued

County	Indoor Radon	Soil Gas or Rn Flx	Soil Radium Profile	Gamma-well Log	Gamma Survey	Geol-ogical	Final
Okeechobee	--	--	--	L	--	L	L
Orange	ML**	L**	ML**	--	--	L	ML
Osceola	--	--	--	ML	--	L	ML
Palm Beach	ML***	--	L*	L	--	L	L
Pasco	L**	--	ML**	--	--	L	L
Pinellas	MH***	--	MH*	--	--	MH	MH
Polk ###	H****			--		H	
unmined		ML***	ML****		L - H		M
mined		H****	H****		H		H
Putnam	L*	--	MH**	--	--	L	ML
St Johns	--	--	L**	--	--	L	L
St Lucie	MH**	--	MH**	MH	--	L	M
Santa Rosa	ML*	--	--	--	--	L	ML
Sarasota	ML****	--	ML**	--	--	H	M
Seminole	L**	--	--	--	--	L	L
Sumter	H**	--	MH**	ML	--	L	ML
Suwannee	ML*	--	MH**	--	--	ML	ML
Taylor	--	--	--	--	--	L	L
Union	--	--	MH**	--	--	H	MH
Volusia	L**	--	ML*	--	--	L	L
Wakulla	--	--	--	MH	--	L	M
Walton	--	--	--	--	--	L	L
Washington	ML*	--	--	MH	--	Low	ML

See Tables 2-6 for further explanation of entries.

Table 9, Continued ...

NOTES:

\# Mining recently begun or planned.
\## Mining has resulted in significant amount of mined lands.
\### Mining/Land reclamation; demonstrated indoor radon effect.
\+ Old phosphate mines (prior to 1940's) known to exist.

L = Low
ML = Medium Low
M = Medium
MH = Medium High
H = High

* Very weak basis, only single data point
** Weak basis, 2-10 data points
*** Modest basis, 11-30 data points
**** Strong basis, >30 data points

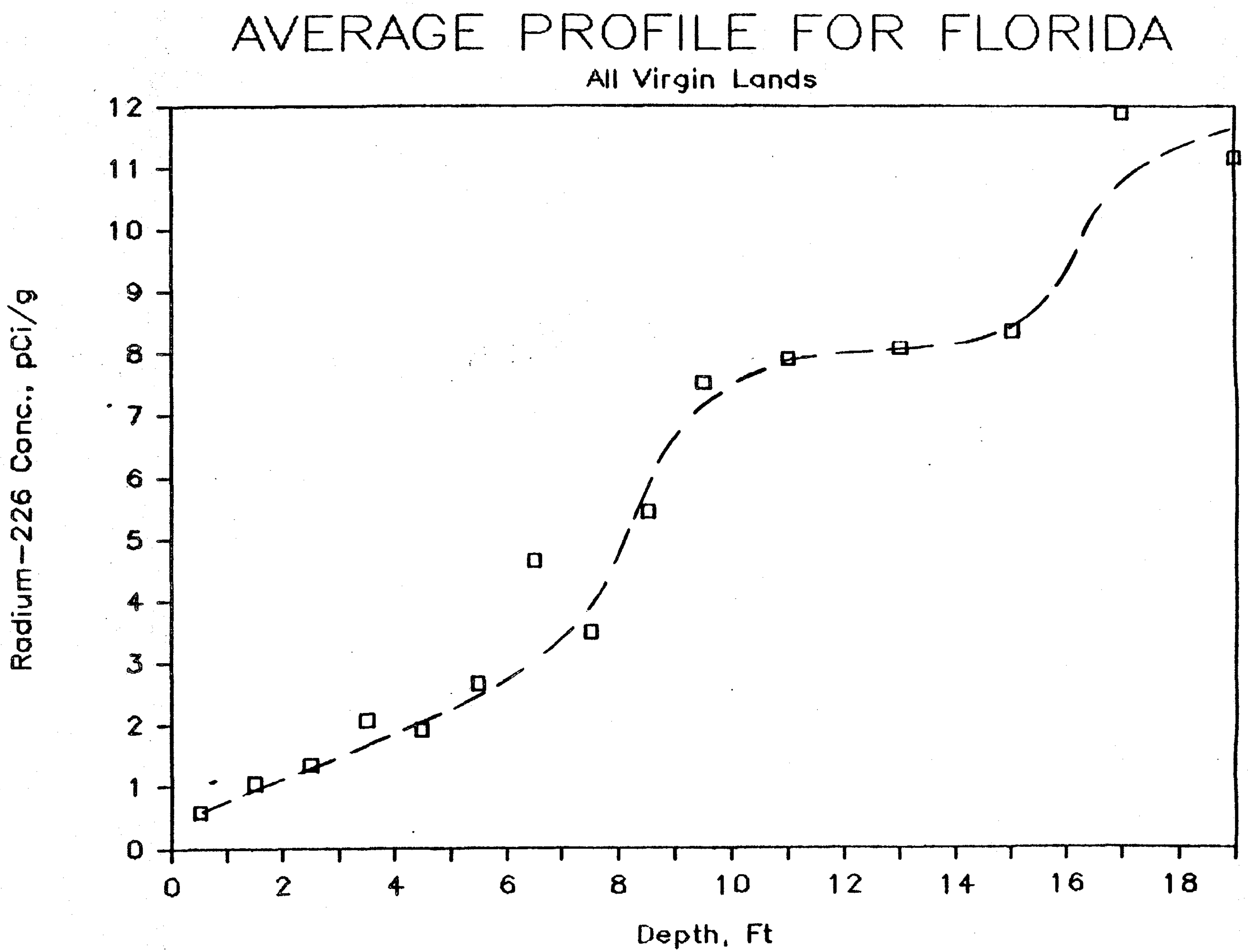


Figure 1. Composite Depth Profile of Radium-226 in Florida Soils

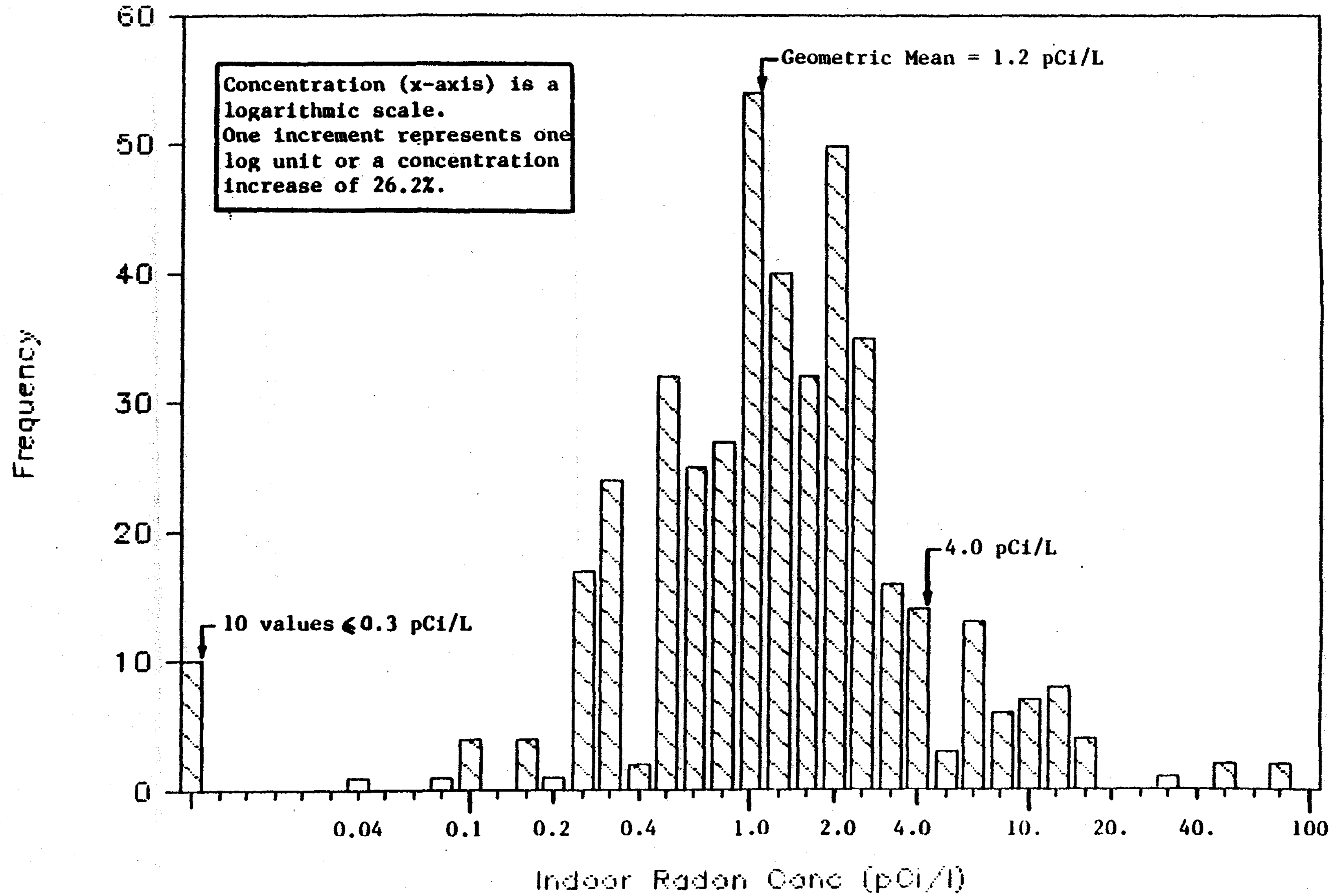


Figure 2. Distribution of Indoor Radon Concentrations in Florida (Frequency vs log concentration).

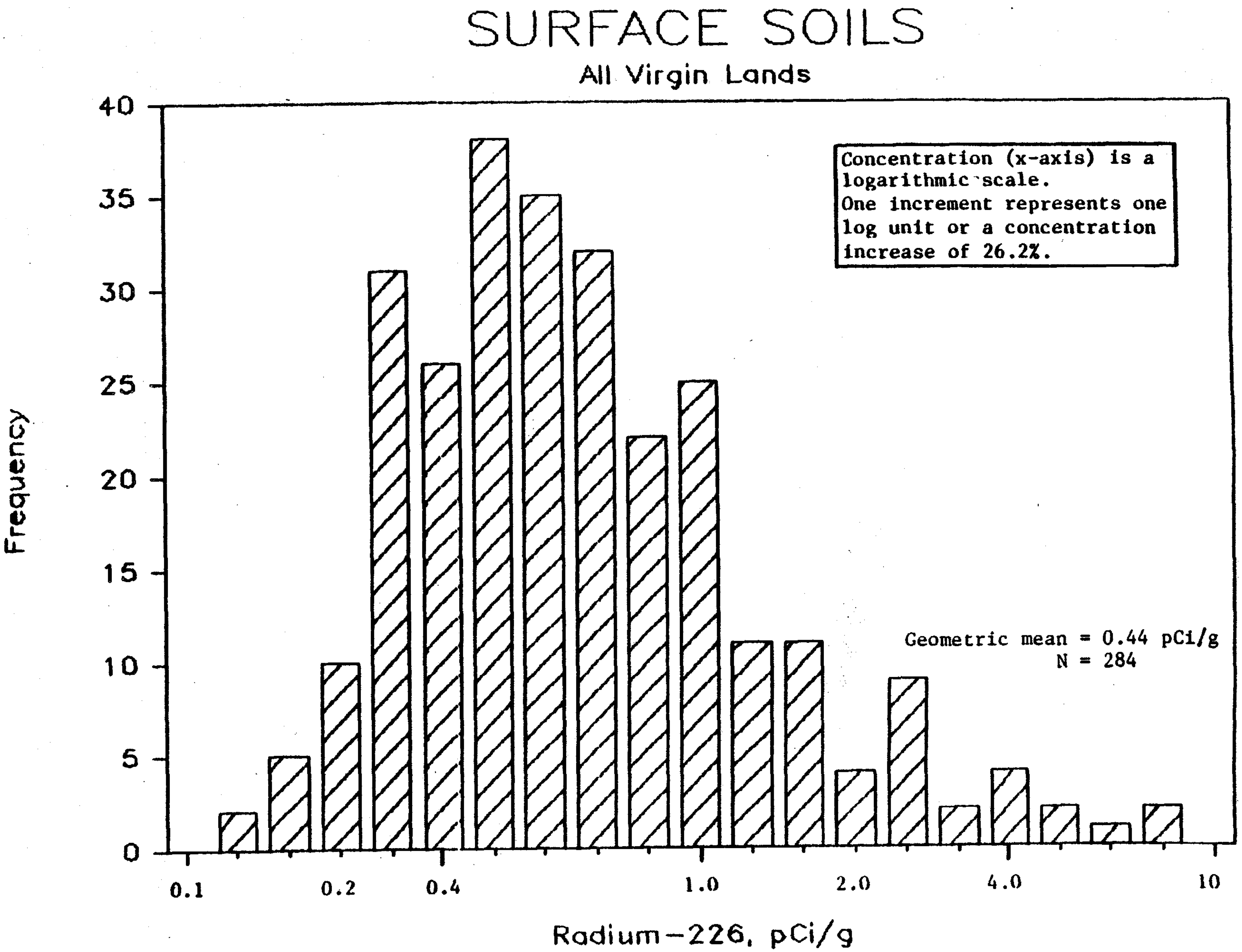


Figure 3. Distribution of Radium-226 Concentrations in Florida Surface Soils

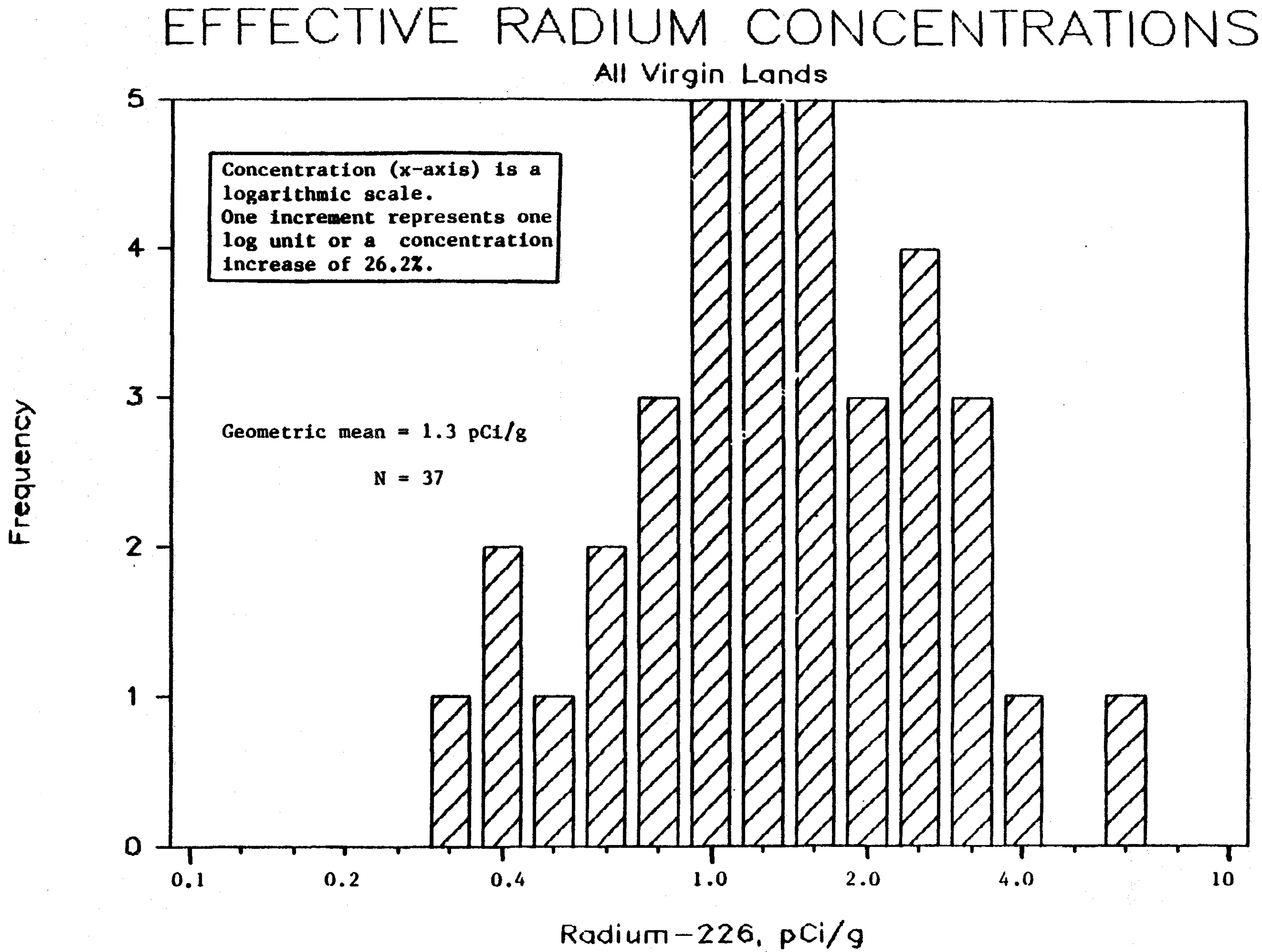


Figure 4. Distribution of Effective Radium Concentrations in Florida Near-Surface Soils

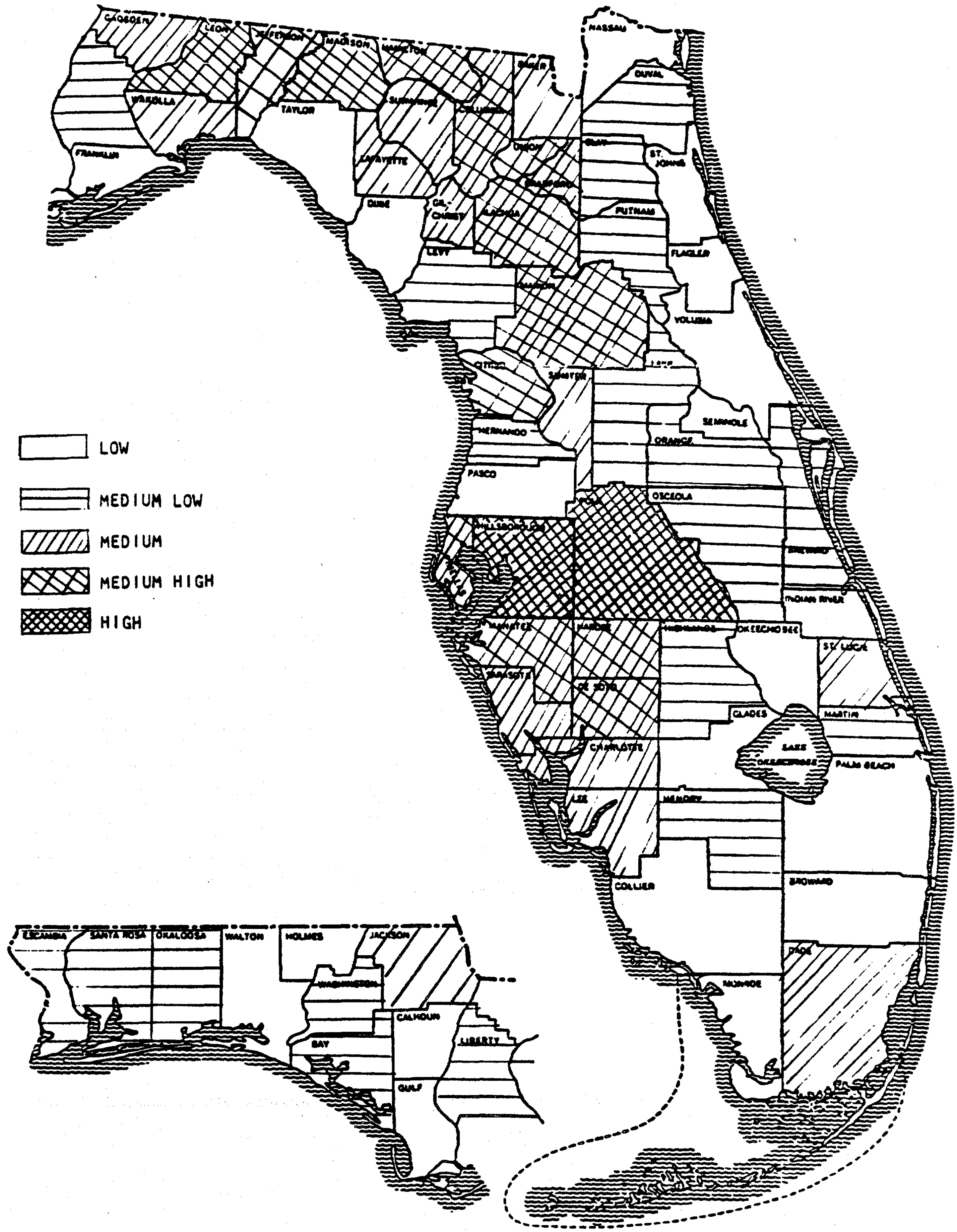
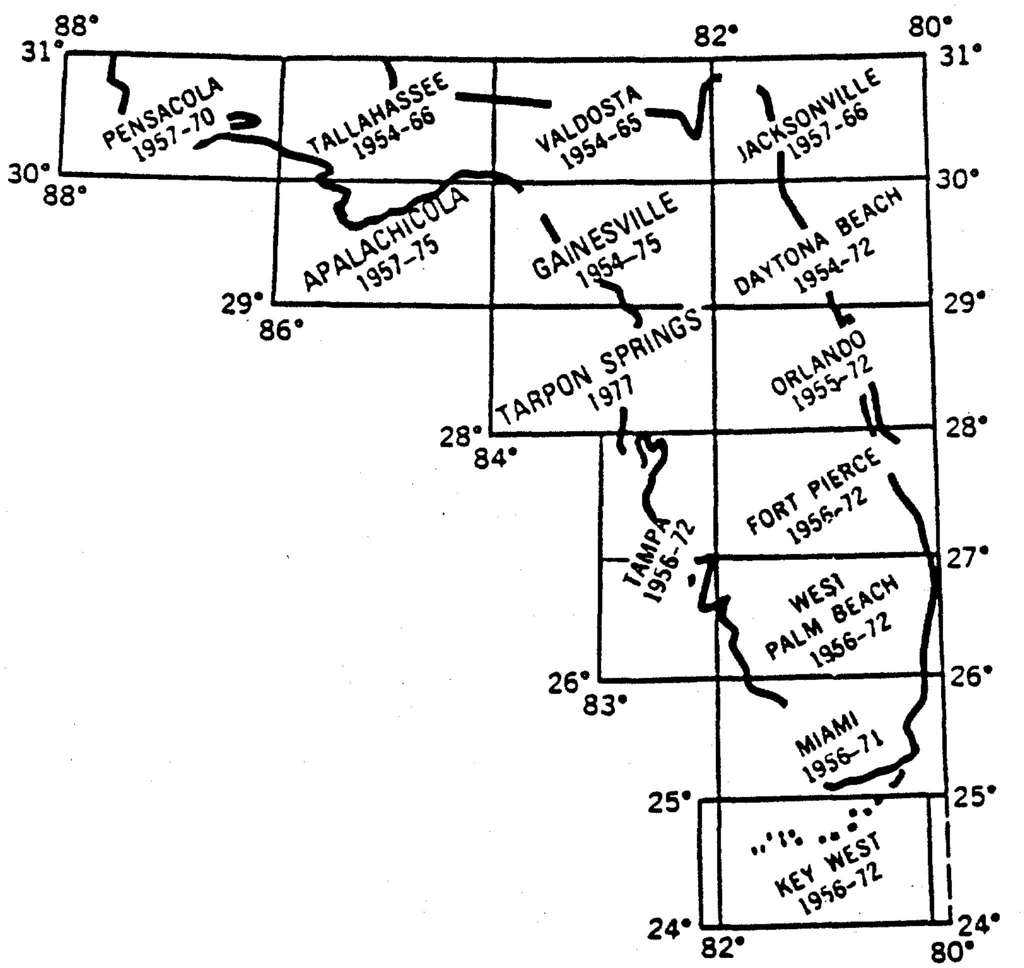


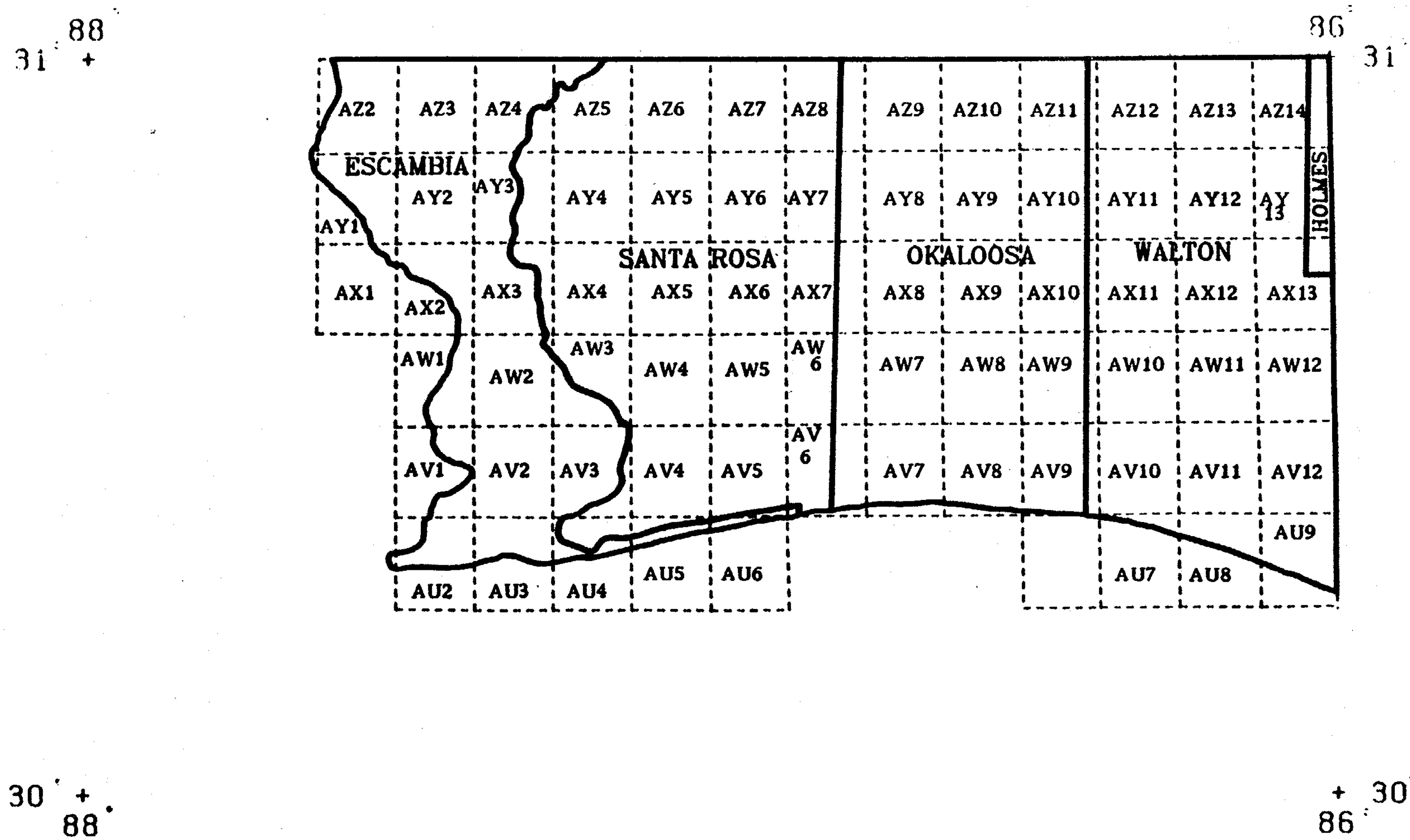
Figure 5. Florida Indoor Radon Potential by Count

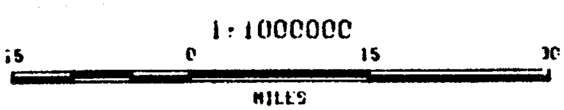
Appendix B

MAPS AND LISTING OF USGS QUADRANGLES

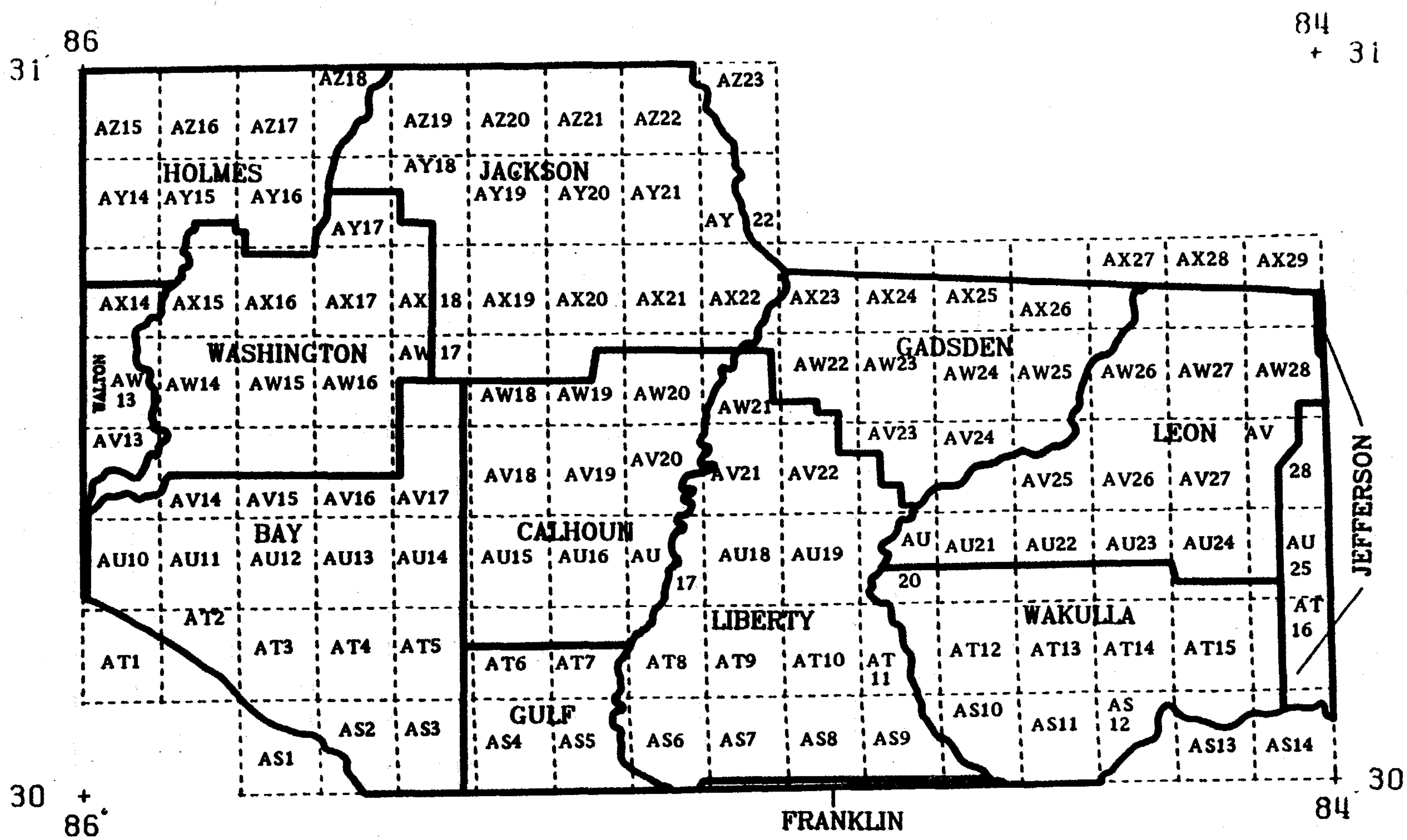


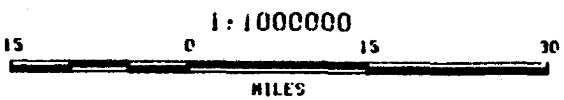
Key to 1:250,000 Maps



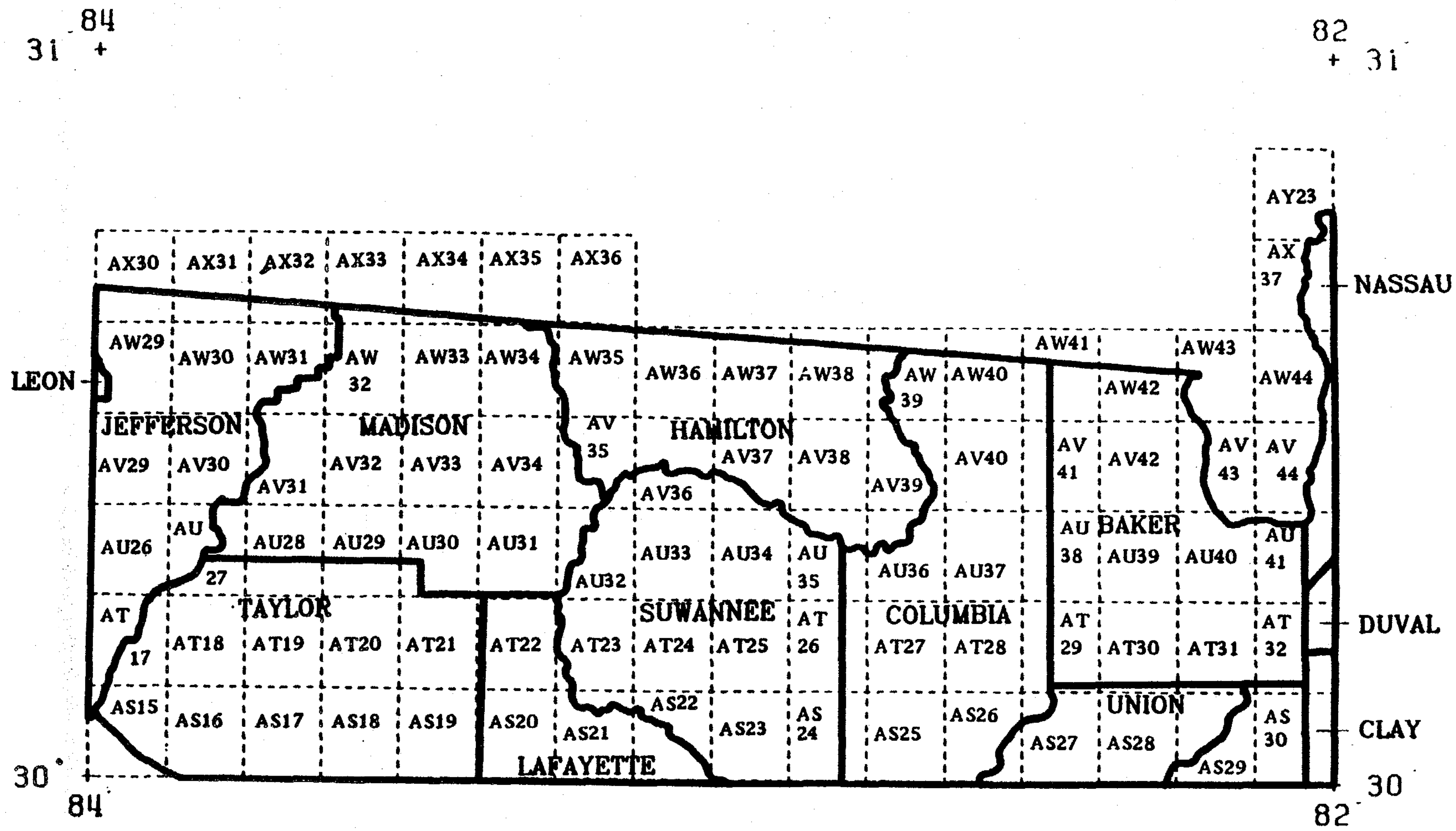


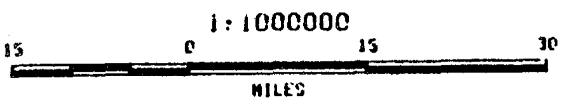
PENSACOLA 1:250,000 QUAD



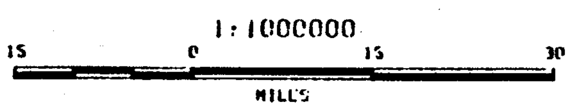


TALLAHASSEE 1:250,000 QUAD

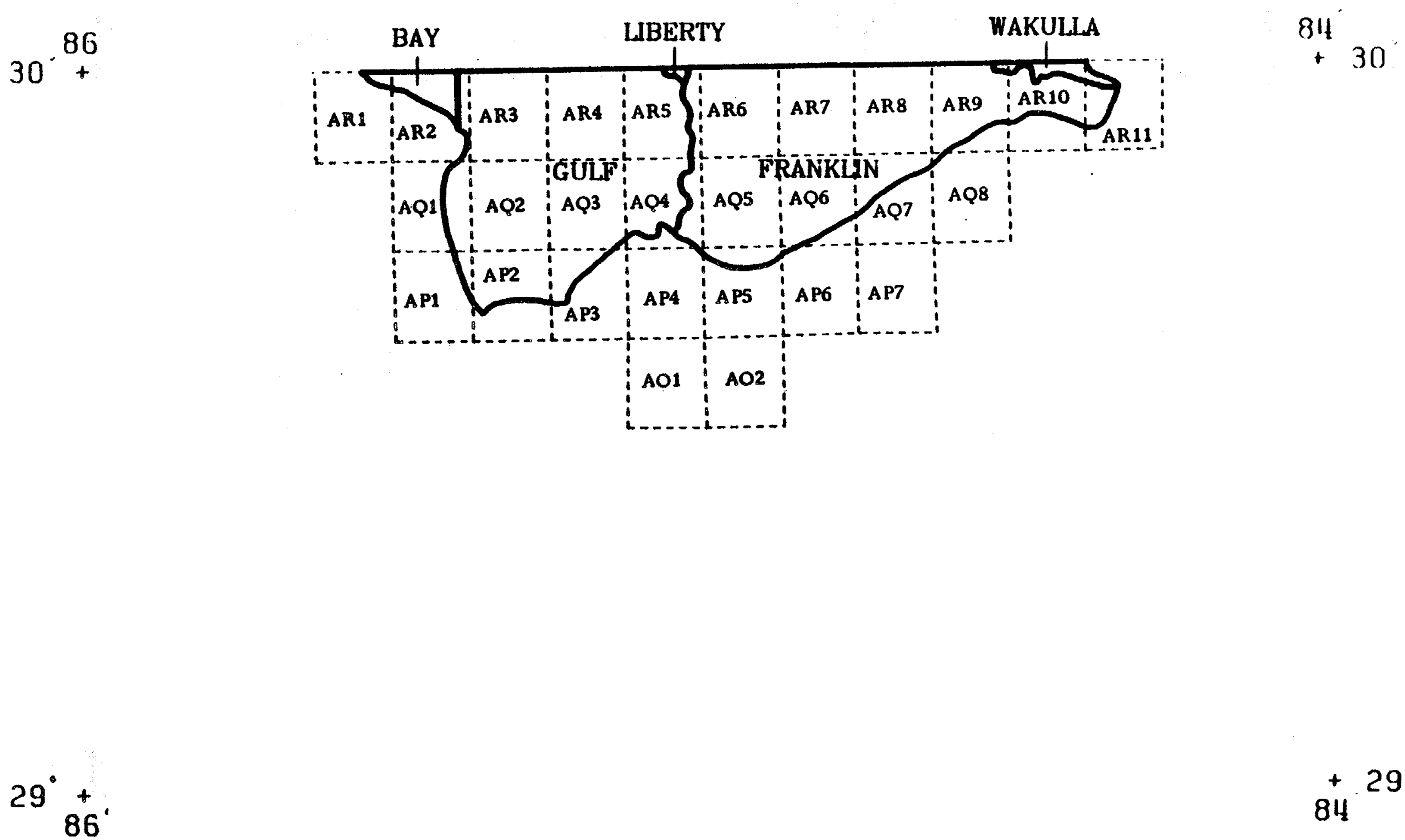




VALDOSTA 1:250,000 QUAD



JACKSONVILLE 1:250,000 QUAD



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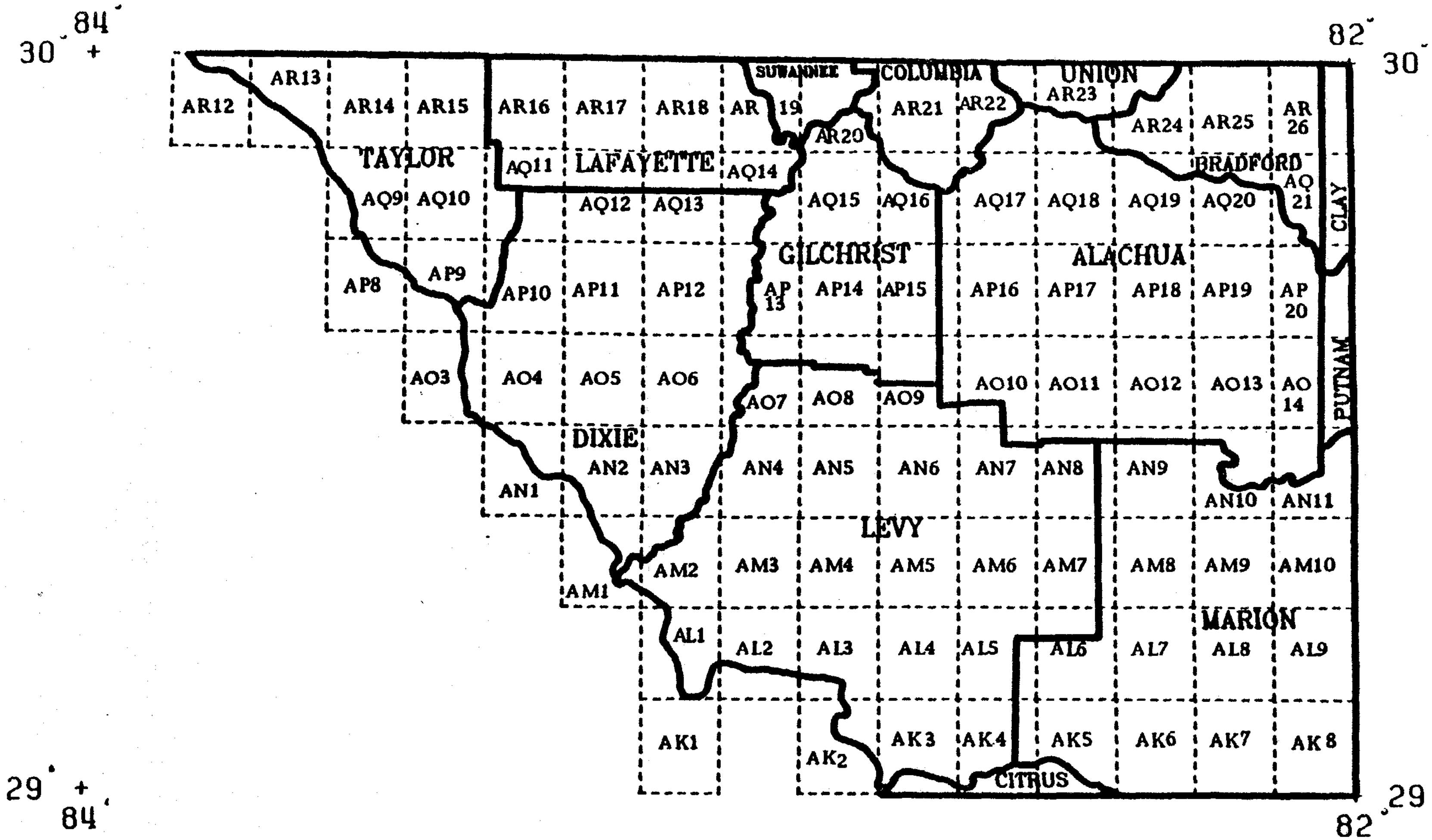
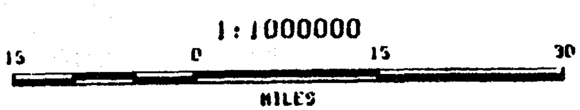
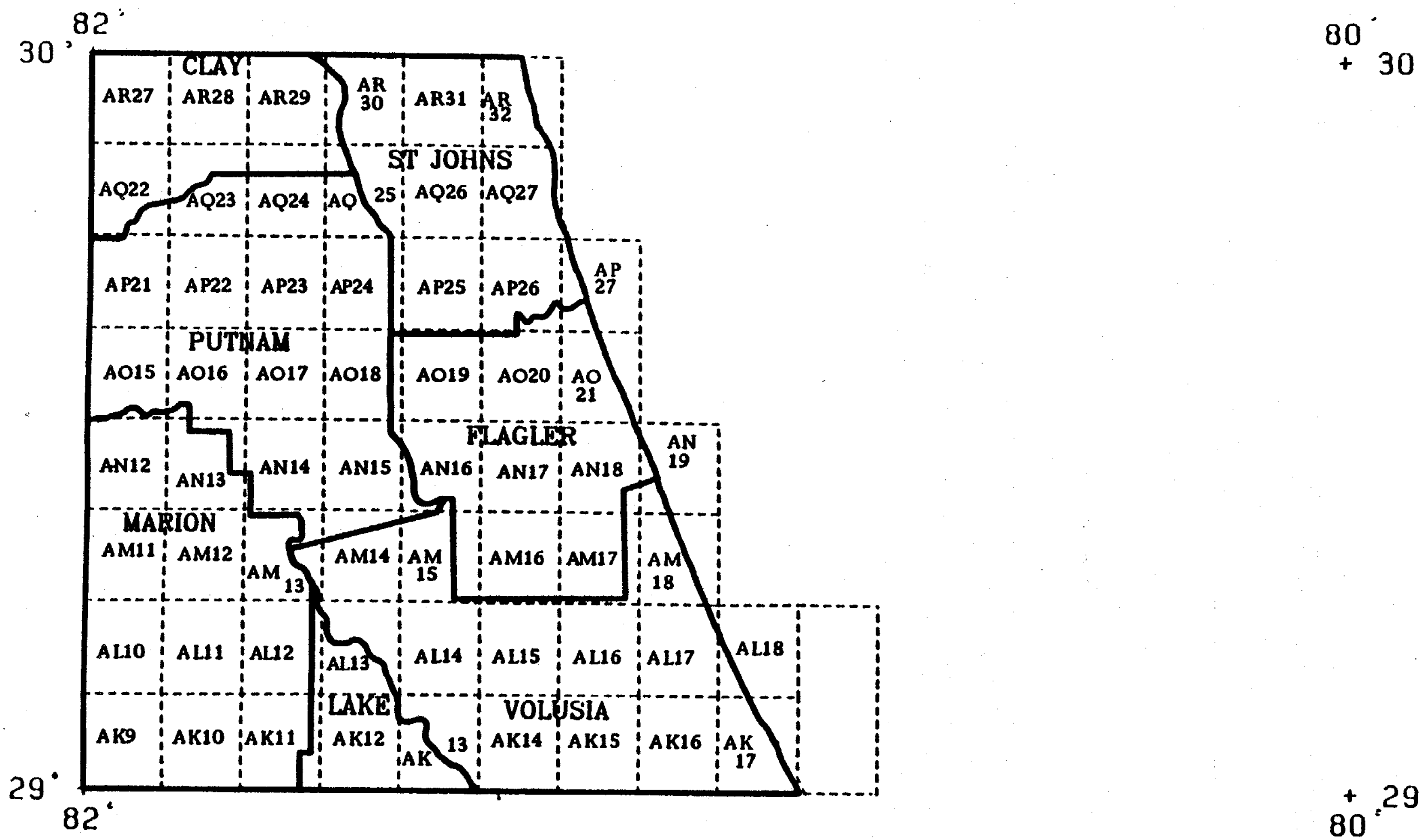




GAINESVILLE 1:250,000 QUAD



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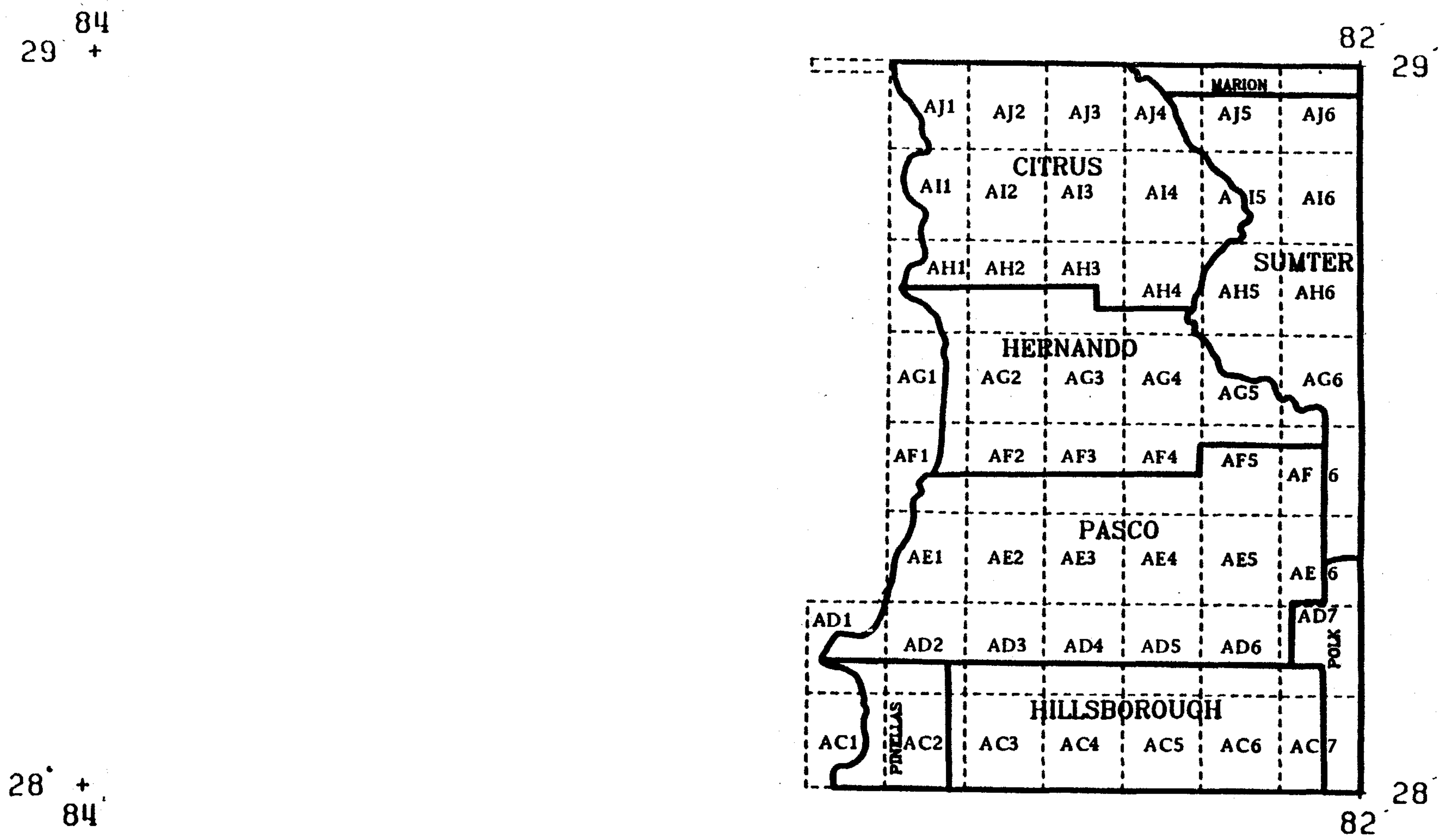
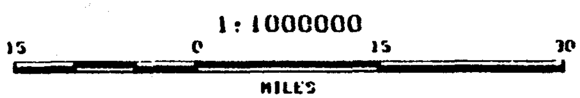
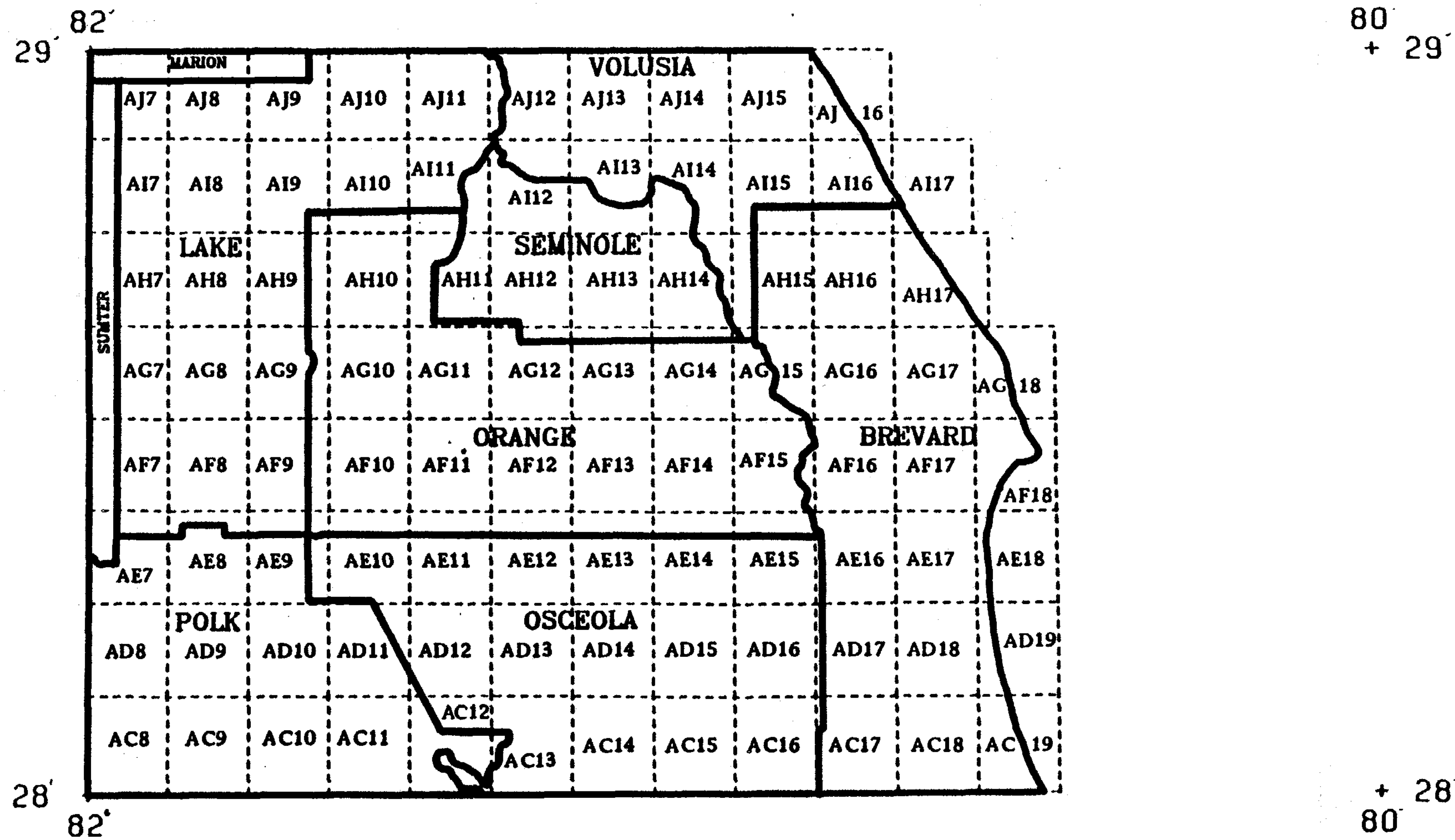
MILES

DAYTONA BEACH 1:250,000 QUAD





TARPON SPRINGS 1:250,000 QUAD



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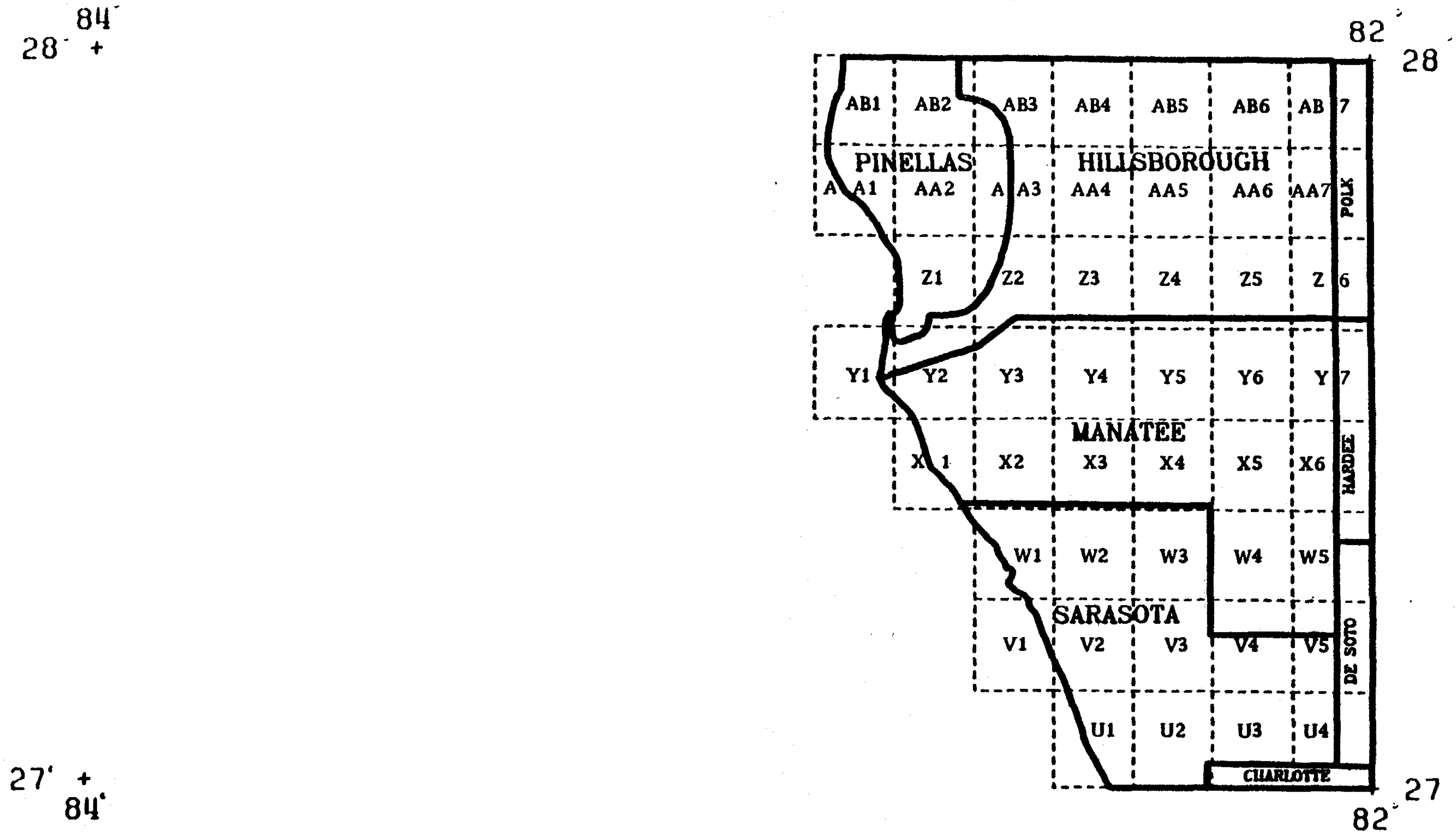
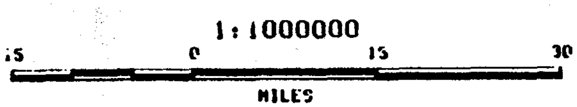
15 0 15 30

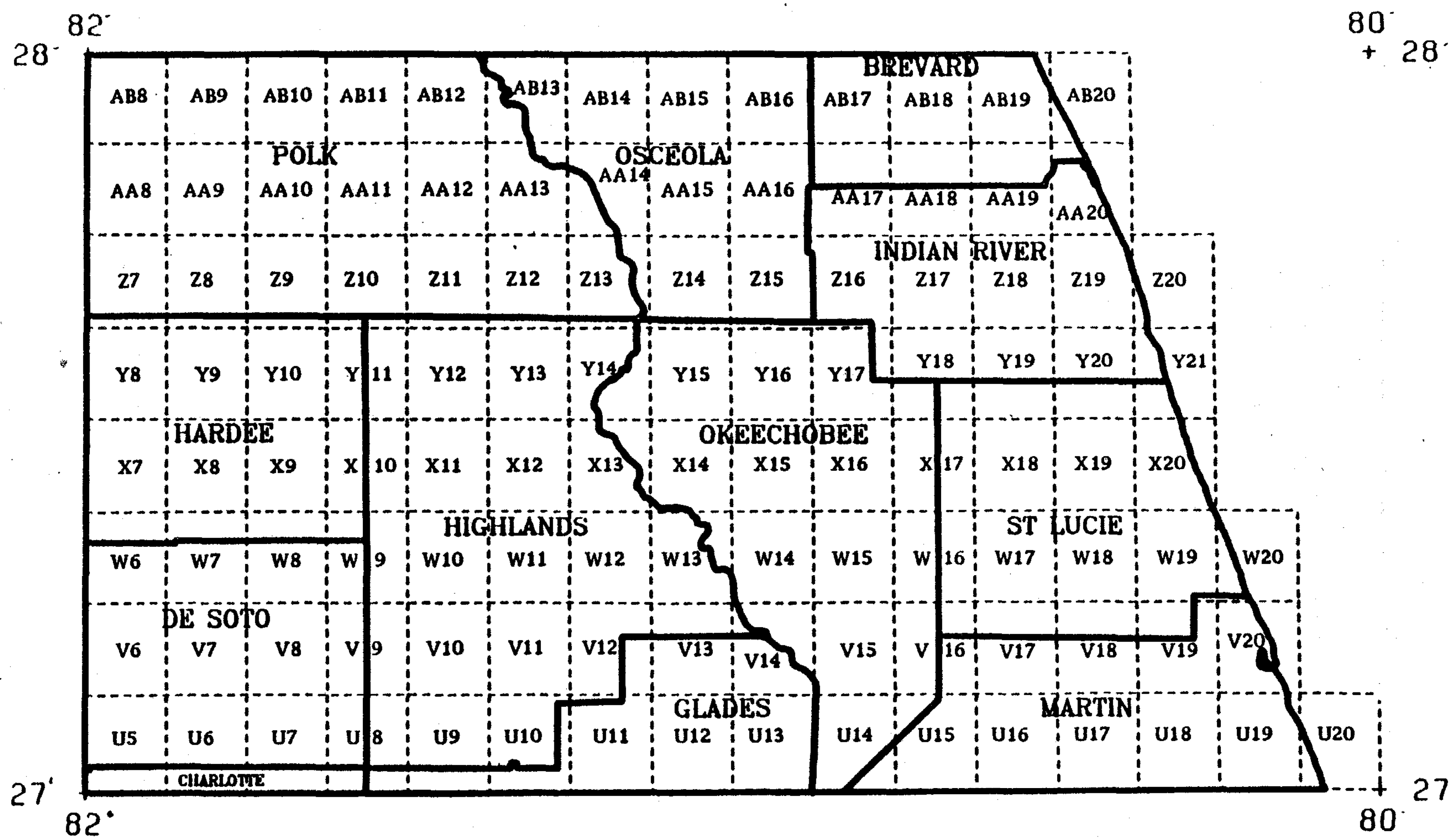
MILES

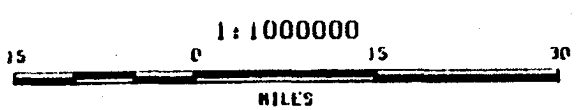
ORLANDO 1:250,000 QUAD





TAMPA NORTH 1:250,000 QUAD





FT PIERCE 1:250,000 QUAD

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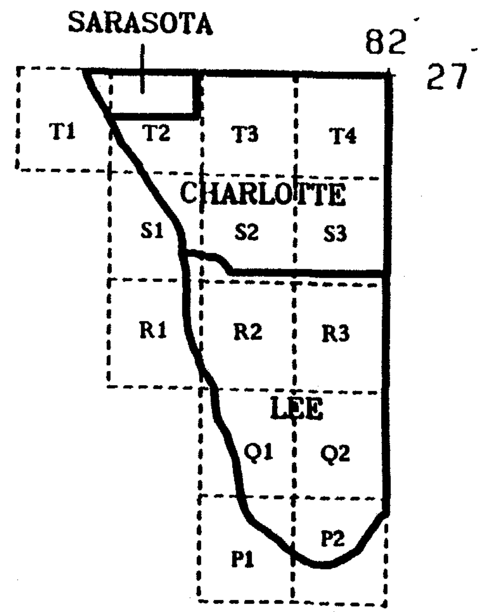
82° 27°



26° 84°

26° 82°

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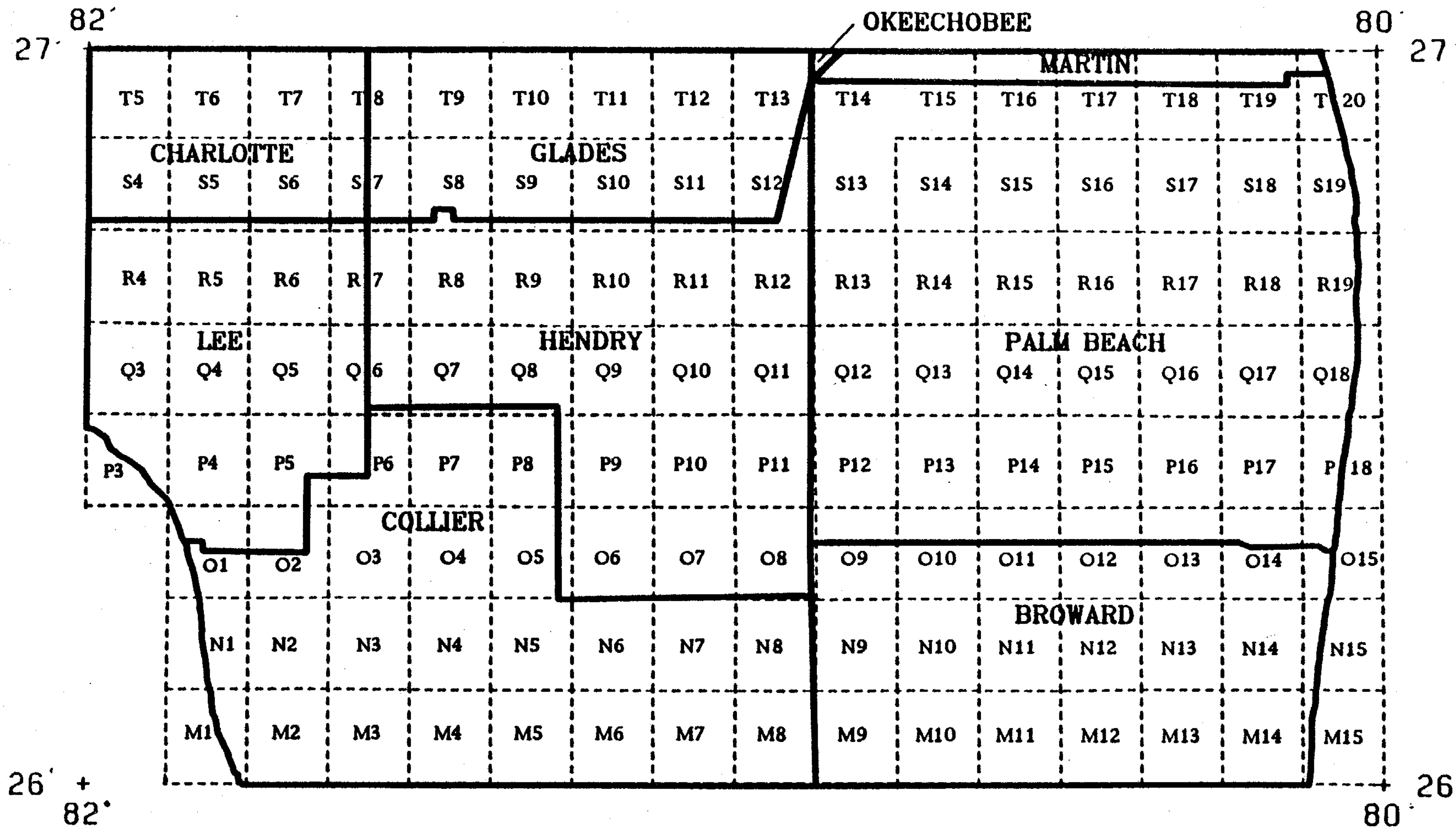
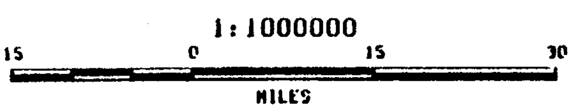
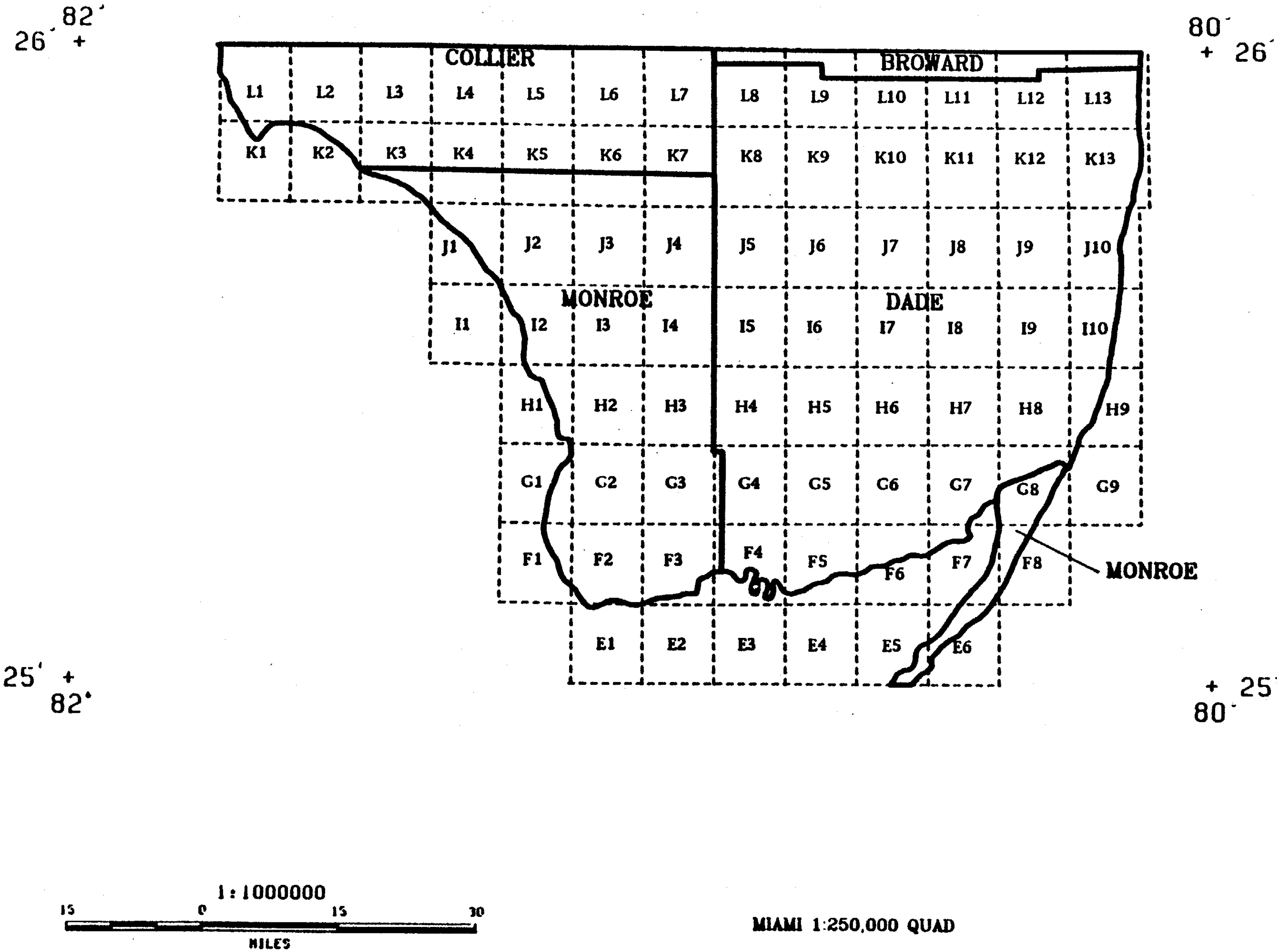
MILES

TAMPA SOUTH 1:250,000 QUAD

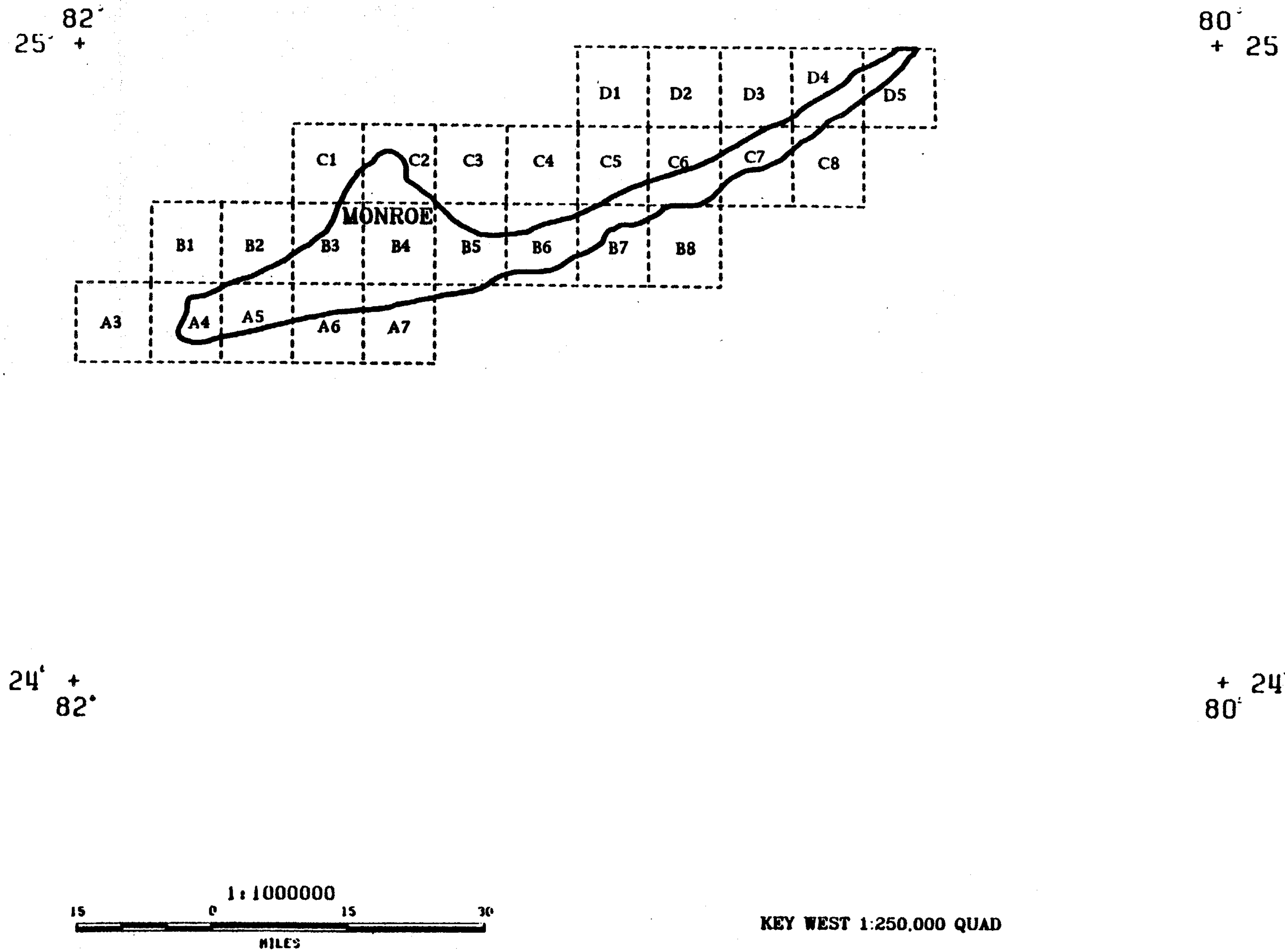




WEST PALM BEACH 1:250,000 QUAD



MIAMI 1:250,000 QUAD



KEY WEST 1:250,000 QUAD

QUAD ID	QUAD NAME
A01	MARQUESAS KEYS WEST
A02	MARQUESAS KEYS EAST
A03	COTTRELL KEY
A04	KEY WEST
A05	BOCA CHICA KEY
A06	SADDLEBUNCH KEYS
A07	LOGGERHEAD KEY
B01	BAY KEYS
B02	SNIPE KEYS
B03	SUGARLOAF KEY
B04	SUMMERLAND KEY
B05	BIG PINE KEY
B06	SEVENMILE BRIDGE
B07	MARATHON
B08	CRAWL KEY
C01	SAWYER KEY
C02	CONTENT KEYS
C03	HORSESHOE KEYS
C04	EAST BAHIA HONDA KEY
C05	BAMBOO KEY
C06	GRASSY KEY
C07	LONG KEY
C08	LOWER MATECUMBE KEY
D01	EAST BAHIA HONDA KEY NE
D02	SCHOONER BANK
D03	BUCHANAN KEYS
D04	UPPER MATECUMBE KEY
D05	PLANTATION KEY
E01	SANDY KEY
E02	CLIVE KEY
E03	PELICAN KEYS
E04	CALUSA KEYS
E05	TAVERNIER
E06	ROCK, HARBOR
F01	LAKE INGRAHAM WEST
F02	LAKE INGRAHAM EAST
F03	FLAMINGO
F04	WEST LAKE
F05	MADEIRA BAY
F06	JOE BAY
F07	BLACKWATER SOUND
F08	GARDEN COVE
G01	SHARK RIVER ISLAND
G02	WHITEWATER BAY WEST
G03	WHITEWATER BAY EAST
G04	MAHOGANY HAMMOCK
G05	TAYLOR SLOUGH
G06	ROYAL PALM RANGER STATION SE
G07	GLADES
G08	CARD SOUND

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
G09	PACIFIC REEF
H01	SHARK POINT
H02	HARNEY RIVER
H03	TARPON BAY
H04	PA-HAY-OKEE LOOKOUT TOWER
H05	LONG PINE KEY
H06*	ROYAL PALM RANGER STATION
H07*	HOMESTEAD
H08	ARSENICKER KEYS
H09	ELLIOTT KEY
I01	PLOVER KEY
I02	LOSTMANS RIVER RANGER STATION
I03	BIG LOSTMANS BAY
I04	INDIAN CAMP CREEK
I05	PANTHER MOUND
I06	BLACK HAMMOCK
I07*	GROSSMAN HAMMOCK
I08*	GOULDS
I09	PERRINE
I10	SOLDIER KEY
J01	PAVILION KEY
J02	ALLIGATOR BAY
J03	BIG BOY LAKE
J04	LOSTMANS TRAIL
J05	SHARK VALLEY LOOKOUT TOWER
J06	CHEKIKA ISLAND
J07	SOUTH OF COOPERTOWN
J08	SOUTH MIAMI NW
J09	SOUTH MIAMI
J10	KEY BISCAYNE
K01	CAPE ROMANO
K02	PANTHER KEY
K03	EVERGLADES CITY
K04	CHOKOLOSKEE
K05	GATOR HOOK SWAMP
K06	MONROE STATION
K07	FIFTYMILE BEND
K08	FORTYMILE BEND
K09	LONG ISLAND
K10	COOPERTOWN
K11	HIALEAH SW
K12	HIALEAH
K13	MIAMI
L01	MARCO ISLAND
L02	ROYAL PALM HAMMOCK
L03	WEAVERS STATION
L04	OCHOPEE
L05	BURNS LAKE
L06	MONROE STATION NE
L07	NORTH OF FIFTYMILE BEND

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
L08	NORTH OF FORTYMILE BEND
L09	CUSTARD APPLE HAMMOCK
L10	WEST OF PENNSUCO
L11	PENNSUCO
L12	OPA-LOCKA
L13	NORTH MIAMI
M01	NAPLES SOUTH
M02	BELLE MEADE
M03	BELLE MEADE SE
M04	DEEP LAKE SW
M05	DEEP LAKE
M06	IMMOKALEE 4 SW
M07	IMMOKALEE 4 SE
M08	EVERGLADES 3 SW
M09	EVERGLADES 3 SE
M10	EVERGLADES 4 SW
M11	EVERGLADES 4 SE
M12	COOPER CITY SW
M13	COOPER CITY
M14	FORT LAUDERDALE SOUTH
M15	PORT EVERGLADES
N01	NAPLES NORTH
N02	BELLE MEADE NW
N03	BELLE MEADE NE
N04	CATHERINE ISLAND
N05	MILES CITY
N06	IMMOKALEE 4 NW
N07	IMMOKALEE 4 NE
N08	EVERGLADES 3 NW
N09	EVERGLADES 3 NE
N10	EVERGLADES 4 NW
N11	EVERGLADES 4 NE
N12	ANDYTOWN
N13	COOPER CITY NE
N14	FORT LAUDERDALE NORTH
N15	POMPANO BEACH
O01	BONITA SPRINGS
O02	CORKSCREW SW
O03	CORKSCREW SE
O04	IMMOKALEE SW
O05	SUNNILAND
O06	IMMOKALEE 1 SW
O07	IMMOKALEE 1 SE
O08	EVERGLADES 2 SW
O09	EVERGLADES 2 SE
O10	EVERGLADES 1 SW
O11	EVERGLADES 1 SE
O12	FORT LAUDERDALE 2 SW
O13	FORT LAUDERDALE 2 SE
O14	WEST DIXIE BEND

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
O15	BOCA RATON
P01	WULFERT
P02	SANIBEL
P03	FORT MYERS BEACH
P04	ESTERO
P05	CORKSCREW NW
P06	CORKSCREW
P07	IMMOKALEE
P08	IMMOKALEE NE
P09	IMMOKALEE 1 NW
P10	IMMOKALEE 1 NE
P11	EVERGLADES 2 NW
P12	EVERGLADES 2 NE
P13	EVERGLADES 1 NW
P14	EVERGLADES 1 NE
P15	FORT LAUDERDALE 2 NW
P16	FORT LAUDERDALE 2 NE
P17	UNIVERSITY PARK
P18	DELRAY BEACH
Q01	CAPTIVA
Q02	PINE ISLAND CTR.
Q03*	FORT MYERS SW
Q04	FORT MYERS SE
Q05	ALVA SW
Q06	ALVA SE
Q07	FELDA
Q08	FELDA SE
Q09	LA BELLE 4 SW
Q10	LA BELLE 4 SE
Q11	LAKE HARBOR SW
Q12	LAKE HARBOR SE
Q13	OKEELANTA
Q14	SHAWANO
Q15	LOXAHATCHEE SW
Q16	LOXAHATCHEE SE
Q17	GREENACRES CITY
Q18	LAKE WORTH
R01	PORT BOCA GRANDE
R02	BOKEELIA
R03	MATLACHA
R04	FORT MYERS NW
R05	FORT MYERS
R06*	OLGA
R07	ALVA
R08	SEARS
R09	FELDA NE
R10	LA BELLE 4 NW
R11	LA BELLE 4 NE
R12	CLEWISTON SOUTH
R13	LAKE HARBOR

*** Quadrangle to which the rule should be applied.**

QUAD ID	QUAD NAME
R14	BELLE GLADE
R15	SIXMILE BEND
R16	LOXAHATCHEE NW
R17	LOXAHATCHEE
R18	PALM BEACH FARMS
R19	PALM BEACH
S01	PLACIDA
S02	PUNTA GORDA SW
S03*	PUNTA GORDA SE
S04	GILCHRIST
S05*	TUCKERS CORNER
S06	TELEGRAPH SWAMP
S07	TELEGRAPH SWAMP SE
S08	LA BELLE
S09	GOODNO
S10	LAKE HICPOCHEE
S11	MOORE HAVEN
S12	CLEWISTON NORTH
S13	OKEECHOBEE LAKE
S14	PAHOKEE
S15	BRYANT
S16	WEST PALM BEACH 2 SW
S17	WEST PALM BEACH 2 SE
S18	DELTA
S19	RIVIERA BEACH
T01	ENGLEWOOD NW
T02	ENGLEWOOD
T03*	EL JOBEAN
T04*	PUNTA GORDA
T05	CLEVELAND
T06	BERMONT
T07	TELEGRAPH SWAMP NW
T08	TELEGRAPH SWAMP NE
T09	LA BELLE NW
T10	PALMDALE
T11	LAKEPORT
T12	FISHEATING BAY
T13	COCHRANS PASS
T14	OKEECHOBEE LAKE
T15	OKEECHOBEE LAKE
T16	PORT MAYACA
T17	WEST PALM BEACH 2 NW
T18	WEST PALM BEACH 2 NE
T19	ROOD
T20	JUPITER
U01	VENICE
U02	MYAKKA RIVER
U03*	MURDOCK
U04*	MURDOCK SE
U05	FT OGDEN

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
U06	ARCADIA SE
U07	LONG ISLAND MARSH SW
U08	LONG ISLAND MARSH SE
U09	VENUS SW
U10	VENUS
U11	BRIGHTON SW
U12	BRIGHTON SE
U13	OKEECHOBEE SW
U14	OKEECHOBEE SE
U15	OKEECHOBEE 4 SW
U16	OKEECHOBEE 4 SE
U17	INDIANTOWN
U18	INDIANTOWN SE
U19	GOMEZ
U20	HOBE SOUND
V01	BIRD KEYS
V02	LAUREL
V03	LOWER MYAKKA LAKE
V04	MURDOCK NW
V05	MURDOCK NE
V06	NOCATEE
V07	ARCADIA
V08	LONG ISLAND MARSH NW
V09	LONG ISLAND MARSH NE
V10	VENUS NW
V11	CHILDS
V12	BRIGHTON NW
V13	BRIGHTON
V14	OKEECHOBEE NW
V15	OKEECHOBEE
V16	OKEECHOBEE 4 NW
V17	OKEECHOBEE 4 NE
V18	INDIANTOWN NW
V19	PALM CITY
V20	ST LUCIE INLET
W01	SARASOTA
W02	BEE RIDGE
W03	OLD MYAKKA
W04	MYAKKA CITY
W05	EDGEVILLE
W06	LIMESTONE
W07	GARDNER
W08	CREWSVILLE SW
W09	CREWSVILLE SE
W10	LAKE JUNE IN WINTER
W11	LAKE PLACID
W12	BASINGER SW
W13	FORT BASINGER
W14	TAYLOR CREEK SW
W15	TAYLOR CREEK SE

* Quadrangle to which the rule should

QUAD ID	QUAD NAME
W16	OKEECHOBEE 1 SW
W17	OKEECHOBEE 1 SE
W18	FORT PIERCE SW
W19	ANKONA
W20	EDEN
X01*	BRADENTON BEACH
X02	BRADENTON
X03	LORRAINE
X04	VERNA
X05	MYAKKA CITY NW
X06	MYAKKA HEAD
X07	ONA
X08*	ZOLFO SPRINGS
X09*	SWEETWATER
X10	CREWSVILLE
X11	SEBRING
X12	LORIDA
X13	BASINGER NW
X14	BASINGER
X15	TAYLOR CREEK NW
X16	TAYLOR CREEK NE
X17	OKEECHOBEE 1 NW
X18	OKEECHOBEE 1 NE
X19	FORT PIERCE NW
X20	FORT PIERCE
Y01	EGMONT KEY
Y02	ANNA MARIA
Y03*	PALMETTO
Y04	PARRISH
Y05	RYE
Y06	KEENTOWN
Y07	DUETTE
Y08	FT GREEN
Y09	WAUCHULA
Y10	GRIFFINS CORNER
Y11	AVON PARK
Y12	LAKE ARBUCKLE SW
Y13	LAKE ARBUCKLE SE
Y14	FORT KISSIMMEE
Y15	FORT KISSIMMEE SE
Y16	FORT DRUM SW
Y17	FORT DRUM
Y18	FELLSMERE 4 SW
Y19	FELLSMERE 4 SE
Y20	OSLO
Y21	INDRIO
Z01	PASS-A-GRILLE BEACH
Z02	COCKROACH BAY
Z03	RUSKIN
Z04	WIMAUMA

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
Z05	FORT LONESOME
Z06*	DUETTE NE
Z07*	BAIRD
Z08*	BOWLING GREEN
Z09*	BEREAH
Z10	FROSTPROOF
Z11	LAKE ARBUCKLE
Z12	LAKE ARBUCKLE NE
Z13	FORT KISSIMMEE NW
Z14	FORT KISSIMMEE NE
Z15	FORT DRUM NW
Z16	FORT DRUM NE
Z17	FELLSMERE 4 NW
Z18	FELLSMERE 4 NE
Z19	VERO BEACH
Z20	RIOMAR
AA01	SEMINOLE
AA02	ST PETERSBURG
AA03	PORT TAMPA
AA04*	GIBSONTON
AA05	RIVERVIEW
AA06*	LITHIA
AA07*	KEYSVILLE
AA08*	BRADLEY JUNCTION
AA09*	HOMELAND
AA10	ALTURAS
AA11	BABSON PARK
AA12	LAKE WEOHYAKAPKA
AA13	LAKE WEOHYAKAPKA SE
AA14	LAKE MARIAN SW
AA15	LAKE MARIAN SE
AA16	KENANSVILLE SW
AA17	KENANSVILLE SE
AA18	FELLSMERE SW
AA19	FELLSMERE
AA20	SEBASTIAN
AB01	CLEARWATER
AB02	SAFETY HARBOR
AB03	GANDY BRIDGE
AB04	TAMPA
AB05*	BRANDON
AB06*	DOVER
AB07*	NICHOLS
AB08*	MULBERRY
AB09*	BARTOW
AB10	ELOISE
AB11	LAKE WALES
AB12	HESPERIDES
AB13	LAKE WEOHYAKAPKA NE
AB14	LAKE MARIAN NW

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AB15	LAKE MARIAN NE
AB16	KENANSVILLE
AB17	KENANSVILLE NE
AB18	FELLSMERE NW
AB19	GRANT
AB20	SEBASTIAN NW
AC01	DUNEDIN
AC02*	OLDSMAR
AC03	CITRUS PARK
AC04	SULPHUR SPRINGS
AC05*	THONOTOSASSA
AC06*	PLANT CITY WEST
AC07*	PLANT CITY EAST
AC08*	LAKELAND
AC09*	AUBURNDALE
AC10	WINTER HAVEN
AC11	DUNDEE
AC12	LAKE HATCHINEHA
AC13	CYPRESS LAKE
AC14	HOLOPAW SW
AC15	HOLOPAW SE
AC16	DEER PARK
AC17	DEER PARK SE
AC18	MELBOURNE WEST
AC19	MELBOURNE EAST
AD01	TARPON SPRINGS
AD02	ELFERS
AD03	ODESSA
AD04	LUTZ
AD05	WESLEY CHAPEL
AD06	ZEPHYRHILLS
AD07*	SOCRUM
AD08	PROVIDENCE
AD09	POLK CITY
AD10	GUM LAKE
AD11	DAVENPORT
AD12	LAKE TOHOPEKALIGA
AD13	ST CLOUD SOUTH
AD14	ASHTON
AD15	HOLOPAW
AD16	DEER PARK NW
AD17	DEER PARK NE
AD18	EAU GALLIE
AD19	TROPIC
AE01	PORT RICHEY
AE02	FIVAY JUNCTION
AE03	EHREN
AE04	SAN ANTONIO
AE05*	DADE CITY
AE06	BRANCHBOROUGH

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AE07	ROCK RIDGE
AE08	POYNER
AE09	LAKE LOUISA SW
AE10	INTERCESSION CITY
AE11	KISSIMMEE
AE12	ST. CLOUD NORTH
AE13	NARCOOSSEE
AE14	NARCOOSSEE SE
AE15	LAKE POINSETT SW
AE16	LAKE POINSETT
AE17	COCOA
AE18	COCOA BEACH
AF01	ARIPEKA
AF02	PORT RICHEY NE
AF03	MASARYKTOWN
AF04	SPRING LAKE
AF05*	LACOOCHEE
AF06	CLAY SINK
AF07	BAY LAKE
AF08	LAKE NELLIE
AF09	LAKE LOUISA
AF10	WINDERMERE
AF11	LAKE JESSAMINE
AF12	PINE CASTLE
AF13	NARCOOSSEE NW
AF14	NARCOOSSEE NE
AF15	LAKE POINSETT NW
AF16	SHARPES
AF17	COURTENAY
AF18	CAPE CANAVERAL
AG01	BAYPORT
AG02	WEEKIWACHEE SPRINGS
AG03	BROOKSVILLE
AG04	BROOKSVILLE SE
AG05	SAINT CATHERINE
AG06	WEBSTER
AG07	MASCOTTE
AG08	CLERMONT WEST
AG09	CLERMONT EAST
AG10	WINTER GARDEN
AG11	ORLANDO WEST
AG12	ORLANDO EAST
AG13	OVIEDO SW
AG14	BITHLO
AG15	TITUSVILLE SW
AG16	TITUSVILLE
AG17	ORSINO
AG18	FALSE CAPE
AH01	CHASSAHOWITZKA BAY
AH02	CHASSAHOWITZKA

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AH03	BROOKSVILLE NW
AH04	NOBLETON
AH05	WAHOO
AH06	BUSHNELL
AH07*	CENTER HILL
AH08	HOWEY IN THE HILLS
AH09	ASTATULA
AH10	APOPKA
AH11	FOREST CITY
AH12	CASSELBERRY
AH13	OVIEDO
AH14	GENEVA
AH15	AURANTIA
AH16	MIMS
AH17	WILSON
AI01	OZELLO
AI02	HOMOSASSA
AI03	LECANTO
AI04*	INVERNESS
AI05	RUTLAND
AI06*	WILDWOOD
AI07	LEESBURG WEST
AI08	LEESBURG EAST
AI09	EUSTIS
AI10	SORRENTO
AI11	SANFORD SW
AI12	SANFORD
AI13	OSTEEN
AI14	OSCEOLA
AI15	MAYTOWN
AI16	OAK HILL
AI17	PARDON ISLAND
AJ01	RED LEVEL
AJ02*	CRYSTAL RIVER
AJ03*	HOLDER
AJ04	STOKES FERRY
AJ05	LAKE PANASOFFKEE NW
AJ06*	OXFORD
AJ07	LADY LAKE
AJ08	EMERALDA ISLAND
AJ09	UMATILLA
AJ10	PAISLEY
AJ11	PINE LAKES
AJ12	ORANGE CITY
AJ13	LAKE HELEN
AJ14	LAKE ASHBY
AJ15	EDGEWATER
AJ16	ARIEL
AK01	SEAHORSE KEY
AK02*	WITHLACOOCHEE BAY

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AK03	YANKEETOWN
AK04	YANKEETOWN SE
AK05	DUNNELLON
AK06*	DUNNELLON SE
AK07*	SHADY
AK08*	BELLEVIEW
AK09	LAKE WEIR
AK10	LAKE MARY
AK11	FARLES LAKE
AK12	ALEXANDER SPRINGS
AK13	LAKE WOODRUFF
AK14	DE LAND
AK15	DAYTONA BEACH SW
AK16	SAMSULA
AK17	NEW SMYRNA BEACH
AL01	CEDAR KEY
AL02	SUMNER
AL03	WACCASASSA BAY
AL04	LEBANON STATION
AL05	TIDEWATER
AL06	ROMEO
AL07*	COTTON PLANT
AL08*	OCALA WEST
AL09*	OCALA EAST
AL10	LYNNE
AL11	HALFMOON LAKE
AL12	JUNIPER SPRINGS
AL13	ASTOR
AL14	PIERSON
AL15	LAKE DIAS
AL16	DAYTONA BEACH NW
AL17	DAYTONA BEACH
AL18	PORT ORANGE
AM01	SUWANNEE
AM02	EAST PASS
AM03	CHIEFLAND SW
AM04	OTTER CREEK
AM05	BRONSON SW
AM06	BRONSON SE
AM07	MORRISTON
AM08	FAIRFIELD
AM09*	REDDICK
AM10*	ANTHONY
AM11	FORT MCCOY
AM12	LAKE KERR
AM13	SALT SPRINGS
AM14	WELAKA SE
AM15	SEVILLE
AM16	CODYS CORNER
AM17	FAVORETTA

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AM18	ORMOND BEACH
AN01	HORSESHOE BEACH
AN02	SHIRED ISLAND
AN03	VISTA
AN04	MANATEE SPRINGS
AN05	CHIEFLAND
AN06	BRONSON
AN07	BRONSON NE
AN08*	WILLISTON
AN09*	FLEMINGTON
AN10*	MCINTOSH
AN11*	CITRA
AN12	EUREKA DAM
AN13	LAKE DELANCY
AN14	WELAKA
AN15	CRESCENT CITY
AN16	ST. JOHNS PARK
AN17	BUNNELL
AN18	FLAGLER BEACH WEST
AN19	FLAGLER BEACH EAST
AO01	CAPE ST. GEORGE
AO02	NEW INLET
AO03	STEINHATCHEE SW
AO04	STEINHATCHEE SE
AO05	CROSS CITY SW
AO06	EUGENE
AO07	SUWANNEE RIVER
AO08*	TRENTON
AO09	NEWBERRY SW
AO10	ARCHER
AO11*	ARREDONDO
AO12*	MICANOPY
AO13*	ROCHELLE
AO14	HAWTHORNE
AO15	KEUKA
AO16	RODMAN
AO17	SATSUMA
AO18	SAN MATEO
AO19	DINNER ISLAND
AO20	ESPANOLA
AO21	BEVERLY BEACH
AP01	ST. JOSEPH PENINSULA
AP02	CAPE SAN BLAS
AP03	INDIAN PASS
AP04	WEST PASS
AP05	APALACHICOLA
AP06	GOOSE ISLAND
AP07	SUGAR HILL
AP08	CROOKED POINT
AP09	STEINHATCHEE

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AP10	JENA
AP11	CROSS CITY WEST
AP12	CROSS CITY EAST
AP13	WANNEE
AP14	FOURMILE LAKE
AP15	WATERS LAKE
AP16*	NEWBERRY
AP17*	GAINESVILLE WEST
AP18*	GAINESVILLE EAST
AP19	ORANGE HEIGHT
AP20	MELROSE
AP21	PUTNAM HALL
AP22	BAYWOOD
AP23	PALATKA
AP24	HASTINGS
AP25	SPUDS
AP26	DINNER ISLAND NE
AP27	MATANZAS INLET
AQ01	ST. JOSEPH POINT
AQ02	PORT ST. JOE
AQ03	LAKE WIMICO
AQ04	JACKSON RIVER
AQ05	BEVERLY
AQ06	GREEN POINT
AQ07	CARRABELLE
AQ08	DOG ISLAND
AQ09	KEATON BEACH
AQ10	SALEM SW
AQ11	CLARA
AQ12	MALLORY SWAMP SW
AQ13	MALLORY SWAMP SE
AQ14	HATCHBEND
AQ15	BELL
AQ16	HIGH SPRINGS SW
AQ17*	HIGH SPRINGS
AQ18*	ALACHUA
AQ19	MONTEOCHA
AQ20	WALDO
AQ21	KEYSTONE HEIGHTS
AQ22	GOLD HEAD BRANCH
AQ23	RICE CREEK
AQ24	BOSTWICK
AQ25	RIVERDALE
AQ26	ELKTON
AQ27	ST. AUGUSTINE BEACH
AR01	CROOKED ISLAND
AR02	BEACON HILL
AR03	OVERSTREET
AR04	WHITE CITY
AR05	FORBES ISLAND

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AR06	FORT GADSDEN
AR07	TATES HELL SWAMP
AR08	PICKETT BAY
AR09	MCINTYRE
AR10	ST. TERESA
AR11	LIGHTHOUSE POINT
AR12	ROCK ISLANDS
AR13	OKEFENOKEE SLOUGH
AR14	WARRIOR SWAMP
AR15	SALEM
AR16	COOKS HAMMOCK
AR17	MALLORY SWAMP NW
AR18	MALLORY SWAMP NE
AR19	BRANFORD
AR20	HILDRETH
AR21	FORT WHITE
AR22*	MIKESVILLE
AR23	WORTHINGTON SPRINGS
AR24	BROOKER
AR25	SAMPSON
AR26	STARKE
AR27	KINGSLEY
AR28	PENNEY FARMS
AR29	GREEN COVE SPRINGS
AR30	PICOLATA
AR31	BAKERSVILLE
AR32	ST. AUGUSTINE
AS01	BEACON BEACH
AS02	LONG POINT
AS03	ALLANTON
AS04	WETAPPO CREEK
AS05	WEWAHITCHKA
AS06	KENNEDY CREEK
AS07	SUMATRA
AS08	OWENS BRIDGE
AS09	THOUSAND YARD BAY
AS10	SANBORN
AS11	SOPCHOPPY
AS12	SPRING CREEK
AS13	SPRAGUE ISLAND
AS14	COBB ROCKS
AS15	SNIPE ISLAND
AS16	MANLIN HAMMOCK
AS17	HAMPTON SPRINGS
AS18	PERRY
AS19	FENHOLLOWAY
AS20	DAY SE
AS21	MAYO
AS22	MAYO SE
AS23	O'BRIEN

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AS24	O'BRIEN SE
AS25	COLUMBIA
AS26*	ELLISVILLE
AS27	LULU
AS28	LAKE BUTLER
AS29	RAIFORD
AS30	LAWTEY
AS31	MIDDLEBURG SW
AS32	MIDDLEBURG
AS33	FLEMING ISLAND
AS34	ORANGEDALE
AS35	DURBIN
AS36	SOUTH PONTE VEDRA BEACH
AT01	LAGUNA BEACH
AT02	PANAMA CITY BEACH
AT03	PANAMA CITY
AT04	SPRINGFIELD
AT05	NORTH OF ALLANTON
AT06	TENMILE SWAMP
AT07	DEAD LAKE
AT08	ORANGE
AT09	WILMA
AT10	QUEENS BAY
AT11	SMITH CREEK
AT12	BRADWELL BAY
AT13	CRAWFORDVILLE WEST
AT14	CRAWFORDVILLE EAST
AT15	ST. MARKS
AT16	ST. MARKS NE
AT17	NUTALL RISE
AT18	JOHNSON HAMMOCK
AT19	SECOTAN
AT20	BOYD
AT21	DAY NW
AT22	DAY
AT23	DOWLING PARK
AT24	MAYO NE
AT25	MCALPIN
AT26	WELLBORN
AT27*	LAKE CITY WEST
AT28	LAKE CITY EAST
AT29	OLUSTEE
AT30	SANDERSON SOUTH
AT31	MANNING
AT32	MAXVILLE
AT33	FIFTONE
AT34	JACKSONVILLE HEIGHTS
AT35	ORANGE PARK
AT36	BAYARD
AT37	PALM VALLEY

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AT38	MICKLER LANDING
AU01	FOLEY
AU02	PERDIDO BAY
AU03	FORT BARRANCAS
AU04	GULF BREEZE
AU05	ORIOLE BEACH
AU06	SOUTH OF HOLLEY
AU07	MIRAMAR BEACH
AU08	GRAYTON BEACH
AU09	POINT WASHINGTON
AU10	SEMINOLE HILLS
AU11	WEST BAY
AU12	SOUTHPORT
AU13	BAYHEAD
AU14	YOUNGSTOWN
AU15	BROAD BRANCH
AU16	FRINK
AU17	ESTIFFANULGA
AU18	WOODS
AU19	TELOGIA
AU20	WARD
AU21	LAKE TALQUIN SE
AU22	HILLIARDVILLE
AU23	LAKE MUNSON
AU24	WOODVILLE
AU25	CODY
AU26	WACISSA
AU27	LAMONT SE
AU28	SHADY GROVE
AU29	GREENVILLE SE
AU30	MADISON SW
AU31	MADISON SE
AU32	FALMOUTH
AU33	LIVE OAK WEST
AU34	LIVE OAK EAST
AU35	WHITE SPRINGS WEST
AU36*	WHITE SPRINGS EAST
AU37	DEEP CREEK
AU38	BIG GUM SWAMP
AU39	SANDERSON NORTH
AU40	MACCLENNY WEST
AU41	MACCLENNY EAST
AU42	BALDWIN
AU43	MARIETTA
AU44	JACKSONVILLE
AU45	ARLINGTON
AU46	JACKSONVILLE BEACH
AV01	LILLIAN
AV02	WEST PENSACOLA
AV03	PENSACOLA

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AV04	GARCON POINT
AV05	HOLLEY
AV06	NAVARRE
AV07	MARY ESTHER
AV08	FORT WALTON BEACH
AV09	DESTIN
AV10	CHOCTAW BEACH
AV11	FREEPORT
AV12	BUNKER
AV13	BRUCE
AV14	RED HEAD
AV15	CRYSTAL LAKE
AV16	BENNETT
AV17	FOUNTAIN
AV18	JUNIPER CREEK
AV19	CLARKSVILLE
AV20	BLOUNTSTOWN
AV21	BRISTOL
AV22	HOSFORD
AV23	BLOXHAM
AV24	LAKE TALQUIN
AV25	MIDWAY
AV26*	TALLAHASSEE
AV27*	LAFAYETTE
AV28	LLOYD
AV29	WAUKEENAH
AV30	LAMONT
AV31	GREENVILLE
AV32	GREENVILLE NE
AV33	MADISON
AV34	LEE
AV35	ELLAVILLE
AV36	FORT UNION
AV37	HILLCOAT
AV38	GENOA
AV39	BENTON
AV40	FAIRVIEW
AV41	SANDERSON NW
AV42	TAYLOR
AV43	MACCLENNY NW
AV44	MACCLENNY NE
AV45	BRYCEVILLE
AV46	DINSMORE
AV47	TROUT RIVER
AV48	EASTPORT
AV49	MAYPORT
AW01	SEMINOLE
AW02	CANTONMENT
AW03	PACE
AW04	MILTON SOUTH

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AW05	WARD BASIN
AW06	HAROLD SE
AW07	HOLT SW
AW08	VALPARAISO
AW09	NICEVILLE
AW10	NICEVILLE SE
AW11	PORTLAND
AW12	ROCK HILL
AW13	REDBAY
AW14	MILLERS FERRY
AW15	VERNON
AW16	GAP LAKE
AW17	COMPASS LAKE
AW18	ALFORD SE
AW19	ALTHA WEST
AW20	ALTHA EAST
AW21	ROCK BLUFF
AW22	SYCAMORE
AW23	GRETNA
AW24	QUINCY
AW25	HAVANA SOUTH
AW26	LAKE JACKSON
AW27	BRADFORDVILLE
AW28	MICCOSUKEE
AW29	LAKE MICCOSUKEE
AW30	MONTICELLO
AW31	ASHVILLE
AW32	HAMBURG
AW33	CHERRY LAKE
AW34	PINETTA
AW35	OCTAHATCHEE
AW36	JENNINGS
AW37	JASPER
AW38	CYPRESS CREEK
AW39	FARGO SW
AW40	COUNCIL
AW41	SARGENT
AW42	EDDY
AW43	MONIAC
AW44	ST. GEORGE
AW45	HILLIARD SW
AW46	CALLAHAN
AW47	ITALIA
AW48	HEDGES
AW49	AMELIA CITY
AX01	GATESWOOD
AX02	BARRINEAU PARK
AX03	MOLINO
AX04	WALLACE
AX05	MILTON NORTH

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AX06	HAROLD
AX07	FLORIDALE
AX08	HOLT
AX09	CRESTVIEW SOUTH
AX10	SPENCER FLATS
AX11	MOSSY HEAD
AX12	DE FUNIAK SPRINGS WEST
AX13	DE FUNIAK SPRINGS EAST
AX14	PONCE DE LEON
AX15	HINSONS CROSSROADS
AX16	POPLAR HEAD
AX17	WAUSAU
AX18	ALFORD
AX19	KYNESVILLE
AX20	OAKDALE
AX21	CYPRESS
AX22	SNEADS
AX23	CHATTAHOOCHEE
AX24	MT. PLEASANT
AX25	DOGTOWN
AX26	HAVANA NORTH
AX27*	CALVARY
AX28	BEACHTON
AX29	MICCOSUKEE NE
AX30	METCALF
AX31	MONTICELLO NE
AX32	GROOVERVILLE
AX33	BADEN
AX34	NANKIN
AX35	CLYATTVILLE
AX36	LAKE PARK
AX37	TOLEDO
AX38	HILLIARD
AX39	HILLIARD NE
AX40	GROSS
AX41	ST. MARYS
AX42	FERNANDINA BEACH
AY01	ENON
AY02	BAY SPRINGS
AY03	MCDAVID
AY04	CHUMUCKLA
AY05	ALLENTOWN
AY06	SPRING HILL
AY07	MUNSON
AY08	BAKER
AY09	CRESTVIEW NORTH
AY10	DORCAS
AY11	NEW HARMONY
AY12	LIBERTY
AY13	GLENDALE

* Quadrangle to which the rule should be applied.

QUAD ID	QUAD NAME
AY14	PROSPERITY
AY15	CARYVILLE
AY16	BONIFAY
AY17	CHIPLEY
AY18	COTTONDALE WEST
AY19	COTTONDALE EAST
AY20	MARIANNA
AY21	DELLWOOD
AY22	FAIRCHILD
AY23	FOLKSTON
AY24	BOULOGNE
AY25	KINGS FERRY
AY26	KINGSLAND
AZ01	DYAS
AZ02	WALNUT HILL
AZ03	BRATT
AZ04	CENTURY
AZ05	JAY
AZ06	FIDELIS
AZ07	MC LELLAN
AZ08	HURRICANE LAKE
AZ09	BLACKMAN
AZ10	OAK GROVE
AZ11	LAUREL HILL
AZ12	PAXTON
AZ13	GASKIN
AZ14	DARLINGTON
AZ15	HOBBS CROSSROADS
AZ16	IZAGORA
AZ17	ESTO
AZ18	GRACEVILLE
AZ19	CAMPBELLTON
AZ20	SILLS
AZ21	MALONE
AZ22	BASCOM
AZ23	STEAM MILL

* Quadrangle to which the rule should be applied.

Appendix C

RADON RESULTS FROM LAND-BASED SURVEY

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
ALACHUA	AN08	32618	.9	101.6
ALACHUA	AO09	32669	.2	176.2
ALACHUA	AO09	32669	2.7	545.4
ALACHUA	AO10	32618	.	62.1
ALACHUA	AO10	32618	.2	172.2
ALACHUA	AO10	32618	.6	80.5
ALACHUA	AO10	32618	.7	30.9
ALACHUA	AO10	32618	.7	134.3
ALACHUA	AO10	32618	.8	49.8
ALACHUA	AO10	32618	1.1	17.0
ALACHUA	AO10	32618	1.7	.
ALACHUA	AO10	32618	1.9	150.7
ALACHUA	AO10	32618	2.1	69.6
ALACHUA	AO10	32618	3.0	97.0
ALACHUA	AO11	32608	.8	147.8
ALACHUA	AO11	32608	1.2	120.1
ALACHUA	AO11	32608	1.4	223.8
ALACHUA	AO11	32608	1.5	268.1
ALACHUA	AO11	32608	1.7	.
ALACHUA	AO11	32608	2.0	507.6
ALACHUA	AO11	32618	2.2	.
ALACHUA	AO11	32608	2.6	.
ALACHUA	AO11	32608	3.0	1146.2
ALACHUA	AO12	32667	.2	.
ALACHUA	AO12	32667	.5	8.9
ALACHUA	AO12	32610	.5	.
ALACHUA	AO12	32667	.6	133.0
ALACHUA	AO12	32667	.6	85.0
ALACHUA	AO12	32667	1.2	0.0
ALACHUA	AO12	32667	1.3	28.0
ALACHUA	AO12	32667	1.7	302.5
ALACHUA	AO12	32667	1.8	440.4
ALACHUA	AO12	32601	2.0	226.6
ALACHUA	AO12	32601	2.3	441.5
ALACHUA	AO12	32608	5.0	102.1
ALACHUA	AO13	32667	.2	7.3
ALACHUA	AO13	32640	17.9	434.7
ALACHUA	AO14	32640	.	117.5
ALACHUA	AO14	32640	.2	13.6
ALACHUA	AO14	32640	.2	.
ALACHUA	AO14	32662	.4	33.9
ALACHUA	AO14	32640	.6	24.3
ALACHUA	AP16	32669	.	336.1
ALACHUA	AP16	32669	1.2	282.8
ALACHUA	AP16	32669	1.3	.
ALACHUA	AP16	32669	1.3	162.4
ALACHUA	AP16	32669	1.9	1028.6
ALACHUA	AP16	32669	2.2	103.3
ALACHUA	AP16	32669	2.5	317.0
ALACHUA	AP16	32669	3.9	.

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
ALACHUA	AP16	32615	8.8	.
ALACHUA	AP16	32669	9.6	418.9
ALACHUA	AP16	32669	9.9	534.4
ALACHUA	AP17	32607	.	248.4
ALACHUA	AP17	32605	.2	39.9
ALACHUA	AP17	32606	.7	156.2
ALACHUA	AP17	32607	1.0	248.0
ALACHUA	AP17	32606	1.0	673.6
ALACHUA	AP17	32606	1.1	.
ALACHUA	AP17	32606	1.3	470.3
ALACHUA	AP17	32601	1.6	152.3
ALACHUA	AP17	32605	1.7	418.1
ALACHUA	AP17	32607	2.8	169.2
ALACHUA	AP17	32601	3.3	618.6
ALACHUA	AP17	32607	28.0	786.9
ALACHUA	AP18	32605	.2	33.9
ALACHUA	AP18	.	.2	123.5
ALACHUA	AP18	32605	.2	68.6
ALACHUA	AP18	32609	.9	326.3
ALACHUA	AP18	32605	1.0	161.2
ALACHUA	AP18	32605	1.3	250.8
ALACHUA	AP18	32605	4.0	2439.5
ALACHUA	AP18	32607	4.4	132.3
ALACHUA	AP18	32605	5.5	2599.7
ALACHUA	AP18	32605	6.3	1583.1
ALACHUA	AP18	32605	7.1	1059.0
ALACHUA	AP19	32601	.	36.5
ALACHUA	AP19	32640	.2	.
ALACHUA	AP19	32601	.2	24.6
ALACHUA	AP19	32601	.2	26.8
ALACHUA	AP19	32601	1.2	66.4
ALACHUA	AP19	32601	1.4	49.3
ALACHUA	AP20	32666	.2	15.3
ALACHUA	AP20	32666	.2	10.5
ALACHUA	AP20	32631	1.4	78.8
ALACHUA	AQ17	32643	.	62.4
ALACHUA	AQ17	32643	.2	110.7
ALACHUA	AQ17	32643	.8	77.9
ALACHUA	AQ17	32643	1.3	67.4
ALACHUA	AQ17	32643	1.6	162.0
ALACHUA	AQ17	32615	1.6	.
ALACHUA	AQ17	32643	2.4	.
ALACHUA	AQ17	32615	2.9	244.0
ALACHUA	AQ17	32615	3.7	1996.4
ALACHUA	AQ17	32615	12.0	1601.6
ALACHUA	AQ17	32615	13.1	5474.9
ALACHUA	AQ17	32615	29.5	1846.9
ALACHUA	AQ18	32615	2.4	624.4
ALACHUA	AQ18	32615	3.2	1380.0
ALACHUA	AQ18	32615	3.5	2195.6

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
ALACHUA	AQ18	32615	3.6	1520.5
ALACHUA	AQ18	32615	4.6	.
ALACHUA	AQ18	32615	6.1	.
ALACHUA	AQ18	32615	18.2	1940.4
ALACHUA	AQ18	32615	22.9	3561.3
ALACHUA	AQ19	32605	.2	.
ALACHUA	AQ19	32609	.5	14.5
ALACHUA	AQ19	32609	.7	185.0
ALACHUA	AQ19	32609	.7	11.5
ALACHUA	AQ19	32609	1.3	22.5
ALACHUA	AQ19	32609	1.6	95.0
ALACHUA	AQ19	32609	2.0	63.2
ALACHUA	AQ20	32694	.	89.5
ALACHUA	AQ20	32694	.6	10.0
ALACHUA	AR22	32615	25.3	200.1
ALACHUA	AR23	32615	.8	171.0
BAKER	AT29	32072	.2	7.2
BAKER	AT29	32072	.4	.
BAKER	AT29	32072	.8	22.0
BAKER	AT30	32087	.2	54.2
BAKER	AT30	32087	.4	.
BAKER	AT31	32063	.5	107.4
BAKER	AT31	32063	1.2	.
BAKER	AU39	32087	.2	53.0
BAKER	AU39	32087	.2	24.3
BAKER	AU39	32087	.2	10.2
BAKER	AU40	32063	.2	18.8
BAKER	AU40	32063	.2	11.6
BAKER	AU40	32063	.2	37.4
BAKER	AU40	32063	.4	.
BAKER	AU41	32063	.	81.8
BAKER	AU41	32063	.2	66.5
BAKER	AU41	32063	.2	100.5
BAKER	AU41	32063	.2	20.5
BAKER	AU41	32063	.5	.
BAKER	AV42	32087	.2	26.2
BAKER	AV43	32087	.2	61.9
BAY	AE07	33809	.7	137.8
BAY	AR02	32410	.	16.0
BAY	AR02	32456	.2	117.9
BAY	AR02	32410	.2	358.5
BAY	AR02	32410	.2	38.3
BAY	AS02	32404	.2	20.2
BAY	AT01	32407	.2	.
BAY	AT01	32407	.2	20.3
BAY	AT01	32407	.2	15.5
BAY	AT01	32407	.2	27.3
BAY	AT02	32407	.2	22.5
BAY	AT02	32407	.2	41.6
BAY	AT02	32407	.2	6.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
BAY	AT02	32407	.2	18.7
BAY	AT02	32407	.2	21.0
BAY	AT03	32405	.2	63.2
BAY	AT03	32405	.2	31.7
BAY	AT03	32405	.2	17.4
BAY	AT03	32405	.2	13.0
BAY	AT03	32405	.4	9.3
BAY	AT03	32405	.5	16.7
BAY	AT04	32404	.	38.0
BAY	AT04	32404	.2	10.2
BAY	AT04	32404	.2	28.0
BAY	AT04	32404	.2	77.8
BAY	AT04	32404	.2	25.4
BAY	AT04	32404	.4	34.8
BAY	AT04	32404	.8	58.3
BAY	AU10	32407	.	23.8
BAY	AU10	32461	.2	.
BAY	AU10	32461	.5	18.2
BAY	AU10	32407	.5	18.2
BAY	AU11	32407	.6	.
BAY	AU12	32409	.2	0.0
BAY	AU12	32409	.2	0.0
BAY	AU13	32404	.	0.0
BAY	AU13	32466	.2	46.5
BAY	AU13	32466	.2	39.2
BAY	AU13	32466	.4	0.0
BAY	AU13	32404	.6	0.0
BAY	AU13	32404	.8	0.0
BAY	AU14	32466	.2	.
BAY	AU14	32466	.2	.
BAY	AU14	32466	1.1	128.9
BAY	AV15	32444	.6	17.5
BAY	AV17	32402	.	117.7
BRADFORD	AQ20	32044	.2	.
BRADFORD	AQ20	32042	.2	149.8
BRADFORD	AQ20	32044	.2	42.7
BRADFORD	AQ20	32044	.2	16.2
BRADFORD	AQ20	32044	.6	152.4
BRADFORD	AQ20	32044	.7	84.4
BRADFORD	AQ20	32044	1.3	39.5
BRADFORD	AQ21	32656	.2	72.4
BRADFORD	AQ21	32656	.2	38.7
BRADFORD	AQ21	32656	.4	32.6
BRADFORD	AR24	32622	.8	56.0
BRADFORD	AR25	32091	.2	5.1
BRADFORD	AR25	32091	.2	29.8
BRADFORD	AR25	32091	.4	14.6
BRADFORD	AR25	32091	1.4	37.4
BRADFORD	AR26	32091	.	98.8
BRADFORD	AR26	32091	.2	86.0

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
BRADFORD	AR26	32091	.2	16.7
BRADFORD	AR26	32091	.2	49.9
BRADFORD	AR26	32091	.2	67.4
BRADFORD	AS29	32091	.2	27.4
BRADFORD	AS29	32091	.4	28.0
BRADFORD	AS30	32058	.	147.3
BRADFORD	AS30	32058	.2	39.5
BRADFORD	AS30	32058	.2	.
BREVARD	AA20	32958	.4	13.2
BREVARD	AB18	32909	.2	.
BREVARD	AB18	32908	.2	94.6
BREVARD	AB18	32909	.4	9.0
BREVARD	AB18	32907	.6	38.9
BREVARD	AB18	32909	1.1	97.8
BREVARD	AB19	32909	.2	87.7
BREVARD	AB19	32905	.2	21.5
BREVARD	AB19	32909	.2	51.2
BREVARD	AB19	32951	.4	16.2
BREVARD	AB19	32951	.4	45.4
BREVARD	AB19	32905	.6	.
BREVARD	AB20	32951	.2	76.1
BREVARD	AB20	32951	.2	34.4
BREVARD	AB20	32951	.2	149.0
BREVARD	AB20	32951	.2	136.0
BREVARD	AB20	32951	.4	18.3
BREVARD	AB20	32951	.5	31.9
BREVARD	AC18	32907	.2	.
BREVARD	AC18	32901	.2	16.2
BREVARD	AC18	32907	.7	.
BREVARD	AC18	32907	.8	20.0
BREVARD	AC18	32907	.9	37.5
BREVARD	AC18	32901	3.2	235.5
BREVARD	AC19	32901	.2	15.5
BREVARD	AC19	32901	.2	6.3
BREVARD	AC19	32901	.2	22.2
BREVARD	AC19	32951	.2	44.0
BREVARD	AC19	32951	.5	28.3
BREVARD	AC19	32905	.6	18.2
BREVARD	AD18	32952	.2	51.2
BREVARD	AD18	32935	.4	40.1
BREVARD	AD18	32935	.5	.
BREVARD	AD18	32952	.8	69.5
BREVARD	AD18	32952	.8	124.4
BREVARD	AD19	32937	.6	57.1
BREVARD	AD19	32937	.7	44.6
BREVARD	AD19	32937	.7	22.1
BREVARD	AE16	32926	.2	8.5
BREVARD	AE16	32926	.2	50.0
BREVARD	AE16	32926	.6	103.5
BREVARD	AE16	32926	.8	10.1

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
BREVARD	AE16	32926	.9	50.0
BREVARD	AE16	32926	1.0	50.0
BREVARD	AE17	32952	.2	41.5
BREVARD	AE17	32952	.2	23.3
BREVARD	AE17	32952	.2	48.9
BREVARD	AE17	32922	.4	25.8
BREVARD	AE17	32952	.4	10.5
BREVARD	AE17	32955	.5	19.3
BREVARD	AE18	32931	.2	28.4
BREVARD	AE18	32931	.2	.8
BREVARD	AE18	32931	.2	29.4
BREVARD	AE18	32931	.4	33.2
BREVARD	AE18	32931	.4	34.1
BREVARD	AE18	32931	.5	11.3
BREVARD	AF16	32927	.2	.
BREVARD	AF16	32959	.4	64.8
BREVARD	AF16	32927	.5	15.5
BREVARD	AF16	32926	.5	80.5
BREVARD	AF16	32927	.7	16.8
BREVARD	AF16	32922	1.4	34.2
BREVARD	AF17	32953	.2	76.1
BREVARD	AF17	32953	.4	10.8
BREVARD	AF17	32953	.4	17.1
BREVARD	AF17	32953	.4	110.7
BREVARD	AF17	32953	.9	51.0
BREVARD	AF17	32952	1.4	44.0
BREVARD	AF18	32920	.2	29.3
BREVARD	AF18	32920	.2	28.5
BREVARD	AF18	32920	.2	26.7
BREVARD	AF18	32920	.2	11.1
BREVARD	AF18	32931	.2	64.0
BREVARD	AF18	32920	.2	28.4
BREVARD	AG16	32796	.5	8.9
BREVARD	AG16	32780	.6	12.8
BREVARD	AG16	32780	.6	15.5
BREVARD	AG16	32796	.6	14.7
BREVARD	AG16	32780	1.2	24.1
BREVARD	AH16	32754	.	28.6
BREVARD	AH16	32754	.2	68.3
BREVARD	AH16	32796	.2	59.6
BREVARD	AH16	32796	.2	129.7
BREVARD	AH16	32754	.9	33.2
BREVARD	AI16	32775	.2	22.6
BREVARD	AI16	32775	.5	15.5
BROWARD	L13	33023	.2	.
BROWARD	M13	33026	.2	22.0
BROWARD	M13	33026	.6	62.1
BROWARD	M13	33330	.7	67.9
BROWARD	M13	33325	1.2	80.5
BROWARD	M13	33331	1.7	107.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
BROWARD	M13	33331	1.8	46.6
BROWARD	M14	33021	.2	52.8
BROWARD	M14	33024	.2	112.4
BROWARD	M14	33317	.2	54.4
BROWARD	M14	33314	.2	100.4
BROWARD	M14	33315	.8	144.4
BROWARD	M15	33301	.2	37.4
BROWARD	M15	33301	.7	4.9
BROWARD	N13	33071	.2	61.2
BROWARD	N13	33071	.2	90.9
BROWARD	N13	33321	.6	187.2
BROWARD	N13	33321	.7	32.8
BROWARD	N13	33322	.8	136.0
BROWARD	N13	33321	1.6	156.9
BROWARD	N14	33317	.2	116.1
BROWARD	N14	33319	.2	.
BROWARD	N14	33309	.2	40.6
BROWARD	N14	33309	.2	203.2
BROWARD	N14	33066	.6	64.8
BROWARD	N14	33309	.6	57.9
BROWARD	N15	33060	.2	47.7
BROWARD	N15	33060	.2	86.5
BROWARD	N15	33308	.2	66.6
BROWARD	N15	33062	.2	10.6
BROWARD	N15	33305	.2	28.4
BROWARD	N15	33308	.5	84.5
BROWARD	O13	33065	.2	223.6
BROWARD	O13	33065	.2	53.6
BROWARD	O13	33065	.2	.
BROWARD	O13	33065	.6	78.2
BROWARD	O13	33065	.6	134.2
BROWARD	O13	33065	1.1	136.8
BROWARD	O14	33442	.2	7.6
BROWARD	O15	33064	.2	31.9
BROWARD	O15	33441	.2	23.9
BROWARD	O15	33441	.7	36.2
BROWARD	O15	33064	.7	28.7
CALHOUN	AV19	32421	.	266.9
CALHOUN	AV19	32424	.2	.
CALHOUN	AV19	32421	.4	147.7
CALHOUN	AV19	32421	.4	68.7
CALHOUN	AV19	32430	.6	425.9
CALHOUN	AV20	32424	.2	23.6
CALHOUN	AV20	32424	.2	266.2
CALHOUN	AV20	32424	.2	40.8
CALHOUN	AW18	32421	.2	0.0
CALHOUN	AW19	32421	.	224.1
CALHOUN	AW19	32421	.2	161.8
CALHOUN	AW19	32421	.2	92.2
CALHOUN	AW19	32421	.2	134.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
CALHOUN	AW19	32421	.9	273.9
CHARLOTTE	S01	33533	.2	.
CHARLOTTE	S01	33946	.2	63.0
CHARLOTTE	S01	33946	.2	5.2
CHARLOTTE	S01	33946	.2	55.0
CHARLOTTE	S01	33946	.4	.
CHARLOTTE	S01	33946	.4	133.5
CHARLOTTE	S01	33946	.6	87.8
CHARLOTTE	S01	33946	1.3	433.4
CHARLOTTE	S01	33946	1.9	82.0
CHARLOTTE	S03	33955	.2	15.6
CHARLOTTE	S03	33955	.4	16.8
CHARLOTTE	S03	33955	.7	.
CHARLOTTE	S03	33955	.7	93.6
CHARLOTTE	S03	33955	.7	28.8
CHARLOTTE	S03	33955	.8	216.1
CHARLOTTE	S03	33955	1.1	.
CHARLOTTE	S03	33951	1.1	321.8
CHARLOTTE	S03	33955	1.4	.
CHARLOTTE	S03	33909	1.4	.
CHARLOTTE	S03	33955	1.7	280.9
CHARLOTTE	S03	33955	4.3	.
CHARLOTTE	S04	33955	.	110.4
CHARLOTTE	S04	33955	.2	65.7
CHARLOTTE	S04	33951	.2	.
CHARLOTTE	S04	33955	.2	71.0
CHARLOTTE	S04	33955	.2	60.2
CHARLOTTE	S04	33955	1.2	388.2
CHARLOTTE	T02	33533	.	96.6
CHARLOTTE	T02	33947	.2	5.1
CHARLOTTE	T02	33533	.2	42.5
CHARLOTTE	T02	33533	.2	44.2
CHARLOTTE	T02	33533	.2	192.5
CHARLOTTE	T02	33533	.2	125.7
CHARLOTTE	T02	33533	1.7	247.0
CHARLOTTE	T03	33533	.2	122.3
CHARLOTTE	T03	33533	.2	10.1
CHARLOTTE	T03	33953	.2	755.9
CHARLOTTE	T03	33948	.5	81.8
CHARLOTTE	T03	33953	.8	6.5
CHARLOTTE	T03	33953	1.0	24.2
CHARLOTTE	T03	33948	1.1	24.2
CHARLOTTE	T03	33948	1.2	67.8
CHARLOTTE	T03	33953	1.5	79.8
CHARLOTTE	T03	33948	1.9	27.9
CHARLOTTE	T04	33952	.	108.3
CHARLOTTE	T04	33950	.	70.2
CHARLOTTE	T04	33951	.	48.6
CHARLOTTE	T04	33950	.	68.9
CHARLOTTE	T04	33950	.2	35.6

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
CHARLOTTE	T04	33950	.2	23.6
CHARLOTTE	T04	33950	.2	61.7
CHARLOTTE	T04	33950	.6	321.3
CHARLOTTE	T04	33948	.7	239.9
CHARLOTTE	T04	33950	.7	79.9
CHARLOTTE	T04	33952	1.8	673.0
CHARLOTTE	T04	33952	3.1	367.5
CHARLOTTE	T05	33950	.2	340.8
CHARLOTTE	T05	33950	.2	.
CHARLOTTE	T05	33950	.2	120.5
CHARLOTTE	T05	33950	.7	55.8
CHARLOTTE	T05	33950	.7	3.4
CHARLOTTE	T05	33950	.9	19.8
CHARLOTTE	T05	33950	1.0	107.4
CHARLOTTE	T05	33950	1.0	148.8
CHARLOTTE	T05	33950	1.0	188.0
CHARLOTTE	T05	33950	2.9	.
CHARLOTTE	T06	33950	2.4	253.5
CHARLOTTE	U03	33952	.6	663.6
CHARLOTTE	U03	33953	1.0	143.6
CHARLOTTE	U03	33948	2.1	320.9
CHARLOTTE	U03	33948	2.3	353.5
CHARLOTTE	U03	33953	2.5	532.4
CHARLOTTE	U03	33954	3.9	240.9
CHARLOTTE	U03	33953	4.2	380.6
CHARLOTTE	U04	33954	.9	36.3
CHARLOTTE	U04	33952	1.1	150.5
CHARLOTTE	U04	33954	1.1	108.0
CHARLOTTE	U04	33952	1.3	255.2
CHARLOTTE	U04	33954	1.8	370.7
CHARLOTTE	U04	33954	1.9	141.5
CHARLOTTE	U04	33954	2.0	293.7
CHARLOTTE	U04	33952	5.3	0.0
CHARLOTTE	U05	33950	.	4.8
CHARLOTTE	U05	33950	.2	.
CHARLOTTE	U05	33950	.2	179.8
CHARLOTTE	U05	33950	.2	.
CHARLOTTE	U05	33950	.4	69.9
CHARLOTTE	U05	33950	.9	207.2
CHARLOTTE	U06	33950	.2	.
CITRUS	AH02	32646	.2	319.8
CITRUS	AH02	32646	.2	131.5
CITRUS	AH02	32646	.2	65.6
CITRUS	AH02	32646	.4	40.5
CITRUS	AH02	32646	.5	48.7
CITRUS	AH02	32646	.6	56.5
CITRUS	AH02	32646	.8	33.3
CITRUS	AH02	32646	.9	39.1
CITRUS	AH02	32646	1.1	85.0
CITRUS	AH02	32646	1.3	1.7

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
CITRUS	AH03	32646	.7	88.9
CITRUS	AH03	32646	.8	302.1
CITRUS	AH03	32636	.8	26.3
CITRUS	AH03	32652	2.7	.
CITRUS	AH04	32636	.4	55.6
CITRUS	AH04	32636	.6	262.2
CITRUS	AH04	32652	1.0	34.6
CITRUS	AH04	32636	1.6	.
CITRUS	AH04	32636	2.1	243.9
CITRUS	AH04	32636	3.3	309.2
CITRUS	AI01	32629	.2	311.1
CITRUS	AI01	32646	.5	477.2
CITRUS	AI01	32629	.5	130.5
CITRUS	AI01	32646	.7	.
CITRUS	AI01	32647	1.3	61.0
CITRUS	AI01	32629	1.4	222.0
CITRUS	AI02	32647	.2	101.0
CITRUS	AI02	32646	.2	257.2
CITRUS	AI02	32646	.2	.
CITRUS	AI02	32647	.4	40.9
CITRUS	AI02	32629	.4	83.2
CITRUS	AI02	32647	.5	43.3
CITRUS	AI02	32629	.6	63.9
CITRUS	AI02	32646	.6	.
CITRUS	AI02	32646	.6	48.1
CITRUS	AI02	32647	1.0	58.4
CITRUS	AI03	32661	.6	22.6
CITRUS	AI03	32647	.7	183.6
CITRUS	AI03	32646	.8	60.1
CITRUS	AI03	32661	.8	.
CITRUS	AI03	32642	1.4	158.0
CITRUS	AI03	32661	1.5	116.8
CITRUS	AI03	32661	2.1	485.5
CITRUS	AI04	32650	.2	136.5
CITRUS	AI04	32650	.2	.
CITRUS	AI04	32636	.2	131.8
CITRUS	AI04	32650	.7	90.8
CITRUS	AI04	32650	.9	37.0
CITRUS	AI04	32636	1.1	176.7
CITRUS	AI04	32636	1.1	37.7
CITRUS	AI04	32650	1.5	195.0
CITRUS	AI04	33652	2.1	0.0
CITRUS	AI04	32650	2.1	568.3
CITRUS	AI04	33652	3.4	1505.2
CITRUS	AI04	32650	3.8	301.6
CITRUS	AI05	32650	.2	177.5
CITRUS	AI05	33785	.8	59.0
CITRUS	AJ01	32629	.5	85.6
CITRUS	AJ02	32629	.4	.
CITRUS	AJ02	32629	.7	33.8

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
CITRUS	AJ02	32629	.7	0.0
CITRUS	AJ02	32629	.9	1026.4
CITRUS	AJ02	32629	1.0	10.1
CITRUS	AJ02	32629	1.1	158.5
CITRUS	AJ02	32629	1.2	136.2
CITRUS	AJ02	32629	1.5	.
CITRUS	AJ02	32629	1.5	.
CITRUS	AJ03	32642	.4	85.7
CITRUS	AJ03	32661	.4	.
CITRUS	AJ03	32642	.5	194.8
CITRUS	AJ03	32629	.5	66.7
CITRUS	AJ03	32661	.5	68.1
CITRUS	AJ03	32642	.6	68.6
CITRUS	AJ03	32642	8.5	293.6
CITRUS	AJ04	32651	.	150.6
CITRUS	AJ04	32642	.2	51.0
CITRUS	AJ04	32642	.8	25.3
CITRUS	AJ04	32630	1.0	87.4
CITRUS	AJ04	32650	1.2	.
CITRUS	AJ04	32642	2.8	.
CITRUS	AK05	32630	1.3	36.5
CITRUS	AK05	32630	2.9	65.6
CLAY	AQ21	32656	.6	83.2
CLAY	AQ21	32656	.6	35.1
CLAY	AR26	32091	1.1	96.4
CLAY	AR28	32079	.2	8.5
CLAY	AR28	32079	.2	.
CLAY	AR28	32043	.2	90.3
CLAY	AR28	32043	.4	48.2
CLAY	AR28	32043	.7	.
CLAY	AR28	32043	1.6	28.9
CLAY	AR29	32043	.	59.8
CLAY	AR29	32043	.2	10.2
CLAY	AR29	32043	.2	63.6
CLAY	AR29	32043	.2	19.8
CLAY	AR29	32043	.6	26.7
CLAY	AR29	32043	.7	19.0
CLAY	AS32	32068	.4	38.4
CLAY	AS32	32068	.7	14.5
CLAY	AS32	32068	2.3	189.4
CLAY	AS33	32043	.2	27.9
CLAY	AS33	32043	.2	34.9
CLAY	AS33	32043	.2	114.9
CLAY	AS33	32043	.2	10.1
CLAY	AS33	32043	.2	57.4
CLAY	AS33	32043	.4	45.5
CLAY	AT34	32073	.2	6.6
CLAY	AT34	32073	.4	10.6
CLAY	AT34	32068	.7	17.1
CLAY	AT35	32073	.2	50.9

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
CLAY	AT35	32073	.9	94.8
COLLIER	K03	33929	.2	67.7
COLLIER	K03	33929	.2	78.8
COLLIER	K03	33929	.2	94.3
COLLIER	K03	33929	.2	95.2
COLLIER	K03	33929	.2	.
COLLIER	L01	33962	.2	59.6
COLLIER	L01	33962	.2	173.7
COLLIER	L01	33937	.4	5.3
COLLIER	L01	33937	.8	23.3
COLLIER	L01	33937	.8	113.7
COLLIER	L01	33937	1.2	82.0
COLLIER	M01	33962	.2	.
COLLIER	M01	33962	.9	64.0
COLLIER	M01	33963	1.0	54.5
COLLIER	M01	33962	1.1	44.3
COLLIER	M02	33962	.2	5.5
COLLIER	M02	33962	.5	37.6
COLLIER	M02	33962	.8	174.6
COLLIER	N01	33940	.2	12.1
COLLIER	N01	33962	.2	.
COLLIER	N01	33940	.2	25.8
COLLIER	N01	33940	.4	5.3
COLLIER	N01	33940	.5	61.9
COLLIER	N01	33940	.5	27.3
COLLIER	N01	33940	.7	1.9
COLLIER	N01	33963	.9	34.1
COLLIER	N01	33940	.9	41.0
COLLIER	N02	33999	.2	.
COLLIER	N02	33999	.5	220.3
COLLIER	N02	33999	.9	37.5
COLLIER	N02	33999	1.2	188.0
COLLIER	N02	33999	1.6	184.5
COLLIER	N02	33999	3.1	95.9
COLLIER	O01	33942	.2	6.5
COLLIER	O01	33963	1.1	29.3
COLLIER	O02	33999	1.0	91.8
COLLIER	O03	33964	.8	7.9
COLLIER	O03	33964	1.1	.
COLLIER	P07	33934	.2	20.9
COLLIER	P07	33934	.5	61.2
COLLIER	P07	33934	1.1	.
COLLIER	P07	33934	1.6	186.0
COLLIER	P07	33934	2.3	.
COLUMBIA	AR20	32055	.6	.
COLUMBIA	AS26	32055	.2	197.4
COLUMBIA	AS26	32055	3.3	1037.1
COLUMBIA	AS26	32055	4.2	105.9
COLUMBIA	AT26	32056	.	77.0
COLUMBIA	AT27	32055	1.4	49.9

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
COLUMBIA	AT27	32055	1.4	61.7
COLUMBIA	AT27	32055	1.9	80.5
COLUMBIA	AT27	32055	11.6	4401.8
COLUMBIA	AT28	32055	.	10.2
COLUMBIA	AT28	32055	.2	89.5
COLUMBIA	AT28	32055	.4	35.2
COLUMBIA	AT28	32055	.4	22.8
COLUMBIA	AT28	32055	.4	18.2
COLUMBIA	AT28	32055	1.0	39.9
COLUMBIA	AU36	32096	.2	28.6
COLUMBIA	AU36	32096	.2	23.4
COLUMBIA	AU36	32055	1.3	.
COLUMBIA	AU36	32096	3.1	2598.0
COLUMBIA	AU36	32055	11.7	1248.7
COLUMBIA	AU37	32056	1.0	.
COLUMBIA	AV39	32096	.2	213.6
DADE	H06	33030	.	140.7
DADE	H06	33030	1.5	110.8
DADE	H06	33030	1.5	108.9
DADE	H06	33030	4.0	152.4
DADE	H06	33030	4.7	121.2
DADE	H07	33030	.2	59.1
DADE	H07	33030	.2	134.3
DADE	H07	33030	.2	35.9
DADE	H07	33030	.4	1205.5
DADE	H07	33030	.6	86.3
DADE	I08	33157	1.1	203.6
DADE	I08	33177	1.5	.
DADE	I08	33177	2.7	96.4
DADE	I08	33177	3.9	470.0
DADE	I09	33032	.2	163.3
DADE	I09	33157	.8	33.6
DADE	I09	33157	1.1	428.8
DADE	I09	33032	1.2	252.1
DADE	I09	33032	1.8	208.6
DADE	J08	33186	.6	74.8
DADE	J08	33183	.7	7.6
DADE	J08	33183	1.0	17.1
DADE	J08	33186	1.4	206.8
DADE	J08	33186	1.8	91.2
DADE	J09	33165	.2	139.4
DADE	J09	33156	.2	162.0
DADE	J09	33165	.4	65.1
DADE	J09	33156	1.1	.
DADE	J09	33143	1.4	409.5
DADE	J09	33176	2.2	86.5
DADE	J10	33149	.2	10.6
DADE	K11	33174	.	227.7
DADE	K11	33184	.2	143.8
DADE	K11	33184	.4	.

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
DADE	K11	33184	.5	149.5
DADE	K11	33172	1.1	260.5
DADE	K11	33184	1.4	.
DADE	K12	33166	.2	59.6
DADE	K12	33013	.2	46.7
DADE	K12	33134	.2	176.7
DADE	K12	33166	.4	20.8
DADE	K12	33013	.4	207.7
DADE	K12	33134	1.3	172.8
DADE	K13	33141	.2	29.3
DADE	K13	33145	.2	193.9
DADE	K13	33140	.6	24.9
DADE	K13	33138	.8	25.8
DADE	L12	33014	.	44.6
DADE	L12	33015	.4	51.3
DADE	L12	33016	.4	40.5
DADE	L12	33012	.4	82.9
DADE	L12	33014	.4	98.9
DADE	L12	33015	1.3	186.5
DADE	L13	33179	.4	313.2
DADE	L13	33169	.6	31.9
DADE	L13	33169	1.2	72.6
DADE	L13	33179	1.5	128.3
DADE	L13	33169	3.9	35.6
DESOTO	U04	33864	1.5	16.0
DESOTO	U04	33952	3.0	86.2
DESOTO	U05	33821	.2	.
DESOTO	U05	33842	.2	23.8
DESOTO	U05	33821	2.9	122.3
DESOTO	U06	33864	.	318.1
DESOTO	U06	33821	.2	15.5
DESOTO	U06	33821	1.1	29.4
DESOTO	V06	33864	.2	178.5
DESOTO	V06	33864	.2	77.3
DESOTO	V06	33864	.2	.
DESOTO	V06	33864	.5	46.4
DESOTO	V07	33821	.	71.5
DESOTO	V07	33821	.2	19.0
DESOTO	V07	33821	.2	35.9
DESOTO	V07	33821	.2	57.8
DESOTO	V07	33821	.2	367.7
DESOTO	V07	33821	.4	84.6
DESOTO	V07	33820	.5	9.3
DESOTO	V07	33821	.7	11.2
DESOTO	V07	33821	1.2	61.2
DESOTO	V07	33821	1.2	47.3
DESOTO	V07	33820	1.6	145.3
DESOTO	V08	33821	.7	25.9
DESOTO	W07	33821	.	111.2
DESOTO	W07	33821	.2	24.2

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
DIXIE	AO06	32628	.2	24.8
DIXIE	AO06	32680	.5	5.4
DIXIE	AO06	32680	.6	36.3
DIXIE	AO06	32628	.9	20.0
DIXIE	AO07	32680	.	0.0
DIXIE	AO07	32680	.2	43.8
DIXIE	AO07	32680	.2	.
DIXIE	AO07	32680	1.1	58.8
DIXIE	AO07	32680	1.9	99.3
DIXIE	AP09	32359	.8	58.7
DIXIE	AP11	32628	.2	25.4
DIXIE	AP11	32628	.2	17.2
DIXIE	AP11	32628	.2	31.1
DIXIE	AP11	32628	.4	.
DIXIE	AP11	32628	.6	25.6
DIXIE	AP11	32628	.8	107.4
DIXIE	AP12	32628	.	26.7
DIXIE	AP12	32628	.2	41.9
DIXIE	AP12	32628	.2	.
DIXIE	AP12	32628	.4	79.2
DIXIE	AP12	32628	.5	41.4
DIXIE	AP12	32628	.8	136.2
DIXIE	AQ14	32008	.8	52.9
DUVAL	AT32	32265	.2	31.1
DUVAL	AT32	32265	.6	.
DUVAL	AT33	32234	.4	101.4
DUVAL	AT34	32244	.2	19.2
DUVAL	AT34	32244	.2	15.4
DUVAL	AT34	32222	.5	83.2
DUVAL	AT35	32223	.2	.
DUVAL	AT35	32223	.2	.
DUVAL	AT35	32217	.5	17.8
DUVAL	AT35	32223	.7	62.2
DUVAL	AT36	32217	.2	131.6
DUVAL	AT36	32217	.2	24.3
DUVAL	AT36	32217	.2	16.3
DUVAL	AT36	32217	.2	72.1
DUVAL	AT36	32217	.4	15.1
DUVAL	AT36	32217	.6	113.4
DUVAL	AU41	32234	.2	60.6
DUVAL	AU42	32220	.2	103.2
DUVAL	AU42	32220	.2	15.5
DUVAL	AU42	32234	.2	44.7
DUVAL	AU42	32234	.7	.
DUVAL	AU43	32244	.	41.9
DUVAL	AU43	32221	.2	52.4
DUVAL	AU43	32244	.8	29.7
DUVAL	AU43	32244	.8	42.3
DUVAL	AU43	32244	1.1	16.4
DUVAL	AU44	32205	.2	30.4

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
DUVAL	AU44	32205	.2	86.0
DUVAL	AU44	32210	.2	6.0
DUVAL	AU44	32210	.4	5.6
DUVAL	AU44	32207	.5	23.1
DUVAL	AU44	32205	.6	10.2
DUVAL	AU45	32216	.2	39.3
DUVAL	AU45	32216	.2	7.7
DUVAL	AU45	32225	.2	18.9
DUVAL	AU45	32211	.2	43.1
DUVAL	AU45	32216	.2	.
DUVAL	AU45	32216	.2	38.7
DUVAL	AU46	32250	.2	6.3
DUVAL	AU46	32216	.2	.
DUVAL	AU46	32250	.2	24.4
DUVAL	AU46	32250	.4	38.7
DUVAL	AU46	32225	.4	8.4
DUVAL	AV46	32219	.2	.
DUVAL	AV46	32219	.2	23.0
DUVAL	AV46	32219	.2	33.7
DUVAL	AV46	32219	.4	43.7
DUVAL	AV47	32219	.2	99.1
DUVAL	AV47	32218	.2	5.6
DUVAL	AV47	32218	.2	34.2
DUVAL	AV47	32218	.2	8.4
DUVAL	AV47	32218	.5	14.1
DUVAL	AV48	32211	.2	9.7
DUVAL	AV48	32225	.2	15.5
DUVAL	AV48	32225	.2	23.1
DUVAL	AV48	32226	.2	134.1
DUVAL	AV48	32226	.4	15.4
DUVAL	AV48	32211	.6	7.2
DUVAL	AV48	32225	.7	16.6
DUVAL	AV49	32225	.2	.
DUVAL	AV49	32225	.4	.
DUVAL	AW47	32218	.2	342.2
DUVAL	AW47	32218	.2	37.4
DUVAL	AW48	32218	.2	22.7
DUVAL	AW48	32218	.2	.
DUVAL	AW48	32218	.2	36.6
DUVAL	AW48	32218	.2	8.5
ESCAMBIA	AU02	32507	.2	25.4
ESCAMBIA	AU02	32507	.2	9.1
ESCAMBIA	AU02	32507	.2	5.2
ESCAMBIA	AU02	32507	.5	10.3
ESCAMBIA	AU02	32507	.5	63.4
ESCAMBIA	AU03	32507	.2	.
ESCAMBIA	AU03	32507	.4	51.1
ESCAMBIA	AU03	32507	.7	.
ESCAMBIA	AU04	32561	.2	4.2
ESCAMBIA	AU04	32561	.2	9.7

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
ESCAMBIA	AU04	32561	.5	.
ESCAMBIA	AV01	32506	.2	20.9
ESCAMBIA	AV01	32506	.2	39.1
ESCAMBIA	AV01	32506	.2	.
ESCAMBIA	AV01	32506	.2	32.6
ESCAMBIA	AV01	32506	.6	43.6
ESCAMBIA	AV01	32506	.8	17.8
ESCAMBIA	AV02	32503	.2	39.9
ESCAMBIA	AV02	32505	.2	.
ESCAMBIA	AV02	32505	.8	.
ESCAMBIA	AV02	32503	.9	149.0
ESCAMBIA	AV02	32505	1.8	.
ESCAMBIA	AV03	32504	.2	76.4
ESCAMBIA	AV03	32504	.4	71.7
ESCAMBIA	AV03	32503	.7	128.6
ESCAMBIA	AV03	32503	.8	104.0
ESCAMBIA	AV03	32504	1.1	207.7
ESCAMBIA	AW01	32533	.4	59.2
ESCAMBIA	AW01	32506	.5	13.6
ESCAMBIA	AW01	32533	.6	93.6
ESCAMBIA	AW01	32533	.7	71.1
ESCAMBIA	AW01	32506	1.0	229.1
ESCAMBIA	AW01	32506	1.0	35.2
ESCAMBIA	AW02	32533	.2	235.5
ESCAMBIA	AW02	32533	.4	63.3
ESCAMBIA	AW02	32533	.8	.
ESCAMBIA	AW02	32533	.9	67.4
ESCAMBIA	AW02	32533	1.4	44.7
ESCAMBIA	AW02	32533	2.6	126.6
ESCAMBIA	AW03	32514	.2	46.2
ESCAMBIA	AX02	32533	.6	132.9
ESCAMBIA	AX03	32533	1.6	303.2
ESCAMBIA	AZ02	32568	1.4	235.4
ESCAMBIA	AZ03	32535	.	214.7
ESCAMBIA	AZ03	32535	.4	346.1
ESCAMBIA	AZ03	32568	1.1	67.3
ESCAMBIA	AZ03	32568	1.5	20.7
ESCAMBIA	AZ03	32535	1.5	0.0
ESCAMBIA	AZ04	32535	.2	90.0
ESCAMBIA	AZ04	32535	.6	524.8
ESCAMBIA	AZ04	32535	.7	470.9
ESCAMBIA	AZ04	32535	.8	.
FLAGLER	AM16	32010	1.4	110.7
FLAGLER	AN16	32010	.7	242.5
FLAGLER	AN17	32010	.	34.6
FLAGLER	AN17	32010	.2	32.6
FLAGLER	AN17	32010	.2	79.3
FLAGLER	AN17	32010	.4	40.8
FLAGLER	AN17	32010	1.3	8.4
FLAGLER	AN18	32036	.2	44.2

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
FLAGLER	AN18	32036	.2	15.6
FLAGLER	AN18	32037	.2	184.4
FLAGLER	AN18	32036	1.0	221.9
FLAGLER	AN19	32036	.2	51.2
FLAGLER	AN19	32036	.5	26.7
FLAGLER	AN19	32036	.6	86.5
FLAGLER	AN19	32036	.7	41.9
FLAGLER	AN19	32036	1.4	28.0
FLAGLER	AO20	32010	.2	.
FLAGLER	AO20	32037	.2	16.7
FLAGLER	AO20	32037	.2	4.1
FLAGLER	AO20	32037	.6	9.2
FLAGLER	AO20	32037	.9	70.6
FLAGLER	AO20	32037	.9	8.5
FLAGLER	AO21	32036	.2	66.2
FLAGLER	AO21	32036	.2	23.9
FLAGLER	AO21	32036	.7	.
FLAGLER	AO21	32086	2.2	122.1
FLAGLER	AP27	32086	1.0	42.4
FRANKLIN	AP04	32320	.2	11.2
FRANKLIN	AP05	32328	.2	19.2
FRANKLIN	AP05	32320	.2	52.3
FRANKLIN	AP05	32328	.2	74.7
FRANKLIN	AP05	32320	.2	8.9
FRANKLIN	AP05	32328	1.1	23.3
FRANKLIN	AQ07	32322	.	8.7
FRANKLIN	AQ07	32322	.	7.9
FRANKLIN	AQ07	32322	.	21.0
FRANKLIN	AQ07	32322	.2	3.2
FRANKLIN	AR09	32322	.2	2.8
FRANKLIN	AR09	32323	.4	8.9
FRANKLIN	AR09	32322	1.3	10.2
FRANKLIN	AR10	32358	.2	32.0
FRANKLIN	AR10	32358	.2	.
FRANKLIN	AR11	32358	.4	45.7
FRANKLIN	AR11	32358	.4	5.8
GADSDEN	AV24	32351	.2	35.7
GADSDEN	AV24	32351	.6	87.1
GADSDEN	AV24	32351	.9	49.9
GADSDEN	AW22	32351	.	38.1
GADSDEN	AW22	32351	.4	74.2
GADSDEN	AW22	32351	1.2	.
GADSDEN	AW23	32330	.5	42.4
GADSDEN	AW24	32351	.5	40.2
GADSDEN	AW24	32333	.6	38.0
GADSDEN	AW24	32351	.7	132.3
GADSDEN	AW24	32351	.9	242.0
GADSDEN	AW24	32333	1.4	147.7
GADSDEN	AW25	32333	.2	35.2
GADSDEN	AW25	32315	.2	67.1

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
GADSDEN	AW25	32333	.2	22.7
GADSDEN	AW25	32333	.2	15.8
GADSDEN	AW25	32333	.6	85.2
GADSDEN	AW25	32333	.7	142.3
GADSDEN	AX24	32351	.	234.8
GADSDEN	AX26	32333	.5	129.1
GILCHRIST	AO07	32693	.2	176.8
GILCHRIST	AO08	32693	.5	53.6
GILCHRIST	AO08	32693	1.5	2400.4
GILCHRIST	AO08	32693	2.2	116.9
GILCHRIST	AO08	32693	2.3	394.6
GILCHRIST	AO08	32693	3.0	225.6
GILCHRIST	AO08	32693	3.8	607.2
GILCHRIST	AO08	32693	6.2	342.0
GILCHRIST	AO09	32669	.4	89.5
GILCHRIST	AO09	32693	.5	51.6
GILCHRIST	AO09	32693	.8	106.7
GILCHRIST	AO09	32669	.8	170.1
GILCHRIST	AO09	32693	1.6	53.6
GILCHRIST	AP15	32693	.5	.
GILCHRIST	AP15	32693	1.6	76.5
GILCHRIST	AQ14	32619	.9	199.2
GILCHRIST	AQ14	32619	2.1	27.9
GILCHRIST	AQ15	32619	.4	56.5
GILCHRIST	AQ15	32619	.7	.
GILCHRIST	AQ15	32619	1.9	120.2
GILCHRIST	AQ15	32619	2.1	33.4
GILCHRIST	AQ16	32643	.2	24.1
GILCHRIST	AQ16	32643	.2	79.4
GILCHRIST	AR20	32008	.5	44.2
GILCHRIST	AR20	32008	.8	22.3
GLADES	S11	33471	.2	75.6
GLADES	S11	33471	1.0	192.3
GLADES	T10	33944	.2	6.7
GLADES	U12	33474	.2	25.1
GLADES	U12	33474	.2	102.5
GLADES	U12	33474	.2	96.5
GULF	AP02	32456	.2	5.0
GULF	AQ02	32456	.	4.3
GULF	AQ02	32456	.	7.7
GULF	AQ02	32456	.2	4.6
GULF	AQ02	32456	.2	.
GULF	AQ02	32456	.6	33.6
GULF	AQ02	32456	.6	18.0
GULF	AR02	32456	.2	22.0
GULF	AR02	32456	.2	7.3
GULF	AR03	32453	.2	28.6
GULF	AR03	32456	.2	13.3
GULF	AR04	32465	.2	108.5
GULF	AR04	32456	.2	154.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
GULF	AR04	32456	.4	194.6
GULF	AS05	32465	.2	61.2
GULF	AS05	32465	1.2	209.7
HAMILTON	AU35	32096	.2	22.2
HAMILTON	AU35	32096	.2	94.3
HAMILTON	AU35	32096	.2	65.4
HAMILTON	AU36	32096	1.3	60.8
HAMILTON	AV37	32052	.2	38.6
HAMILTON	AV37	32052	.5	185.9
HAMILTON	AV37	32052	.6	.
HAMILTON	AV38	32052	.2	.
HAMILTON	AV38	32096	.2	109.0
HAMILTON	AV38	32052	.2	76.2
HAMILTON	AW35	32053	.2	44.5
HAMILTON	AW36	32053	.2	24.2
HAMILTON	AW36	32053	.2	13.3
HAMILTON	AW36	32053	.2	29.6
HAMILTON	AW36	32052	.6	17.2
HAMILTON	AW36	32053	1.2	44.0
HAMILTON	AW36	32052	1.3	122.4
HAMILTON	AW37	32052	.2	58.0
HAMILTON	AW37	32052	.2	45.7
HAMILTON	AW37	32052	.2	20.8
HAMILTON	AW37	32052	.4	26.1
HAMILTON	AW37	32052	.6	26.7
HAMILTON	AW37	32052	1.4	308.4
HARDEE	W08	33890	.2	27.5
HARDEE	W08	33890	.2	10.6
HARDEE	X06	33865	.9	56.1
HARDEE	X07	33865	.2	42.0
HARDEE	X07	33865	.4	60.1
HARDEE	X08	33890	.2	319.8
HARDEE	X08	33890	.2	44.3
HARDEE	X08	33873	.2	20.6
HARDEE	X08	33873	.2	71.0
HARDEE	X08	33873	.2	249.1
HARDEE	X08	33890	.7	213.2
HARDEE	X08	33873	.7	.
HARDEE	X08	33873	.9	121.5
HARDEE	X08	33873	2.2	1249.3
HARDEE	X08	33873	7.5	.
HARDEE	X09	33890	.2	41.5
HARDEE	X09	33890	.2	251.0
HARDEE	X09	33890	.9	39.5
HARDEE	X09	33890	2.5	1908.8
HARDEE	X10	33890	.2	72.1
HARDEE	Y09	33873	.	508.9
HARDEE	Y09	33873	.2	13.7
HARDEE	Y09	33873	.2	65.0
HARDEE	Y09	33873	1.2	610.2

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
HARDEE	Y09	33873	1.3	199.7
HARDEE	Y09	33873	1.4	86.7
HARDEE	Y09	33873	1.4	167.9
HARDEE	Y10	33873	.9	92.1
HARDEE	Z08	33834	.2	140.4
HARDEE	Z08	33834	.2	.
HARDEE	Z08	33834	.2	56.2
HARDEE	Z08	33834	.7	139.2
HARDEE	Z08	33834	1.4	82.2
HENDRY	P10	33440	.6	126.3
HENDRY	Q07	33930	.9	40.1
HENDRY	R07	33935	.9	251.9
HENDRY	R07	33920	1.2	.
HENDRY	R07	33935	4.7	146.2
HENDRY	R08	33935	.2	57.8
HENDRY	R08	33935	.2	99.7
HENDRY	R08	33935	.6	25.8
HENDRY	R08	33935	.8	103.0
HENDRY	R12	33440	.4	70.7
HENDRY	R12	33440	1.3	.
HENDRY	S08	33935	.2	156.6
HENDRY	S08	33935	1.2	143.2
HENDRY	S08	33935	1.2	.
HENDRY	S08	33935	2.0	.
HENDRY	S08	33935	2.4	257.7
HENDRY	S08	33935	3.3	289.9
HENDRY	S08	33935	4.7	229.8
HENDRY	S11	33440	.2	60.5
HERNANDO	AF01	34252	.2	.
HERNANDO	AF01	33526	.2	350.6
HERNANDO	AF01	33526	.4	91.2
HERNANDO	AF01	33526	.4	535.0
HERNANDO	AF01	33526	.5	214.2
HERNANDO	AF01	33526	.7	701.9
HERNANDO	AF01	34252	.8	450.2
HERNANDO	AF01	33526	.9	77.5
HERNANDO	AF01	33526	1.2	98.1
HERNANDO	AF01	33526	1.7	64.8
HERNANDO	AF01	33526	2.8	165.7
HERNANDO	AF02	33526	.2	29.5
HERNANDO	AF02	33526	.2	3.5
HERNANDO	AF02	33526	.2	41.0
HERNANDO	AF02	33526	.2	.
HERNANDO	AF02	33526	.2	.
HERNANDO	AF02	33526	.2	24.0
HERNANDO	AF02	33526	.5	83.2
HERNANDO	AF02	33526	.7	118.1
HERNANDO	AF02	33526	.9	40.5
HERNANDO	AF02	33526	1.5	69.5
HERNANDO	AF02	33526	1.5	16.6

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
HERNANDO	AF03	33512	.2	251.2
HERNANDO	AF03	33512	.6	68.1
HERNANDO	AF03	33573	.6	36.8
HERNANDO	AF03	33573	.7	44.6
HERNANDO	AF03	33512	1.3	53.6
HERNANDO	AF03	33526	1.3	88.1
HERNANDO	AF03	33512	2.3	227.6
HERNANDO	AF04	33512	.2	.
HERNANDO	AF04	33512	.9	387.0
HERNANDO	AF04	33512	3.6	162.5
HERNANDO	AF05	33525	.2	92.7
HERNANDO	AF05	33525	.4	44.7
HERNANDO	AF05	33525	.5	30.2
HERNANDO	AG01	33526	.2	136.5
HERNANDO	AG01	33526	.2	231.1
HERNANDO	AG01	33526	.4	133.5
HERNANDO	AG01	33526	.5	.7
HERNANDO	AG01	33526	.6	105.3
HERNANDO	AG01	33526	.9	189.6
HERNANDO	AG02	33573	.2	21.6
HERNANDO	AG02	33526	.2	65.5
HERNANDO	AG02	33526	.2	43.0
HERNANDO	AG02	33526	.4	19.5
HERNANDO	AG02	33526	.5	103.1
HERNANDO	AG02	33526	.5	.
HERNANDO	AG02	33526	.7	22.5
HERNANDO	AG02	33526	.7	43.1
HERNANDO	AG02	33526	.9	38.8
HERNANDO	AG02	33526	.9	19.4
HERNANDO	AG02	33566	.9	52.4
HERNANDO	AG02	33526	1.1	57.7
HERNANDO	AG03	33512	.2	23.4
HERNANDO	AG03	33512	.2	270.8
HERNANDO	AG03	33512	.2	64.4
HERNANDO	AG03	33512	.2	212.3
HERNANDO	AG03	33512	.2	78.5
HERNANDO	AG03	33512	.2	139.3
HERNANDO	AG03	33512	.6	72.0
HERNANDO	AG03	33512	.8	314.8
HERNANDO	AG03	33512	2.3	318.1
HERNANDO	AG03	33512	3.3	293.6
HERNANDO	AG04	33512	.7	151.1
HERNANDO	AG04	33512	.7	1273.3
HERNANDO	AG04	33512	.8	258.6
HERNANDO	AG04	33512	1.2	69.3
HERNANDO	AG04		1.6	152.2
HERNANDO	AG04	33512	1.7	347.2
HERNANDO	AG04	33512	1.9	.
HERNANDO	AG04	33512	2.0	172.2
HERNANDO	AG04	33512	2.0	272.6

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
HERNANDO	AG04	33512	2.0	208.0
HERNANDO	AG04	33512	2.0	249.4
HERNANDO	AG04	34298	2.1	197.4
HERNANDO	AG04	33512	2.8	766.0
HERNANDO	AG04	33512	3.2	510.3
HERNANDO	AG05	33525	.2	10.7
HERNANDO	AG05	33597	.2	.
HERNANDO	AG05	34298	.2	40.5
HERNANDO	AG05	33597	.6	21.5
HERNANDO	AG05	33525	.6	132.2
HERNANDO	AG05	33525	1.1	26.7
HERNANDO	AG05	33525	1.4	56.3
HERNANDO	AG05	33525	1.6	463.5
HERNANDO	AH02	33573	.7	28.6
HERNANDO	AH03	33573	.2	27.4
HERNANDO	AH03	33573	.6	98.0
HERNANDO	AH03	34298	1.2	293.4
HERNANDO	AH03	33573	1.9	44.4
HERNANDO	AH04	34263	.8	71.5
HERNANDO	AH04	34263	.8	81.9
HERNANDO	AH04	34263	1.4	103.2
HIGHLANDS	V09	33852	.4	22.1
HIGHLANDS	V09	33852	.7	5.2
HIGHLANDS	V10	33852	.	2.3
HIGHLANDS	V10	33852	.	2.2
HIGHLANDS	V10	33852	.	3.4
HIGHLANDS	V10	33852	.2	.
HIGHLANDS	V10	33852	.2	8.5
HIGHLANDS	V10	33852	.8	2.7
HIGHLANDS	V11	33852	.2	12.0
HIGHLANDS	V11	33852	.2	8.2
HIGHLANDS	V11	33852	.2	7.0
HIGHLANDS	V11	33852	.6	7.3
HIGHLANDS	W10	33852	.2	9.4
HIGHLANDS	W10	33852	.2	5.6
HIGHLANDS	W10	33852	.2	11.8
HIGHLANDS	W10	33852	.2	18.9
HIGHLANDS	W10	33852	.2	2.0
HIGHLANDS	W10	33852	.4	11.4
HIGHLANDS	W11	33852	.	30.4
HIGHLANDS	W11	33852	.	21.1
HIGHLANDS	W11	33852	.	7.3
HIGHLANDS	W11	33852	.2	12.8
HIGHLANDS	W11	33852	.2	22.0
HIGHLANDS	W11	33852	.2	12.4
HIGHLANDS	W11	33852	.2	45.4
HIGHLANDS	W11	33852	.5	24.5
HIGHLANDS	W11	33852	.9	48.2
HIGHLANDS	X11	33870	.	24.4
HIGHLANDS	X11	33870	.2	22.2

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
HIGHLANDS	X11	33870	.2	43.7
HIGHLANDS	X11	33870	.2	23.1
HIGHLANDS	X11	33870	.2	12.0
HIGHLANDS	X11	33870	.2	26.7
HIGHLANDS	X12	33857	.2	6.0
HIGHLANDS	X12	33870	.2	7.4
HIGHLANDS	X12	33870	.2	5.0
HIGHLANDS	X13	33857	.2	83.0
HIGHLANDS	X13	33857	.2	16.0
HIGHLANDS	Y11	33825	.2	37.1
HIGHLANDS	Y11	33825	.2	95.7
HIGHLANDS	Y11	33825	.2	31.0
HIGHLANDS	Y11	33825	.2	33.0
HIGHLANDS	Y11	33825	.4	15.5
HIGHLANDS	Y12	33825	.2	33.0
HIGHLANDS	Y12	33870	.2	13.7
HIGHLANDS	Y12	33870	.2	40.5
HIGHLANDS	Y12	33825	.9	30.3
HIGHLANDS	Z10	33825	.2	.
HIGHLANDS	Z10	33825	.8	.
HILLSBOROUGH	Z03	33570	.2	427.1
HILLSBOROUGH	Z03	33570	.2	97.3
HILLSBOROUGH	Z03	33570	.2	41.6
HILLSBOROUGH	Z03	33570	.2	83.1
HILLSBOROUGH	Z03	33570	.5	76.7
HILLSBOROUGH	Z03	33570	.6	135.0
HILLSBOROUGH	Z03	33570	.7	55.8
HILLSBOROUGH	Z03	33570	.8	9.6
HILLSBOROUGH	Z04	34253	.	81.2
HILLSBOROUGH	Z04	33547	.5	60.3
HILLSBOROUGH	Z04	33598	.8	33.2
HILLSBOROUGH	Z04	33594	1.8	215.0
HILLSBOROUGH	Z05	33547	.6	53.6
HILLSBOROUGH	Z05	34253	.6	.
HILLSBOROUGH	Z06	33834	1.8	149.7
HILLSBOROUGH	AA04	33570	.2	183.5
HILLSBOROUGH	AA04	33534	.2	25.7
HILLSBOROUGH	AA04	33611	.2	.
HILLSBOROUGH	AA04	33534	.4	38.4
HILLSBOROUGH	AA04	33570	.6	199.1
HILLSBOROUGH	AA04	33611	.8	.
HILLSBOROUGH	AA04	33611	.9	17.3
HILLSBOROUGH	AA04	33611	1.0	.
HILLSBOROUGH	AA04	33611	1.1	191.9
HILLSBOROUGH	AA05	33569	.2	24.5
HILLSBOROUGH	AA05	33569	.2	.
HILLSBOROUGH	AA05	33569	.2	89.7
HILLSBOROUGH	AA05	33569	.4	18.9
HILLSBOROUGH	AA05	33569	.5	208.2
HILLSBOROUGH	AA05	33569	.6	321.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
HILLSBOROUGH	AA05	33569	.8	100.4
HILLSBOROUGH	AA05	33569	.8	15.0
HILLSBOROUGH	AA05	33569	.8	11.9
HILLSBOROUGH	AA05	34253	1.2	21.9
HILLSBOROUGH	AA05	33569	1.5	.
HILLSBOROUGH	AA05	33569	1.7	.
HILLSBOROUGH	AA05	33569	1.9	395.3
HILLSBOROUGH	AA06	33547	1.3	109.4
HILLSBOROUGH	AA06	33547	1.7	219.4
HILLSBOROUGH	AA06	33547	2.4	856.6
HILLSBOROUGH	AA06	33547	3.3	830.0
HILLSBOROUGH	AA07	33547	2.7	189.8
HILLSBOROUGH	AB03	33616	.2	51.4
HILLSBOROUGH	AB03	33615	.2	393.8
HILLSBOROUGH	AB03	33615	.2	.
HILLSBOROUGH	AB04	33611	.2	71.8
HILLSBOROUGH	AB04	33706	.2	23.9
HILLSBOROUGH	AB04	33706	.2	7.8
HILLSBOROUGH	AB04	33602	.2	60.5
HILLSBOROUGH	AB04	33611	.2	13.6
HILLSBOROUGH	AB04	33611	.2	18.6
HILLSBOROUGH	AB04	33606	.2	57.3
HILLSBOROUGH	AB04	33619	.4	174.0
HILLSBOROUGH	AB04	33619	.6	63.4
HILLSBOROUGH	AB04	33611	.6	40.2
HILLSBOROUGH	AB05	33584	.	1184.2
HILLSBOROUGH	AB05	33511	.2	4.7
HILLSBOROUGH	AB05	33511	.4	274.6
HILLSBOROUGH	AB05	33511	.5	167.2
HILLSBOROUGH	AB05	33511	.5	137.2
HILLSBOROUGH	AB05	33511	.7	100.8
HILLSBOROUGH	AB05	33511	1.0	37.6
HILLSBOROUGH	AB05	33584	1.2	259.4
HILLSBOROUGH	AB05	33511	1.3	104.9
HILLSBOROUGH	AB05	33594	1.9	950.9
HILLSBOROUGH	AB05	33511	2.0	126.1
HILLSBOROUGH	AB05	33511	2.1	155.8
HILLSBOROUGH	AB05	33511	3.4	172.7
HILLSBOROUGH	AB05	33511	6.5	391.6
HILLSBOROUGH	AB06	33527	.2	302.1
HILLSBOROUGH	AB06	33511	.6	76.3
HILLSBOROUGH	AB06	33566	.7	464.3
HILLSBOROUGH	AB06	33527	1.0	165.9
HILLSBOROUGH	AB06	33594	1.4	.
HILLSBOROUGH	AB06	34258	2.0	.
HILLSBOROUGH	AB06	33594	9.1	.
HILLSBOROUGH	AC03	33624	.	315.5
HILLSBOROUGH	AC03	33624	.2	151.9
HILLSBOROUGH	AC03	33624	.2	136.8
HILLSBOROUGH	AC03	33624	.2	.

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
HILLSBOROUGH	AC03	33615	.2	318.1
HILLSBOROUGH	AC03	33625	.2	.
HILLSBOROUGH	AC03	33624	.2	214.9
HILLSBOROUGH	AC03	33556	.2	7.3
HILLSBOROUGH	AC03	33556	.2	38.3
HILLSBOROUGH	AC03	33614	.2	15.5
HILLSBOROUGH	AC03	33624	.2	107.3
HILLSBOROUGH	AC03	33624	.2	13.3
HILLSBOROUGH	AC03	33624	.2	.
HILLSBOROUGH	AC03	33624	.5	78.6
HILLSBOROUGH	AC03	33624	.5	23.8
HILLSBOROUGH	AC03	33624	.7	99.1
HILLSBOROUGH	AC03	33624	.7	.
HILLSBOROUGH	AC03	33624	.9	106.2
HILLSBOROUGH	AC03	33614	1.5	218.6
HILLSBOROUGH	AC03	33624	4.6	.
HILLSBOROUGH	AC04	33612	.2	14.7
HILLSBOROUGH	AC04	33604	.2	0.0
HILLSBOROUGH	AC04	33549	.2	39.2
HILLSBOROUGH	AC04	33617	.2	25.8
HILLSBOROUGH	AC04	33613	.2	.
HILLSBOROUGH	AC04	33613	.2	16.0
HILLSBOROUGH	AC04	33612	.2	88.1
HILLSBOROUGH	AC04	33612	.2	.
HILLSBOROUGH	AC04	33623	.2	18.7
HILLSBOROUGH	AC04	33613	.2	23.8
HILLSBOROUGH	AC04	33618	.2	.
HILLSBOROUGH	AC04	33613	.2	36.9
HILLSBOROUGH	AC04	33549	.4	9.9
HILLSBOROUGH	AC04	33549	.5	49.1
HILLSBOROUGH	AC04	33617	.7	256.9
HILLSBOROUGH	AC04	33618	.8	77.8
HILLSBOROUGH	AC04	33612	3.0	25.8
HILLSBOROUGH	AC05	33610	.2	23.2
HILLSBOROUGH	AC05	33537	.2	47.2
HILLSBOROUGH	AC05	33584	.4	.
HILLSBOROUGH	AC05	33592	.7	58.4
HILLSBOROUGH	AC05	33617	.8	42.2
HILLSBOROUGH	AC05	33610	1.1	209.9
HILLSBOROUGH	AC05	33592	1.8	148.4
HILLSBOROUGH	AC05	33584	1.8	164.7
HILLSBOROUGH	AC05	33637	2.0	133.4
HILLSBOROUGH	AC05	33584	9.9	.
HILLSBOROUGH	AC06	33566	.2	355.8
HILLSBOROUGH	AC06	33527	.4	.
HILLSBOROUGH	AC06	33566	.6	56.1
HILLSBOROUGH	AC06	33566	.9	98.2
HILLSBOROUGH	AC06	33527	1.0	195.8
HILLSBOROUGH	AC06	33566	1.2	512.0
HILLSBOROUGH	AC06	33566	1.7	202.6

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
HILLSBOROUGH	AC06	33566	5.5	813.5
HILLSBOROUGH	AC06	33566	7.7	724.0
HILLSBOROUGH	AC06	33566	9.0	723.9
HILLSBOROUGH	AC07	33566	1.0	422.2
HILLSBOROUGH	AC07	33566	3.3	1520.2
HILLSBOROUGH	AD02	33556	.2	157.8
HILLSBOROUGH	AD04	33549	.2	31.9
HILLSBOROUGH	AD04	33549	.2	26.7
HILLSBOROUGH	AD04	33549	.2	73.6
HILLSBOROUGH	AD04	33549	1.0	.
HOLMES	AX14	32455	.2	32.6
HOLMES	AX14	32455	.4	0.0
HOLMES	AY14	32464	.	175.2
HOLMES	AY14	32464	.4	.
HOLMES	AY15	32464	.	29.3
HOLMES	AY16	32425	.2	83.9
HOLMES	AY16	32425	.2	267.4
HOLMES	AY16	32425	.6	117.0
HOLMES	AY16	32425	.7	129.2
HOLMES	AY16	32425	3.3	65.3
HOLMES	AZ14	32464	.7	236.8
HOLMES	AZ14	32464	1.2	61.6
HOLMES	AZ15	32464	.	124.2
HOLMES	AZ15	32464	.5	134.9
HOLMES	AZ15	32464	.6	228.7
HOLMES	AZ15	32464	.7	242.6
HOLMES	AZ17	32425	.5	181.5
HOLMES	AZ18	32440	.2	.
INDIAN RIVER	Y20	32962	.2	4.6
INDIAN RIVER	Y20	32962	.2	8.2
INDIAN RIVER	Y20	32962	.7	12.8
INDIAN RIVER	Y21	32962	.2	22.3
INDIAN RIVER	Y21	32963	.4	18.6
INDIAN RIVER	Y21	32960	.7	46.4
INDIAN RIVER	Y21	32963	.9	25.7
INDIAN RIVER	Y21	32962	.9	32.1
INDIAN RIVER	Z18	32960	.2	14.5
INDIAN RIVER	Z18	32960	.2	10.5
INDIAN RIVER	Z18	32960	.2	37.6
INDIAN RIVER	Z18	32960	.6	11.4
INDIAN RIVER	Z18	32960	.7	7.1
INDIAN RIVER	Z18	32960	1.3	15.5
INDIAN RIVER	Z20	32963	.2	19.0
INDIAN RIVER	Z20	32963	.2	14.8
INDIAN RIVER	Z20	32963	.4	144.3
INDIAN RIVER	Z20	32963	.4	.
INDIAN RIVER	Z20	32963	.7	37.3
INDIAN RIVER	Z20	32963	.8	10.7
INDIAN RIVER	AA19	32948	.2	8.4
INDIAN RIVER	AA19	32960	.2	50.1

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
INDIAN RIVER	AA19	32948	.7	44.4
INDIAN RIVER	AA19	32948	.7	36.7
INDIAN RIVER	AA19	32948	1.7	25.8
INDIAN RIVER	AA20	32958	.2	10.3
INDIAN RIVER	AA20	32957	.2	42.3
INDIAN RIVER	AA20	32958	.2	42.3
INDIAN RIVER	AA20	32958	.4	12.3
INDIAN RIVER	AA20	32958	.5	6.3
JACKSON	AW17	32420	.2	.
JACKSON	AX19	32446	.2	91.5
JACKSON	AX19	32446	.5	85.9
JACKSON	AX19	32446	.6	117.0
JACKSON	AX19	32446	.7	41.2
JACKSON	AX19	32446	.7	128.6
JACKSON	AX19	32431	1.2	37.3
JACKSON	AX20	32446	.2	45.8
JACKSON	AX21	32442	.	46.6
JACKSON	AX21	32442	.2	135.5
JACKSON	AX21	32446	.5	27.3
JACKSON	AX21	32442	.7	.
JACKSON	AX21	32432	.9	63.3
JACKSON	AX22	32460	.	173.8
JACKSON	AX22	32460	.5	.
JACKSON	AX22	32460	.6	319.7
JACKSON	AY18	32431	.6	0.0
JACKSON	AY18	32431	.9	227.0
JACKSON	AY18	32431	1.5	58.4
JACKSON	AY19	32446	.	32.0
JACKSON	AY19	32446	.2	161.8
JACKSON	AY19	32446	.6	136.2
JACKSON	AY20	32446	.	342.7
JACKSON	AY20	32446	.2	614.4
JACKSON	AY20	32446	.8	331.1
JACKSON	AY20	32443	.9	125.3
JACKSON	AY20	32446	2.2	706.8
JACKSON	AY20	32446	2.2	.
JACKSON	AY21	32443	1.4	156.0
JACKSON	AY21	32443	1.5	43.9
JACKSON	AZ18	32440	.2	173.0
JACKSON	AZ18	32440	.4	0.0
JACKSON	AZ18	32440	.5	94.9
JACKSON	AZ18	32440	1.5	220.2
JACKSON	AZ19	32440	.5	87.9
JACKSON	AZ19	32426	.9	155.1
JACKSON	AZ20	32446	.	163.7
JACKSON	AZ22	32445	.2	24.2
JACKSON	AZ22	32423	.5	67.4
JEFFERSON	AV28	32344	.2	.
JEFFERSON	AV30	32336	.5	121.4
LAFAYETTE	AR19	32008	.	22.1

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
LAFAYETTE	AS21	32066	.	12.0
LAFAYETTE	AS21	32066	.4	69.0
LAFAYETTE	AS21	32066	.5	71.3
LAFAYETTE	AS21	32066	.8	55.5
LAFAYETTE	AS22	.	.	61.7
LAFAYETTE	AT22	32013	.6	82.2
LAKE	AF07	32736	.2	79.8
LAKE	AF07	32736	.2	76.5
LAKE	AF07	32736	3.0	.
LAKE	AF08	32736	.2	61.8
LAKE	AF08	32711	.2	16.5
LAKE	AF08	32711	.2	75.6
LAKE	AF08	32711	.6	40.9
LAKE	AF08	32711	.6	13.2
LAKE	AF08	32711	.9	40.6
LAKE	AF09	32711	.	56.9
LAKE	AG07	32736	.2	7.7
LAKE	AG07	32753	.2	30.0
LAKE	AG07	32753	.2	10.9
LAKE	AG07	32753	.2	29.2
LAKE	AG07	32736	.2	27.5
LAKE	AG07	33597	.2	235.8
LAKE	AG07	32753	.6	.
LAKE	AG08	32753	.2	23.2
LAKE	AG08	32726	.2	.
LAKE	AG08	32711	.2	0.0
LAKE	AG08	32711	.2	18.0
LAKE	AG08	32711	.2	.
LAKE	AG08	32711	.2	.
LAKE	AG08	32726	.4	17.0
LAKE	AG08	32711	.5	59.3
LAKE	AG08	32711	.9	48.6
LAKE	AG09	32755	.2	12.8
LAKE	AG09	32755	.4	34.8
LAKE	AG09	32755	.5	27.5
LAKE	AG09	32755	.6	70.4
LAKE	AG09	32756	.6	144.6
LAKE	AG09	32756	.8	131.9
LAKE	AH07	32762	.4	19.7
LAKE	AH07	32762	.4	18.9
LAKE	AH08	32737	.2	39.5
LAKE	AH08	32797	.2	20.3
LAKE	AH08	32737	.8	44.2
LAKE	AH08	32737	2.0	27.4
LAKE	AH09	32705	.4	41.8
LAKE	AH09	32778	.5	23.2
LAKE	AH09	32705	.9	28.1
LAKE	AH09	32705	1.1	.
LAKE	AH09	32705	1.3	95.0
LAKE	AI07	32748	.2	27.4

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
LAKE	AI07	32748	.2	33.3
LAKE	AI07	32749	.2	8.5
LAKE	AI07	32748	.5	15.3
LAKE	AI07	32748	.5	20.0
LAKE	AI07	32748	.6	10.9
LAKE	AI08	32788	.2	.
LAKE	AI08	32788	.2	39.8
LAKE	AI08	32731	.4	53.6
LAKE	AI08	32788	.5	13.3
LAKE	AI08	32788	.5	14.9
LAKE	AI08	32788	.5	22.0
LAKE	AI08	32788	.5	46.9
LAKE	AI08	32788	.6	21.5
LAKE	AI08	32788	.6	63.3
LAKE	AI08	32788	.6	39.4
LAKE	AI08	32788	1.0	63.7
LAKE	AI09	32757	.2	26.2
LAKE	AI09	32778	.2	14.3
LAKE	AI09	32726	.2	14.6
LAKE	AI09	32726	.4	4.2
LAKE	AI09	32726	.4	47.2
LAKE	AI10	32776	.6	91.0
LAKE	AI10	32776	.7	4.7
LAKE	AI10	32776	1.1	46.4
LAKE	AI10	32776	1.4	39.5
LAKE	AJ07	32659	.4	.
LAKE	AJ07	32659	.8	23.7
LAKE	AJ07	32659	.8	.
LAKE	AJ07	32659	1.0	47.4
LAKE	AJ07	32659	1.1	37.5
LAKE	AJ08	32726	.2	34.2
LAKE	AJ08	32784	.4	41.5
LAKE	AJ09	32784	.2	20.3
LAKE	AJ09	32702	.2	46.7
LAKE	AJ09	32784	.2	16.9
LAKE	AJ09	32784	.7	55.4
LAKE	AJ09	32735	.9	73.0
LAKE	AJ09	32784	1.5	42.2
LAKE	AJ10	32726	.2	4.0
LAKE	AJ10	32776	.2	.
LAKE	AJ10	32726	.7	237.6
LAKE	AJ11	32726	.2	19.0
LAKE	AJ11	32726	1.0	87.3
LAKE	AK12	32702	3.1	313.0
LAKE	AK13	32767	.6	6.6
LAKE	AL13	32002	.2	5.5
LAKE	AL13	32002	.2	7.3
LAKE	AL13	32002	.2	17.6
LAKE	AL13	32002	.2	.
LAKE	AL13	32002	.2	32.0

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
LAKE	AL13	32002	.2	.
LAKE	AL13	32002	.4	6.1
LAKE	AL13	32002	.4	.
LAKE	AL13	32002	.4	3.4
LEE	O01	33923	.2	301.4
LEE	O01	33923	.2	.
LEE	O01	33923	.4	11.6
LEE	O01	33923	.6	115.0
LEE	O01	33923	.7	.
LEE	O01	33923	.8	18.2
LEE	O01	33923	1.1	162.5
LEE	O01	33923	1.1	.
LEE	O01	33923	1.7	135.5
LEE	P01	33957	.4	15.8
LEE	P01	33924	.6	20.2
LEE	P01	33957	.6	51.1
LEE	P01	33957	1.4	41.7
LEE	P02	33957	.2	44.6
LEE	P02	33956	.2	43.5
LEE	P02	33956	.2	144.1
LEE	P02	33956	.2	102.8
LEE	P02	33957	.5	22.7
LEE	P02	33956	.5	2.8
LEE	P02	33956	.5	30.5
LEE	P02	33957	.6	33.8
LEE	P02	33957	.7	119.5
LEE	P02	33957	1.8	47.3
LEE	P02	33956	2.2	180.8
LEE	P03	33931	.2	91.8
LEE	P03	33931	.2	76.3
LEE	P03	33931	.2	101.2
LEE	P03	33931	.2	78.2
LEE	P03	33931	.2	74.5
LEE	P03	33931	.4	74.8
LEE	P03	33931	.5	130.2
LEE	P03	33931	.7	165.2
LEE	P04	33923	.2	18.0
LEE	P04	33912	.2	66.1
LEE	P04	33912	.2	12.0
LEE	P04	33928	.9	106.6
LEE	P04	33912	.9	62.5
LEE	P04	33928	1.4	101.0
LEE	P04	33912	1.5	200.1
LEE	P04	33912	1.9	19.6
LEE	P04	33912	3.6	385.4
LEE	Q01	33924	.6	17.5
LEE	Q02	33956	.2	457.3
LEE	Q02	33922	.2	228.4
LEE	Q02	33922	.4	14.8
LEE	Q02	33922	.9	26.1

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
LEE	Q02	33956	1.0	14.1
LEE	Q02	33956	1.1	32.5
LEE	Q03	33908	.2	112.5
LEE	Q03	33914	.5	56.2
LEE	Q03	33907	.5	.
LEE	Q03	33904	1.0	77.7
LEE	Q03	33904	1.2	128.3
LEE	Q03	33907	1.3	136.0
LEE	Q03	33904	1.3	77.7
LEE	Q03	33908	1.3	323.1
LEE	Q03	33907	1.5	124.7
LEE	Q03	33908	1.7	206.5
LEE	Q03	33914	2.8	178.5
LEE	Q03	33907	5.8	50.3
LEE	Q04	33912	.2	.
LEE	Q04	33901	.2	70.3
LEE	Q04	33901	.2	65.2
LEE	Q04	33901	.2	61.0
LEE	Q04	33901	.4	29.8
LEE	Q04	33912	.4	84.8
LEE	Q04	33907	.5	55.2
LEE	Q04	33907	1.3	215.8
LEE	Q04	33907	1.4	209.7
LEE	Q04	33907	1.5	68.0
LEE	Q04	33912	2.1	164.5
LEE	Q05	33936	.2	18.6
LEE	Q05	33936	.4	25.9
LEE	Q05	33936	.5	20.3
LEE	Q05	33936	.7	21.1
LEE	Q05	33936	1.1	35.7
LEE	Q05	33936	1.4	.
LEE	Q05	33936	1.9	192.3
LEE	Q05	33936	2.4	362.8
LEE	Q06	33936	.7	67.0
LEE	Q06	33936	1.5	172.1
LEE	Q06	33936	1.7	214.1
LEE	R01	33921	.2	47.6
LEE	R01	33921	.2	66.2
LEE	R02	33922	.	128.5
LEE	R02	33922	.2	6.0
LEE	R02	33922	.4	12.1
LEE	R02	33922	.5	26.7
LEE	R02	33945	1.0	11.5
LEE	R02	33945	1.4	51.7
LEE	R02	33945	2.3	49.6
LEE	R03	33909	.	16.9
LEE	R03	33922	.2	27.4
LEE	R03	33914	.2	30.0
LEE	R03	33909	.2	.
LEE	R03	33914	.5	52.9

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
LEE	R03	33909	.7	7.5
LEE	R03	33916	.7	72.6
LEE	R03	33914	.9	381.7
LEE	R03	33909	1.3	114.8
LEE	R03	33922	1.6	0.0
LEE	R03	33922	1.7	30.0
LEE	R03	33909	4.5	188.8
LEE	R04	33903	.2	245.3
LEE	R04	33909	.2	69.3
LEE	R04	33909	.8	152.4
LEE	R04	33904	1.1	110.0
LEE	R04	33903	1.2	.
LEE	R04	33904	1.3	.
LEE	R04	33909	1.4	188.0
LEE	R04	33903	1.4	362.8
LEE	R04	33914	1.5	136.7
LEE	R04	33909	1.7	111.2
LEE	R04	33909	1.9	.
LEE	R04	33903	2.5	276.1
LEE	R05	33905	.	36.1
LEE	R05	33901	.2	6.1
LEE	R05	33901	.2	70.0
LEE	R05	33905	.2	122.8
LEE	R05	33905	.2	41.0
LEE	R05	33903	.2	189.8
LEE	R05	33905	.2	186.2
LEE	R05	33905	.2	9.4
LEE	R05	33901	.2	23.4
LEE	R05	33905	.2	68.8
LEE	R05	33901	.4	126.3
LEE	R05	33905	.8	39.5
LEE	R05	33901	1.4	53.6
LEE	R05	33905	1.9	25.9
LEE	R06	33905	.2	52.3
LEE	R06	33905	.2	430.0
LEE	R06	33905	1.4	1848.4
LEE	R06	33905	1.8	295.0
LEE	R06	33905	1.8	59.5
LEE	R06	33905	2.3	159.7
LEE	R06	33905	2.7	3087.3
LEE	R06	33905	2.9	332.2
LEE	R06	33905	3.5	178.8
LEE	R07	33936	.8	341.7
LEE	R07	33920	.9	.
LEE	R07	33936	2.9	169.9
LEE	S01	33921	.2	37.7
LEE	S01	33921	.4	152.4
LEE	S01	33921	.8	.
LEE	S04	33903	2.2	90.2
LEE	S04	33903	2.3	118.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
LEE	S05	33903	4.6	49.7
LEON	AU23	32304	.2	179.6
LEON	AV24	32301	.4	64.1
LEON	AV24	32304	.5	16.0
LEON	AV24	32304	.7	85.6
LEON	AV25	32304	.7	124.7
LEON	AV26	32304	.	43.8
LEON	AV26	32303	.	1277.9
LEON	AV26	32312	1.4	80.5
LEON	AV26	32303	1.5	.
LEON	AV26	32301	6.5	410.3
LEON	AV26	32303	13.8	149.6
LEON	AV27	32301	.6	408.1
LEON	AV27	32301	.9	114.4
LEON	AV27	32301	2.9	296.9
LEON	AV28	33201	2.4	247.9
LEON	AW26	32303	.2	259.5
LEON	AW27	32312	.2	.
LEON	AW27	32308	.4	170.7
LEON	AW27	32312	.8	123.6
LEON	AW27	32308	.8	60.3
LEON	AW27	32308	.9	.
LEON	AW27	32308	2.4	351.5
LEON	AW28	32308	.2	259.7
LEON	AX27	32312	.	1271.0
LEVY	AK03	32649	.2	97.6
LEVY	AK03	32649	.5	115.1
LEVY	AK03	32649	.6	233.7
LEVY	AK03	32698	.7	231.1
LEVY	AK03	32649	1.0	246.7
LEVY	AK03	32698	1.1	482.4
LEVY	AK03	32649	1.1	325.7
LEVY	AK03	32649	1.2	140.2
LEVY	AK03	32649	2.3	570.8
LEVY	AK03	32649	2.5	337.9
LEVY	AK03	32649	2.7	580.0
LEVY	AK04	32630	.2	5.8
LEVY	AK04	32630	.2	64.3
LEVY	AK04	32630	.2	156.0
LEVY	AK04	32630	.6	40.5
LEVY	AK04	32630	.6	216.9
LEVY	AK04	32630	.6	75.4
LEVY	AK04	32630	.9	112.5
LEVY	AK04	32649	.9	114.4
LEVY	AK04	32649	1.1	453.3
LEVY	AK04	32630	1.5	117.3
LEVY	AK04	32630	1.7	218.8
LEVY	AK04	32630	1.8	125.3
LEVY	AL01	33575	.2	5.4
LEVY	AL01	32625	.4	22.5

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
LEVY	AL01	32625	1.0	28.6
LEVY	AL02	32625	.5	22.5
LEVY	AL02	32625	.8	120.5
LEVY	AM07	32668	.2	56.6
LEVY	AN03	32626	.9	11.1
LEVY	AN04	32626	.4	128.7
LEVY	AN04	32626	.6	129.5
LEVY	AN04	32626	1.4	182.1
LEVY	AN05	32626	.2	34.3
LEVY	AN05	32626	.2	.
LEVY	AN05	32626	.2	57.1
LEVY	AN05	32626	1.1	257.2
LEVY	AN05	32626	1.1	26.0
LEVY	AN05	32626	1.4	261.1
LEVY	AN05	32626	2.1	76.9
LEVY	AN05	32626	2.5	116.3
LEVY	AN06	32621	.2	101.1
LEVY	AN06	32621	.6	37.3
LEVY	AN06	32621	.9	82.4
LEVY	AN07	32621	.2	30.8
LEVY	AN07	32696	.5	81.0
LEVY	AN08	32696	.5	.
LEVY	AN08	32696	.8	197.6
LEVY	AN08	32696	1.5	450.4
LEVY	AN08	32696	1.6	872.7
LEVY	AN08	32696	1.8	.
LEVY	AN08	32696	1.8	90.7
LEVY	AN08	32696	2.0	266.3
LEVY	AN08	32696	2.0	191.6
LEVY	AN08	32696	3.5	734.3
LEVY	AN08	32696	4.9	207.0
LEVY	AO07	32693	.9	284.9
LEVY	AO07	32693	2.0	318.0
LEVY	AO08	32693	.4	.
LEVY	AO08	32693	.6	146.2
LEVY	AO08	32693	1.0	152.0
LEVY	AO08	32693	1.3	261.1
LEVY	AO08	32693	2.7	922.9
LEVY	AO09	32621	.8	53.1
LEVY	AO09	32669	1.0	.
LIBERTY	AS09	32360	.2	24.2
LIBERTY	AV21	32321	.6	24.7
LIBERTY	AV21	32321	.7	209.8
LIBERTY	AV21	32321	1.4	110.6
MADISON	AU28	32331	.4	130.0
MADISON	AV33	32340	1.2	449.9
MADISON	AW33	32340	.2	56.7
MADISON	AW33	32350	.2	119.5
MADISON	AW34	32350	.2	27.6
MANATEE	X01	33529	.2	87.8

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
MANATEE	X01	33529	.2	230.3
MANATEE	X01	33529	.2	22.1
MANATEE	X01	33529	.2	95.0
MANATEE	X01	33548	.2	12.9
MANATEE	X01	33529	.5	124.5
MANATEE	X01	33529	.6	108.6
MANATEE	X01	33510	1.2	1273.8
MANATEE	X01	33548	1.5	95.7
MANATEE	X02	34203	.2	46.5
MANATEE	X02	33505	.2	.
MANATEE	X02	34203	.6	39.1
MANATEE	X02	34203	.8	163.0
MANATEE	X02	34203	1.0	133.3
MANATEE	X02	34203	1.0	300.0
MANATEE	X02	34203	2.5	206.5
MANATEE	X03	33508	.2	22.9
MANATEE	X03	33508	.2	76.3
MANATEE	X03	34202	.2	504.1
MANATEE	X03	34202	.2	827.0
MANATEE	X03	33508	1.1	389.7
MANATEE	X04	34202	.2	202.9
MANATEE	X04	34202	.2	17.6
MANATEE	X04	33551	.2	7.2
MANATEE	Y02	33510	.2	13.6
MANATEE	Y02	33501	.2	0.0
MANATEE	Y02	33510	.2	0.0
MANATEE	Y02	33510	.2	56.8
MANATEE	Y02	33501	.2	34.5
MANATEE	Y02	33529	.2	11.2
MANATEE	Y02	33529	.4	24.8
MANATEE	Y02	33529	1.3	207.6
MANATEE	Y03	33561	.2	552.9
MANATEE	Y03	33561	.2	234.0
MANATEE	Y03	33561	.2	157.8
MANATEE	Y03	33561	.2	.
MANATEE	Y03	33561	.5	553.7
MANATEE	Y03	33561	.6	114.4
MANATEE	Y03	33561	.7	90.3
MANATEE	Y03	33561	1.5	62.5
MANATEE	Y03	33532	1.6	175.4
MANATEE	Y03	33561	3.1	263.6
MANATEE	Y04	33564	.2	190.3
MANATEE	Y04	33561	.2	21.5
MANATEE	Y04	33564	.2	.
MANATEE	Y04	33564	.2	28.3
MANATEE	Y04	33564	.4	36.3
MANATEE	Y07	33834	.2	54.4
MARION	AJ06	32684	2.1	.
MARION	AJ06	32691	2.5	345.6
MARION	AJ06	32691	7.3	950.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
MARION	AJ07	32691	.2	93.1
MARION	AJ07	32629	.4	.
MARION	AJ07	32691	.7	86.7
MARION	AJ07	32691	.7	111.1
MARION	AJ07	32765	.8	88.1
MARION	AJ07	32691	.9	68.3
MARION	AJ07	32691	1.1	97.0
MARION	AJ08	32695	.2	30.5
MARION	AJ08	32695	.2	9.4
MARION	AJ08	32784	.2	36.3
MARION	AJ08	32784	.4	23.5
MARION	AJ08	32695	.5	27.9
MARION	AJ08	32695	.7	40.5
MARION	AJ08	32695	1.1	215.6
MARION	AJ09	32784	.	89.6
MARION	AJ09	32702	.5	175.2
MARION	AJ09	32784	.5	142.9
MARION	AJ09	32784	.7	94.6
MARION	AJ09	32784	.8	32.5
MARION	AK05	32630	1.4	89.5
MARION	AK05	32630	1.6	151.5
MARION	AK05	32630	2.1	0.0
MARION	AK06	32630	.8	113.8
MARION	AK06	32630	1.0	316.6
MARION	AK06	32630	1.9	129.9
MARION	AK06	32630	2.7	940.0
MARION	AK06	32630	3.1	818.3
MARION	AK06	32630	5.7	1003.6
MARION	AK07	32673	.4	93.3
MARION	AK07	32673	.6	193.7
MARION	AK07	32673	.8	75.7
MARION	AK07	32673	1.1	54.3
MARION	AK07	32673	1.8	157.0
MARION	AK07	32676	3.4	.
MARION	AK07	32676	4.5	769.6
MARION	AK07	32676	4.7	1147.4
MARION	AK07	32676	5.9	281.4
MARION	AK07	32674	24.1	439.7
MARION	AK08	32620	.7	156.4
MARION	AK08	32620	1.0	121.1
MARION	AK08	32620	1.3	145.8
MARION	AK08	32676	1.8	758.8
MARION	AK08	32620	1.9	162.1
MARION	AK08	32674	3.3	633.1
MARION	AK08	32620	3.8	342.8
MARION	AK08	32691	4.7	1648.9
MARION	AK08	32620	5.9	1738.5
MARION	AK08	32620	10.8	3055.9
MARION	AK08	32620	17.7	3256.2
MARION	AK08	32691	22.9	2144.5

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
MARION	AK09	.	.2	.
MARION	AK09	.	.4	.
MARION	AK09	.	.4	.
MARION	AK09	32632	.5	19.0
MARION	AK09	32679	.5	33.8
MARION	AK09	32679	.7	.
MARION	AK09	32620	.9	30.7
MARION	AK09	.	1.1	.
MARION	AK09	32679	1.3	242.5
MARION	AK09	32679	1.3	110.2
MARION	AK10	32679	.2	21.6
MARION	AL06	32630	.7	.
MARION	AL06	32630	1.3	101.5
MARION	AL06	32630	2.3	472.4
MARION	AL06	32630	3.9	651.7
MARION	AL07	32674	.8	109.9
MARION	AL07	32675	2.5	362.2
MARION	AL07	32675	4.7	433.6
MARION	AL07	32675	15.1	659.3
MARION	AL08	32674	2.3	387.0
MARION	AL08	32674	2.7	114.8
MARION	AL08	32674	3.4	1185.5
MARION	AL08	32674	3.9	272.3
MARION	AL08	32674	4.2	136.2
MARION	AL08	32674	4.2	314.7
MARION	AL08	32674	6.4	920.0
MARION	AL08	32674	8.0	1008.1
MARION	AL08	32674	8.3	1099.3
MARION	AL08	32674	8.7	254.9
MARION	AL08	32674	15.0	1914.6
MARION	AL09	32688	.8	5.2
MARION	AL09	32688	1.1	71.2
MARION	AL09	32671	1.4	1200.8
MARION	AL09	32688	2.6	88.3
MARION	AL09	33670	3.5	149.6
MARION	AL09	32671	3.8	190.4
MARION	AL09	32670	4.0	470.3
MARION	AL09	32671	4.4	631.3
MARION	AL09	32671	4.8	474.3
MARION	AL09	32671	6.0	743.0
MARION	AL09	32670	11.3	632.3
MARION	AL09	32671	13.4	2258.2
MARION	AL10	32688	.2	69.2
MARION	AL10	32688	.9	37.5
MARION	AL10	32688	.9	540.1
MARION	AL10	32679	2.9	75.4
MARION	AL11	32688	.2	26.7
MARION	AL11	32688	.2	13.3
MARION	AL11	32688	.2	45.3
MARION	AL11	32688	.4	16.9

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
MARION	AL11	32688	.5	36.3
MARION	AL11	32688	.6	73.0
MARION	AL11	32688	.6	23.9
MARION	AL11	32688	.6	26.7
MARION	AL11	32688	.7	45.3
MARION	AL11	32688	.8	29.7
MARION	AL11	32688	1.0	61.2
MARION	AL11	32688	1.2	33.3
MARION	AM09	32686	.2	151.8
MARION	AM09	32663	.5	479.3
MARION	AM09	32634	.7	362.8
MARION	AM09	32663	.8	176.1
MARION	AM09	32663	2.8	1073.5
MARION	AM09	32686	3.0	1498.9
MARION	AM09	32627	3.3	144.2
MARION	AM09	32675	3.4	815.7
MARION	AM09	32686	3.6	.
MARION	AM09	32670	6.6	519.4
MARION	AM09	32686	7.0	885.3
MARION	AM10	32670	1.2	228.0
MARION	AM10	32617	1.4	.
MARION	AM10	32670	1.7	434.0
MARION	AM10	32617	3.7	980.9
MARION	AM10	32670	3.7	1464.6
MARION	AM10	32617	4.9	1864.8
MARION	AM10	32670	9.8	1464.6
MARION	AM10	32670	10.2	638.6
MARION	AM10	32617	14.0	2312.1
MARION	AM10	32617	32.4	1591.1
MARION	AM11	32637	.4	.
MARION	AM11	32637	.5	34.2
MARION	AM11	32627	.6	20.8
MARION	AM11	32637	.7	21.1
MARION	AM12	32637	.2	24.0
MARION	AM12	33526	.2	79.7
MARION	AM12	32637	.2	101.3
MARION	AM12	32637	.5	16.8
MARION	AM12	32637	.6	176.6
MARION	AM12	32637	.7	79.9
MARION	AM12	32637	.8	48.1
MARION	AM12	32637	1.0	17.8
MARION	AM12	32637	1.0	159.4
MARION	AM12	32637	2.8	39.8
MARION	AM13	32637	.2	32.5
MARION	AM13	32637	.2	45.7
MARION	AM13	32637	.6	33.3
MARION	AM13	32637	1.1	29.3
MARION	AN09	32686	1.3	.
MARION	AN09	32686	2.1	203.3
MARION	AN09	32634	2.3	554.0

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
MARION	AN09	32686	2.7	285.2
MARION	AN09	32634	6.4	535.1
MARION	AN10	32640	.2	18.8
MARION	AN10	32633	.2	75.2
MARION	AN10	32640	.4	145.6
MARION	AN10	32640	.5	143.0
MARION	AN10	32627	.9	.
MARION	AN10	32686	1.3	241.2
MARION	AN10	32664	1.9	259.0
MARION	AN10	32627	2.2	180.9
MARION	AN10	32627	4.4	318.1
MARION	AN10	32627	4.7	226.1
MARION	AN10	32664	6.4	611.1
MARION	AN10	32627	14.3	600.3
MARION	AN11	32627	1.8	2522.5
MARION	AN11	32627	3.0	44.0
MARION	AN11	32627	3.7	227.4
MARION	AN11	32627	7.7	545.4
MARION	AN12	32682	.	34.7
MARION	AN12	32682	.2	60.6
MARION	AN12	32682	.2	8.4
MARION	AN12	32682	.2	23.0
MARION	AN12	32637	.9	65.3
MARION	AN12	32682	1.0	23.9
MARION	AN13	32637	.	40.0
MARION	AN13	32637	1.5	13.9
MARTIN	T20	33469	.2	28.4
MARTIN	U17	33456	.2	103.9
MARTIN	U17	33456	.4	81.3
MARTIN	U17	33456	1.6	62.2
MARTIN	U19	33455	.2	10.7
MARTIN	U19	33455	.2	34.2
MARTIN	U19	33455	.2	36.2
MARTIN	U19	33455	.2	81.3
MARTIN	U19	33455	.4	17.2
MARTIN	U19	33455	.5	25.1
MARTIN	U20	33455	.2	28.4
MARTIN	U20	33455	.2	.
MARTIN	U20	33455	.6	.
MARTIN	U20	33455	.7	31.0
MARTIN	V18	33497	.4	47.1
MARTIN	V19	33494	.2	14.1
MARTIN	V19	33497	.2	6.7
MARTIN	V19	33490	.2	2.5
MARTIN	V19	33490	.2	75.4
MARTIN	V19	33490	.2	129.7
MARTIN	V19	33490	.2	90.9
MARTIN	V20	33497	.2	15.5
MARTIN	V20	33494	.2	.
MARTIN	V20	33497	.5	.

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
MARTIN	V20	33494	.7	32.6
MARTIN	V20	33494	.7	18.4
MARTIN	V20	33494	1.2	18.0
MARTIN	W20	33457	.2	43.6
MARTIN	W20	33457	.5	30.9
MONROE	A04	33040	.2	5.0
MONROE	A04	33040	.2	23.4
MONROE	A04	33040	.2	39.4
MONROE	A04	33040	.6	24.3
MONROE	A04	33040	1.7	32.2
MONROE	A05	33040	.2	10.9
MONROE	A05	33040	.2	22.6
MONROE	A05	33040	.2	50.4
MONROE	A05	33040	.2	47.6
MONROE	A05	33040	.7	39.3
MONROE	A05	33040	.9	21.0
MONROE	B03	33042	.8	1.6
MONROE	B03	33042	.9	25.9
MONROE	B05	33043	.2	8.0
MONROE	B05	33043	.5	5.5
MONROE	B05	33043	.5	13.2
MONROE	B05	33043	.6	14.9
MONROE	B05	33043	1.0	11.1
MONROE	B07	33050	.2	13.7
MONROE	B07	33050	.2	16.3
MONROE	C06	33050	.2	15.2
MONROE	C06	33050	.2	30.0
MONROE	C07	33001	.2	19.8
MONROE	C08	33036	.2	22.9
MONROE	C08	33036	.2	.
MONROE	D04	33036	.2	81.3
MONROE	D04	33036	.2	30.9
MONROE	D04	33036	.6	23.6
MONROE	D04	33036	1.7	35.1
MONROE	D05	33036	.2	19.8
MONROE	D05	33070	1.5	16.3
MONROE	D05	33070	2.8	20.1
MONROE	E05	33070	.5	33.0
MONROE	E05	33070	.8	28.4
MONROE	E05	33036	1.0	52.1
MONROE	E06	33037	.2	0.0
MONROE	E06	33037	.2	0.0
MONROE	E06	33037	.6	.
MONROE	E06	33037	3.2	24.3
MONROE	G08	33037	.2	11.0
MONROE	G08	33037	.2	5.0
MONROE	G08	33037	.2	24.0
MONROE	G08	33037	.5	6.7
NASSAU	AU41	32011	.5	86.3
NASSAU	AV45	32009	.2	10.8

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
NASSAU	AV45	32009	.4	37.4
NASSAU	AW45	32046	.2	29.9
NASSAU	AW46	32011	.2	0.0
NASSAU	AW46	32011	.2	8.0
NASSAU	AW46	32011	.2	79.2
NASSAU	AW46	32011	.2	91.5
NASSAU	AW46	32011	.2	21.6
NASSAU	AW47	32011	.5	11.4
NASSAU	AW47	32097	.7	144.3
NASSAU	AW49	32034	.2	7.0
NASSAU	AW49	32034	.6	104.2
NASSAU	AX38	32046	.2	137.3
NASSAU	AX38	32046	.2	61.6
NASSAU	AX38	32046	.5	24.3
NASSAU	AX39	32046	.4	.
NASSAU	AX41	32097	.2	31.6
NASSAU	AX41	32034	.2	23.9
NASSAU	AX41	32097	.5	73.9
NASSAU	AX41	32097	.6	50.2
NASSAU	AX41	32097	.7	21.7
NASSAU	AX42	32034	.2	84.3
NASSAU	AX42	32034	.2	18.6
NASSAU	AX42	32034	.5	106.2
NASSAU	AX42	32034	.5	57.8
NASSAU	AX42	32034	.5	111.2
NASSAU	AY24	32046	.2	99.4
NASSAU	AY24	32046	.5	49.6
OKALOOSA	AV06	32569	.2	0.0
OKALOOSA	AV06	32569	.2	13.7
OKALOOSA	AV06	32569	.2	13.6
OKALOOSA	AV06	32569	.7	0.0
OKALOOSA	AV07	32569	.	22.6
OKALOOSA	AV07	32569	.2	17.4
OKALOOSA	AV07	32548	.2	78.7
OKALOOSA	AV07	32548	.4	0.0
OKALOOSA	AV07	32548	.8	170.1
OKALOOSA	AV07	32548	.9	188.0
OKALOOSA	AV08	32548	.	80.0
OKALOOSA	AV08	32548	.	26.7
OKALOOSA	AV08	32548	.2	24.1
OKALOOSA	AV08	32548	.2	32.0
OKALOOSA	AV08	32548	.2	26.7
OKALOOSA	AV08	32548	.4	57.6
OKALOOSA	AV09	32541	.2	10.7
OKALOOSA	AV09	32541	.4	39.5
OKALOOSA	AV09	32541	.7	16.5
OKALOOSA	AW08	32580	.	35.9
OKALOOSA	AW08	32580	.2	65.0
OKALOOSA	AW08	32580	.2	.
OKALOOSA	AW08	32580	.4	30.8

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
OKALOOSA	AW08	32580	.5	72.4
OKALOOSA	AW08	32580	1.1	95.3
OKALOOSA	AW09	32578	.	53.0
OKALOOSA	AW09	32578	.2	30.1
OKALOOSA	AW09	32578	.2	65.1
OKALOOSA	AW09	32578	.5	.
OKALOOSA	AW09	32578	.9	17.8
OKALOOSA	AX08	32537	.2	64.8
OKALOOSA	AX08	32537	.6	13.6
OKALOOSA	AX09	32536	1.1	29.1
OKALOOSA	AY07	32531	.	86.0
OKALOOSA	AY08	32531	.	307.5
OKALOOSA	AY08	32537	.	91.1
OKALOOSA	AY08	32531	.2	408.6
OKALOOSA	AY08	32531	.2	32.1
OKALOOSA	AY08	32531	1.8	106.2
OKALOOSA	AY09	32536	.	127.4
OKALOOSA	AY09	32536	.2	36.7
OKALOOSA	AY09	32536	.2	69.5
OKALOOSA	AY09	32536	.2	121.5
OKALOOSA	AY09	32536	.4	66.7
OKALOOSA	AY09	32536	1.5	128.7
OKALOOSA	AZ09	32531	.5	0.0
OKALOOSA	AZ11	32567	.9	216.6
OKALOOSA	AZ11	32567	1.2	.
OKEECHOBEE	V14	33474	.2	90.0
OKEECHOBEE	V15	33474	.2	60.3
OKEECHOBEE	V15	33474	.2	31.4
OKEECHOBEE	V15	33473	.2	.
OKEECHOBEE	V15	33474	.5	7.6
OKEECHOBEE	V16	33474	.2	50.0
OKEECHOBEE	V16	33474	.7	13.3
OKEECHOBEE	V16	33474	.8	38.4
OKEECHOBEE	W14	33472	1.0	72.6
OKEECHOBEE	W15	33472	.2	48.7
OKEECHOBEE	W15	33472	.2	182.1
OKEECHOBEE	W15	33472	.2	60.1
OKEECHOBEE	W15	33472	.6	11.5
OKEECHOBEE	W15	33472	1.3	16.3
OKEECHOBEE	X14	33472	1.0	36.1
OKEECHOBEE	X15	33472	.6	11.5
OKEECHOBEE	X16	33472	.4	6.7
OKEECHOBEE	X17	33472	1.0	10.0
ORANGE	AF09	32787	.2	38.8
ORANGE	AF10	32786	.2	30.0
ORANGE	AF10	32786	.2	10.0
ORANGE	AF10	32786	.2	15.5
ORANGE	AF10	32786	.2	25.6
ORANGE	AF10	32786	.5	23.1
ORANGE	AF10	32786	1.0	33.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
ORANGE	AF10	32786	1.5	.
ORANGE	AF10	32811	2.6	4.6
ORANGE	AF11	32819	.2	15.8
ORANGE	AF11	32819	.2	2.2
ORANGE	AF11	32821	.5	8.2
ORANGE	AF11	32821	.6	32.4
ORANGE	AF11	32821	.7	113.1
ORANGE	AF11	32819	.8	5.8
ORANGE	AF12	32812	.2	34.7
ORANGE	AF12	32824	.2	.
ORANGE	AF12	32806	.2	35.1
ORANGE	AF12	32806	.2	29.9
ORANGE	AF12	32812	.2	71.3
ORANGE	AF12	32812	.4	122.1
ORANGE	AF12	32806	.7	318.0
ORANGE	AF12	32806	.7	131.9
ORANGE	AF12	32806	2.0	77.6
ORANGE	AF12	32812	2.6	23.2
ORANGE	AG10	32787	.	118.3
ORANGE	AG10	32787	.2	95.2
ORANGE	AG10	32787	.2	35.3
ORANGE	AG10	32787	.2	38.8
ORANGE	AG10	32761	.4	225.6
ORANGE	AG10	32787	.6	185.3
ORANGE	AG11	32804	.	148.0
ORANGE	AG11	32810	.2	.
ORANGE	AG11	32810	.2	36.7
ORANGE	AG11	32812	.4	.
ORANGE	AG11	32811	.5	39.7
ORANGE	AG11	32810	.9	95.5
ORANGE	AG11	32810	1.1	122.2
ORANGE	AG11	32810	1.1	26.7
ORANGE	AG11	32818	1.3	.
ORANGE	AG11	32818	1.5	83.6
ORANGE	AG11	32810	1.5	288.8
ORANGE	AG11	32810	2.3	54.2
ORANGE	AG12	32792	.	30.0
ORANGE	AG12	32803	.	116.3
ORANGE	AG12	32789	.2	79.9
ORANGE	AG12	32792	.2	34.1
ORANGE	AG12	32792	.4	32.0
ORANGE	AG12	32792	.4	6.9
ORANGE	AG12	32817	.6	160.2
ORANGE	AG12	32822	.8	.
ORANGE	AG12	32822	1.3	54.3
ORANGE	AG12	32806	2.1	141.7
ORANGE	AG13	32825	.2	41.4
ORANGE	AG13	32826	.4	38.3
ORANGE	AG13	32826	.5	86.9
ORANGE	AG13	32825	.7	.

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
ORANGE	AG13	32826	.7	.
ORANGE	AG13	32817	1.0	17.7
ORANGE	AG14	32820	.2	32.8
ORANGE	AG14	32820	.2	127.3
ORANGE	AG14	32820	.9	30.4
ORANGE	AG14	32820	1.2	40.1
ORANGE	AG14	32709	1.4	49.9
ORANGE	AH10	32712	.2	17.8
ORANGE	AH10	32712	.2	14.3
ORANGE	AH10	32798	.5	70.6
ORANGE	AH10	32712	.6	25.4
ORANGE	AH10	32704	.7	49.1
ORANGE	AH10	32798	.8	.
ORANGE	AH10	32798	1.1	.
ORANGE	AH10	32712	1.5	43.1
ORANGE	AH10	32768	2.1	67.7
ORANGE	AH11	32703	.5	97.9
ORANGE	AI10	32712	.4	31.7
ORANGE	AI10	32712	1.2	40.5
OSCEOLA	AB14	32742	.2	.
OSCEOLA	AC12	32741	.2	.
OSCEOLA	AC12	32741	.2	.
OSCEOLA	AC12	32741	.2	106.5
OSCEOLA	AC12	32741	.2	45.8
OSCEOLA	AC14	32739	.2	.
OSCEOLA	AC16	32904	.	51.1
OSCEOLA	AC16	32901	.2	43.2
OSCEOLA	AD12	32741	.2	64.5
OSCEOLA	AD12	32758	.2	16.3
OSCEOLA	AD12	32758	.2	20.6
OSCEOLA	AD12	32741	.4	66.6
OSCEOLA	AD13	32769	.2	29.0
OSCEOLA	AD13	32769	.2	78.7
OSCEOLA	AD13	32769	.5	89.7
OSCEOLA	AD14	32769	.2	35.4
OSCEOLA	AD15	32904	.2	4.1
OSCEOLA	AE10	33848	.2	20.6
OSCEOLA	AE10	33848	.4	5.4
OSCEOLA	AE10	33848	.5	36.1
OSCEOLA	AE10	33848	.6	18.0
OSCEOLA	AE10	33848	1.0	34.4
OSCEOLA	AE11	32741	.2	4.7
OSCEOLA	AE11	32741	.2	16.3
OSCEOLA	AE11	32741	.2	18.2
OSCEOLA	AE11	32741	.2	14.9
OSCEOLA	AE11	32743	.2	149.8
OSCEOLA	AE11	32743	.2	44.4
OSCEOLA	AE11	32741	.4	8.5
OSCEOLA	AE11	32741	.6	.
OSCEOLA	AE12	32769	.	31.9

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
OSCEOLA	AE12	32769	.	10.7
OSCEOLA	AE12	32769	.2	19.6
OSCEOLA	AE12	32769	.2	12.3
OSCEOLA	AE13	32769	.6	9.3
OSCEOLA	AE13	32769	.7	53.4
OSCEOLA	AE13	32769	.8	197.0
OSCEOLA	AE13	32769	.9	.
OSCEOLA	AE13	32769	1.1	59.8
OSCEOLA	AE13	32769	1.5	209.7
PALM BEACH	O14	33428	.5	68.3
PALM BEACH	O14	33428	.5	356.0
PALM BEACH	O14	33433	.9	85.5
PALM BEACH	O14	33428	.9	207.1
PALM BEACH	O14	33428	1.6	221.3
PALM BEACH	O15	33432	.2	13.2
PALM BEACH	O15	33431	.2	13.2
PALM BEACH	O15	33432	.5	20.2
PALM BEACH	P17	33445	.2	24.3
PALM BEACH	P17	33434	.2	78.8
PALM BEACH	P17	33434	.2	.
PALM BEACH	P17	33445	.4	42.7
PALM BEACH	P17	33434	.5	5.9
PALM BEACH	P17	33434	.7	206.2
PALM BEACH	P18	33444	.	11.7
PALM BEACH	P18	33444	.2	25.9
PALM BEACH	P18	33444	.2	8.1
PALM BEACH	P18	33445	.2	3.9
PALM BEACH	P18	33444	.5	38.8
PALM BEACH	P18	33444	.6	17.6
PALM BEACH	Q17	33463	.5	314.9
PALM BEACH	Q17	33463	.6	.
PALM BEACH	Q17	33467	.9	41.8
PALM BEACH	Q17	33463	1.0	98.9
PALM BEACH	Q18	33462	.2	.
PALM BEACH	Q18	33435	.2	131.1
PALM BEACH	Q18	33462	.2	11.1
PALM BEACH	Q18	33435	.2	11.2
PALM BEACH	Q18	33462	.5	2.1
PALM BEACH	Q18	33436	1.6	16.5
PALM BEACH	R13	33440	.2	.
PALM BEACH	R13	33459	1.1	100.6
PALM BEACH	R14	33430	.2	.
PALM BEACH	R14	33430	.2	226.8
PALM BEACH	R14	33430	.6	188.6
PALM BEACH	R14	33430	.7	188.8
PALM BEACH	R18	33411	.2	162.0
PALM BEACH	R18	33411	.2	37.3
PALM BEACH	R18	33415	.2	10.7
PALM BEACH	R18	33411	.4	.
PALM BEACH	R18	33413	.4	11.2

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
PALM BEACH	R18	33411	.6	38.2
PALM BEACH	R19	33409	.2	92.7
PALM BEACH	R19	33417	.2	29.8
PALM BEACH	R19	33415	.2	6.7
PALM BEACH	R19	33406	.2	7.0
PALM BEACH	R19	33461	.2	86.2
PALM BEACH	R19	33417	.5	132.6
PALM BEACH	S14	33476	.2	22.0
PALM BEACH	S14	33476	.2	97.8
PALM BEACH	S14	33491	.8	.
PALM BEACH	S18	33418	.5	228.9
PALM BEACH	S19	33418	.2	50.9
PALM BEACH	S19	33403	.2	11.6
PALM BEACH	S19	33410	.2	22.3
PALM BEACH	S19	33410	.4	16.8
PALM BEACH	S19	33408	.8	51.9
PALM BEACH	S19	33418	1.2	168.7
PALM BEACH	T19	33458	.2	81.2
PALM BEACH	T19	33458	.2	56.8
PALM BEACH	T19	33458	.2	55.1
PALM BEACH	T19	33478	.5	623.1
PALM BEACH	T19	33478	.6	171.6
PALM BEACH	T19	33478	.8	367.7
PALM BEACH	T20	33469	.2	7.0
PALM BEACH	T20	33469	.2	6.9
PALM BEACH	T20	33458	.4	16.5
PALM BEACH	T20	33458	.6	6.0
PALM BEACH	T20	33458	1.5	3.3
PASCO	AD01	33590	.2	9.6
PASCO	AD02	33590	.2	14.4
PASCO	AD02	33552	.2	214.0
PASCO	AD02	33552	.2	109.8
PASCO	AD02	33552	.2	47.3
PASCO	AD02	33552	.2	.
PASCO	AD02	33552	.2	45.6
PASCO	AD02	33552	.4	65.9
PASCO	AD02	33552	.5	144.3
PASCO	AD02	33552	.6	51.1
PASCO	AD03	33556	.2	45.5
PASCO	AD03	33556	.5	33.2
PASCO	AD03	33549	.9	66.0
PASCO	AD04	33539	.2	19.0
PASCO	AD04	33539	.2	100.6
PASCO	AD04	33539	.2	76.9
PASCO	AD04	33539	.2	104.5
PASCO	AD04	33549	.5	31.9
PASCO	AD05	34249	.2	6.0
PASCO	AD05	34249	.2	65.9
PASCO	AD05	34249	.4	100.8
PASCO	AD05	34249	.5	119.7

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
PASCO	AD05	34249	.5	72.1
PASCO	AD05	34249	.7	344.0
PASCO	AD05	34249	.9	116.3
PASCO	AD05	34249	1.3	263.0
PASCO	AD06	34248	.	9.8
PASCO	AD06	34249	.2	49.1
PASCO	AD06	34248	.2	136.9
PASCO	AD06	34249	.2	28.4
PASCO	AD06	34248	.2	31.7
PASCO	AD06	34248	.2	30.1
PASCO	AD06	34249	.7	170.6
PASCO	AD06	34248	.8	488.9
PASCO	AD06	34248	1.3	71.5
PASCO	AE01	33553	.	47.4
PASCO	AE01	33568	.2	.
PASCO	AE01	33568	.2	31.0
PASCO	AE01	33568	.2	45.3
PASCO	AE01	33552	.4	43.0
PASCO	AE01	33568	.4	72.6
PASCO	AE01	33568	.6	18.4
PASCO	AE01	33553	.7	32.9
PASCO	AE02	33539	.	24.6
PASCO	AE02	33562	.2	58.5
PASCO	AE02	33539	.2	28.1
PASCO	AE02	33526	.2	26.7
PASCO	AE02	33553	.4	27.4
PASCO	AE02	33562	.4	71.3
PASCO	AE02	33562	.5	25.4
PASCO	AE02	33562	.8	86.0
PASCO	AE03	33526	.2	41.2
PASCO	AE03	33539	.2	22.5
PASCO	AE03	33526	.2	6.4
PASCO	AE03	33539	.2	39.4
PASCO	AE03	33539	.2	66.3
PASCO	AE03	33539	.7	34.2
PASCO	AE04	34266	.2	24.9
PASCO	AE04	34266	.5	93.0
PASCO	AE04	34266	.7	27.6
PASCO	AE04	34266	1.2	101.1
PASCO	AE05	33525	.4	362.6
PASCO	AE05	33525	.5	91.6
PASCO	AE05	33525	1.2	91.1
PASCO	AE05	33525	1.3	200.7
PASCO	AE05	33525	2.2	167.1
PASCO	AE05	33525	2.7	1487.5
PASCO	AE05	33525	8.0	22.9
PASCO	AF03	33526	.2	18.4
PASCO	AF04	33525	2.0	175.9
PASCO	AF05	34297	.2	108.0
PASCO	AF05	33525	1.1	85.0

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
PASCO	AF05	33525	1.2	660.0
PASCO	AF05	33525	1.6	524.4
PASCO	AF05	33525	4.5	592.2
PASCO	AF05	33525	5.1	418.1
PASCO	AF05	33525	7.0	1259.8
PINELLAS	Z01	33712	.2	11.2
PINELLAS	Z01	33711	.2	.
PINELLAS	Z01	33706	.2	17.5
PINELLAS	Z01	33705	.4	353.4
PINELLAS	AA01	33542	.2	41.6
PINELLAS	AA01	33706	.2	40.2
PINELLAS	AA01	33706	.2	61.6
PINELLAS	AA01	33542	.7	42.0
PINELLAS	AA01	33708	.8	160.1
PINELLAS	AA01	33542	1.4	82.2
PINELLAS	AA01	33542	4.3	224.4
PINELLAS	AA02	33565	.2	116.9
PINELLAS	AA02	33710	.2	12.8
PINELLAS	AA02	33711	.2	36.2
PINELLAS	AA02	33710	.2	11.7
PINELLAS	AA02	33712	.2	.
PINELLAS	AA02	33712	.2	21.1
PINELLAS	AA02	33712	.2	21.3
PINELLAS	AA02	33712	.2	261.5
PINELLAS	AA02	33712	.2	80.4
PINELLAS	AA02	33712	.2	3.2
PINELLAS	AA02	33712	.4	.
PINELLAS	AA02	33709	.9	39.3
PINELLAS	AA02	33712	2.4	56.8
PINELLAS	AA03	33703	.2	43.2
PINELLAS	AA03	33703	.2	.
PINELLAS	AA03	33703	.4	.
PINELLAS	AA03	33703	1.2	12.7
PINELLAS	AB01	33546	.2	108.2
PINELLAS	AB01	33516	.2	66.6
PINELLAS	AB01	33543	.2	50.5
PINELLAS	AB01	33515	.2	65.6
PINELLAS	AB01	33515	.2	20.4
PINELLAS	AB01	33515	.2	50.8
PINELLAS	AB01	33516	.2	23.5
PINELLAS	AB01	33543	.2	85.4
PINELLAS	AB01	33516	.5	114.3
PINELLAS	AB01	33514	.8	74.3
PINELLAS	AB01	33546	1.2	66.0
PINELLAS	AB02	33540	.	126.6
PINELLAS	AB02	33519	.2	205.2
PINELLAS	AB02	33520	.2	34.5
PINELLAS	AB02	33520	.2	19.6
PINELLAS	AB02	33520	.2	145.3
PINELLAS	AB02	33519	.2	408.1

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
PINELLAS	AB02	33519	.2	47.4
PINELLAS	AB02	33520	.4	25.9
PINELLAS	AB02	33519	.5	36.2
PINELLAS	AB02	33519	.7	24.1
PINELLAS	AB02	33572	.8	186.4
PINELLAS	AB02	33572	2.2	207.4
PINELLAS	AC01	33528	.2	154.2
PINELLAS	AC01	33528	.2	55.2
PINELLAS	AC01	33528	.2	27.2
PINELLAS	AC01	33563	.2	51.6
PINELLAS	AC01	33563	.2	11.1
PINELLAS	AC01	33563	.2	27.3
PINELLAS	AC01	33563	.2	74.5
PINELLAS	AC01	33563	.2	39.4
PINELLAS	AC01	33563	.4	287.5
PINELLAS	AC01	33563	.5	18.4
PINELLAS	AC01	33563	.5	75.7
PINELLAS	AC01	33528	.6	102.6
PINELLAS	AC01	33528	.9	147.0
PINELLAS	AC02	33557	.2	51.9
PINELLAS	AC02	33572	.2	6367.2
PINELLAS	AC02	33572	.2	530.4
PINELLAS	AC02	33563	.4	38.1
PINELLAS	AC02	33572	1.0	240.9
PINELLAS	AC02	33572	1.1	28.3
PINELLAS	AC02	33572	3.2	452.1
PINELLAS	AD01	33589	.2	83.9
PINELLAS	AD01	33589	.2	79.2
PINELLAS	AD01	33589	.2	36.4
PINELLAS	AD01	33589	.2	25.4
PINELLAS	AD01	33589	.4	36.4
PINELLAS	AD01	33589	.5	15.4
PINELLAS	AD01	33589	.6	70.6
PINELLAS	AD02	33589	.2	11.0
PINELLAS	AD02	33590	.2	27.6
PINELLAS	AD02	33589	.2	18.9
PINELLAS	AD02	33589	.2	32.9
POLK	Z06	33860	.5	152.7
POLK	Z06	33860	2.4	654.6
POLK	Z06	33860	5.2	491.0
POLK	Z08	33841	1.4	72.7
POLK	Z08	33841	1.6	262.5
POLK	Z08	33841	2.5	2707.5
POLK	Z08	33841	3.6	131.0
POLK	Z09	33843	.2	6.9
POLK	Z09	33841	.8	381.6
POLK	Z10	33843	.2	27.5
POLK	Z10	33843	.2	5.4
POLK	Z10	33843	.2	3.0
POLK	Z10	33843	.2	9.9

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
POLK	Z10	33843	.2	50.9
POLK	Z10	33843	.2	32.8
POLK	Z10	33843	1.9	7.2
POLK	AA07	33860	.5	41.1
POLK	AA07	33860	.8	143.3
POLK	AA08	33835	.2	.
POLK	AA08	33835	1.6	916.3
POLK	AA08	33860	1.8	853.0
POLK	AA08	33860	2.0	1399.8
POLK	AA08	33835	4.9	161.8
POLK	AA08	33860	5.3	1215.9
POLK	AA08	33860	6.2	4260.8
POLK	AA08	33860	6.8	6587.0
POLK	AA08	33860	7.3	.
POLK	AA09	33841	.7	59.1
POLK	AA09	33847	2.3	257.3
POLK	AA09	33847	3.3	6.6
POLK	AA09	33830	3.6	691.6
POLK	AA09	33830	6.8	1458.0
POLK	AA11	33827	.2	16.9
POLK	AA11	33843	.2	15.2
POLK	AA11	33843	.2	28.0
POLK	AA11	33827	.2	12.3
POLK	AA11	33827	.2	15.8
POLK	AA11	33853	.4	16.3
POLK	AA11	33843	.4	49.4
POLK	AA11	33853	.5	21.4
POLK	AA13	33855	.2	5.3
POLK	AA13	33855	.2	17.0
POLK	AA14	33850	.2	24.0
POLK	AA14	33853	.2	2.3
POLK	AA14	33853	.2	59.6
POLK	AB07	33860	.2	163.9
POLK	AB08	33813	.	1864.9
POLK	AB08	33813	.	116.3
POLK	AB08	33860	.4	155.5
POLK	AB08	33803	.6	244.2
POLK	AB08	33803	.7	348.4
POLK	AB08	33803	1.8	119.1
POLK	AB08	33803	2.3	1421.8
POLK	AB08	33813	3.9	518.6
POLK	AB08	33811	4.9	.
POLK	AB08	33860	9.0	423.8
POLK	AB09	33839	.2	30.0
POLK	AB09	33830	.4	312.5
POLK	AB09	33830	1.2	206.0
POLK	AB09	33830	1.6	788.5
POLK	AB09	33830	3.3	1329.4
POLK	AB09	33830	4.6	2317.7
POLK	AB09	33846	4.9	2023.5

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
POLK	AB09	33830	5.1	2085.3
POLK	AB09	33830	5.9	1708.9
POLK	AB09	33830	6.3	1084.5
POLK	AB09	33830	9.6	3659.7
POLK	AB09	33830	10.1	1204.3
POLK	AB09	33830	13.2	2340.6
POLK	AB10	33880	.	33.1
POLK	AB10	33880	.	32.8
POLK	AB10	33880	.	39.8
POLK	AB10	33880	.2	15.5
POLK	AB10	33883	.2	24.2
POLK	AB10	33853	.2	25.4
POLK	AB10	33880	.6	12.8
POLK	AB10	33880	.8	32.1
POLK	AB10	33830	1.4	103.1
POLK	AB11	33863	.2	.
POLK	AB11	33863	.2	36.7
POLK	AB11	33877	.2	.
POLK	AB11	33853	.2	10.1
POLK	AB11	33853	.2	25.3
POLK	AB11	33853	.2	32.7
POLK	AB11	33853	.2	42.7
POLK	AB11	33853	.5	27.5
POLK	AB11	33853	.5	72.9
POLK	AB11	33863	.7	.
POLK	AB11	33853	.7	42.3
POLK	AB11	33830	.8	.
POLK	AC07	33809	.2	62.5
POLK	AC07	33566	.2	30.3
POLK	AC07	33809	.2	33.1
POLK	AC07	33809	.5	172.7
POLK	AC07	33805	.6	75.9
POLK	AC07	33809	.7	29.4
POLK	AC07	33809	1.1	116.3
POLK	AC07	33809	2.2	288.4
POLK	AC08	33805	.	166.1
POLK	AC08	33805	.	12.9
POLK	AC08	33803	.	194.7
POLK	AC08	33803	.	592.7
POLK	AC08	33805	.2	24.2
POLK	AC08	33809	.5	102.1
POLK	AC08	33803	.5	290.3
POLK	AC08	33801	.8	81.7
POLK	AC08	33801	1.2	87.6
POLK	AC09	33823	.2	40.1
POLK	AC09	33881	.2	79.7
POLK	AC09	33823	.2	10.8
POLK	AC09	33880	.5	20.8
POLK	AC09	33823	.5	22.9
POLK	AC09	33823	.5	14.5

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
POLK	AC09	33823	.6	71.5
POLK	AC09	33881	.7	52.7
POLK	AC09	33801	.8	48.5
POLK	AC09	33823	.8	212.2
POLK	AC09	33823	.9	91.9
POLK	AC10	33850	.2	22.6
POLK	AC10	33850	.2	19.1
POLK	AC10	33844	.2	25.3
POLK	AC10	33851	.2	63.6
POLK	AC10	33881	.2	41.0
POLK	AC10	33881	.2	.
POLK	AC10	33850	.2	.
POLK	AC10	33850	.4	62.6
POLK	AC10	33880	.5	39.8
POLK	AC10	33881	.5	63.2
POLK	AC10	33881	.6	59.8
POLK	AC11	33851	.	1.0
POLK	AC11	33838	.2	33.8
POLK	AC11	33844	.2	0.0
POLK	AC11	33844	.2	8.5
POLK	AC11	33844	.2	38.1
POLK	AC11	33844	.2	20.8
POLK	AC11	33844	.2	38.6
POLK	AC11	33844	.5	.
POLK	AC12	33844	.2	63.1
POLK	AC12	32758	.2	.
POLK	AD07	33809	.5	254.1
POLK	AD07	33809	.6	138.9
POLK	AD07	33809	6.0	991.0
POLK	AD08	33802	.	53.3
POLK	AD08	33809	.2	114.5
POLK	AD08	33809	.2	263.6
POLK	AD08	33809	.5	70.5
POLK	AD08	33809	.8	216.5
POLK	AD08	33809	.8	212.0
POLK	AD08	33809	1.6	156.2
POLK	AD08	33809	1.6	20.2
POLK	AD08	33809	1.8	345.3
POLK	AD09	33868	.2	115.3
POLK	AD09	33868	.2	103.0
POLK	AD09	33868	.2	382.5
POLK	AD09	33868	.2	58.0
POLK	AD10	33844	.2	16.2
POLK	AD10	33868	.2	14.1
POLK	AD10	33880	.2	33.2
POLK	AD10	33844	.7	.
POLK	AD11	33837	.2	33.2
POLK	AD11	33837	.2	47.7
POLK	AD11	33858	.2	8.0
POLK	AD11	33844	.2	21.0

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
POLK	AD11	33837	.2	8.2
POLK	AD11	33844	.2	20.7
POLK	AD11	33844	.2	19.7
POLK	AD11	33837	.6	8.4
POLK	AE07	33840	.	169.6
POLK	AE08	33868	.2	10.5
PUTNAM	AN14	32039	.2	18.2
PUTNAM	AN14	32093	.2	33.9
PUTNAM	AN14	32093	.2	29.3
PUTNAM	AN14	32093	.2	33.0
PUTNAM	AN14	32012	.7	24.1
PUTNAM	AN14	32093	.8	33.0
PUTNAM	AN15	32012	.2	30.6
PUTNAM	AN15	32012	.4	99.3
PUTNAM	AN15	32012	.5	6.2
PUTNAM	AN15	32012	.5	15.0
PUTNAM	AN15	32012	.6	27.4
PUTNAM	AN15	32012	1.3	70.3
PUTNAM	AO14	32640	.6	19.9
PUTNAM	AO14	32640	.6	31.6
PUTNAM	AO14	32640	.7	164.7
PUTNAM	AO14	32640	.9	37.9
PUTNAM	AO15	32640	.5	18.4
PUTNAM	AO15	32682	.6	23.1
PUTNAM	AO15	32640	.6	15.8
PUTNAM	AO15	32682	.8	34.2
PUTNAM	AO15	32682	1.1	47.5
PUTNAM	AO16	32047	.2	26.7
PUTNAM	AO16	32077	.4	3.6
PUTNAM	AO17	32077	.2	17.8
PUTNAM	AO17	32077	.2	25.4
PUTNAM	AO17	32089	.2	18.6
PUTNAM	AO17	32077	.2	8.5
PUTNAM	AO17	32077	.5	12.1
PUTNAM	AO17	32077	1.0	73.5
PUTNAM	AO18	32088	.2	22.3
PUTNAM	AO18	32089	.2	30.6
PUTNAM	AO18	32088	.4	16.9
PUTNAM	AO18	32088	.4	.
PUTNAM	AO18	32088	.8	22.5
PUTNAM	AO18	32088	.9	56.3
PUTNAM	AP20	32666	.7	29.8
PUTNAM	AP22	32048	.4	18.2
PUTNAM	AP22	32635	.7	98.6
PUTNAM	AP23	32077	.2	100.2
PUTNAM	AP23	32077	.2	37.6
PUTNAM	AP23	32077	.2	16.6
PUTNAM	AP23	32077	.2	40.2
PUTNAM	AP23	32077	1.4	.
PUTNAM	AP24	32077	.2	27.3

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
PUTNAM	AP24	32031	.2	10.2
PUTNAM	AP24	32031	.2	33.6
PUTNAM	AP24	32031	.6	155.0
PUTNAM	AP24	32031	.7	253.0
PUTNAM	AP24	32031	1.0	11.7
PUTNAM	AQ24	32007	.6	16.2
SAINT JOHNS	AP25	32033	.	51.4
SAINT JOHNS	AP25	32045	.2	21.9
SAINT JOHNS	AP25	32033	.5	6.3
SAINT JOHNS	AP25	32045	.6	43.5
SAINT JOHNS	AP27	32084	1.1	45.9
SAINT JOHNS	AQ27	32086	.2	23.9
SAINT JOHNS	AQ27	32086	.2	18.6
SAINT JOHNS	AQ27	32086	.2	33.9
SAINT JOHNS	AQ27	32086	.2	102.5
SAINT JOHNS	AQ27	32086	.4	14.8
SAINT JOHNS	AQ27	32086	1.3	100.5
SAINT JOHNS	AR30	32084	.2	58.0
SAINT JOHNS	AR30	32084	.5	151.4
SAINT JOHNS	AR31	32084	.2	90.9
SAINT JOHNS	AR31	32084	.2	17.6
SAINT JOHNS	AR31	32084	.2	101.8
SAINT JOHNS	AR31	32084	.2	27.4
SAINT JOHNS	AR31	32084	.7	26.1
SAINT JOHNS	AR32	32084	.2	33.4
SAINT JOHNS	AR32	32084	.2	52.4
SAINT JOHNS	AR32	32084	.2	70.1
SAINT JOHNS	AR32	32084	.2	32.7
SAINT JOHNS	AR32	32084	.2	37.6
SAINT JOHNS	AR32	32084	.4	31.8
SAINT JOHNS	AS34	32358	.2	13.3
SAINT JOHNS	AS34	32358	.2	23.9
SAINT JOHNS	AS34	32358	.5	22.5
SAINT JOHNS	AS34	32358	.6	41.4
SAINT JOHNS	AS36	32082	.2	55.2
SAINT JOHNS	AS36	32082	.6	54.9
SAINT JOHNS	AT37	32082	.2	18.5
SAINT JOHNS	AT37	32082	.2	27.8
SAINT JOHNS	AT37	32082	.2	98.6
SAINT JOHNS	AT37	32082	.5	20.3
SAINT JOHNS	AT37	32082	.9	127.3
SAINT JOHNS	AT38	32082	.2	136.1
SAINT JOHNS	AT38	32082	.2	72.7
SAINT JOHNS	AT38	32082	.2	.
SAINT JOHNS	AT38	32082	.4	75.6
SAINT JOHNS	AT38	32082	.6	285.3
SAINT LUCIE	V18	33453	.	4.9
SAINT LUCIE	V18	33453	.6	71.5
SAINT LUCIE	W17	33453	.2	72.3
SAINT LUCIE	W18	33453	.2	70.0

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
SAINT LUCIE	W18	33453	.2	3.5
SAINT LUCIE	W18	33453	.2	82.1
SAINT LUCIE	W18	33482	.4	15.0
SAINT LUCIE	W19	33452	.	47.6
SAINT LUCIE	W19	33482	.2	23.1
SAINT LUCIE	W19	33452	.2	12.0
SAINT LUCIE	W19	33452	.2	119.0
SAINT LUCIE	W19	33482	.6	73.5
SAINT LUCIE	W19	33482	.7	15.9
SAINT LUCIE	W20	33457	.2	.
SAINT LUCIE	W20	33457	.2	62.6
SAINT LUCIE	W20	33457	.4	22.5
SAINT LUCIE	X17	33451	1.0	88.3
SAINT LUCIE	X18	33451	.4	12.5
SAINT LUCIE	X19	33450	.	94.8
SAINT LUCIE	X19	33450	.2	34.0
SAINT LUCIE	X19	33450	.2	7.0
SAINT LUCIE	X19	33450	.2	.
SAINT LUCIE	X20	33482	.2	12.3
SAINT LUCIE	X20	33449	.2	39.0
SAINT LUCIE	X20	33450	.2	7.0
SAINT LUCIE	X20	33482	.5	.
SAINT LUCIE	X20	33482	1.0	10.1
SAINT LUCIE	X20	33482	1.0	11.0
SAINT LUCIE	Y20	33451	.2	30.0
SAINT LUCIE	Y20	33451	.5	12.3
SAINT LUCIE	Y20	33451	.5	10.3
SAINT LUCIE	Y21	33450	.4	77.0
SANTA ROSA	AU04	32561	.2	54.2
SANTA ROSA	AU04	32561	.6	80.2
SANTA ROSA	AU04	32561	.8	.
SANTA ROSA	AV04	32561	.2	10.9
SANTA ROSA	AV04	32561	.2	15.7
SANTA ROSA	AV04	32561	.7	12.9
SANTA ROSA	AV04	32561	1.0	26.1
SANTA ROSA	AV05	32561	.	15.4
SANTA ROSA	AV05	32561	.2	29.0
SANTA ROSA	AV05	32561	.2	18.7
SANTA ROSA	AV05	32561	.2	72.7
SANTA ROSA	AV05	32561	.2	19.8
SANTA ROSA	AV05	32561	.4	4.6
SANTA ROSA	AV06	32569	.2	9.6
SANTA ROSA	AV06	32569	.5	10.8
SANTA ROSA	AW03	32570	.2	161.8
SANTA ROSA	AW03	32570	.5	24.3
SANTA ROSA	AW03	32570	1.0	172.6
SANTA ROSA	AW03	32570	1.0	47.0
SANTA ROSA	AW04	32570	.2	120.5
SANTA ROSA	AW04	32570	.2	90.7
SANTA ROSA	AW04	32570	.7	204.4

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
SANTA ROSA	AW04	32570	.8	153.2
SANTA ROSA	AW04	32570	1.1	.
SANTA ROSA	AX04	32570	.	139.1
SANTA ROSA	AX04	32570	.	33.6
SANTA ROSA	AX05	32570	.2	16.6
SANTA ROSA	AX05	32570	.6	.
SANTA ROSA	AX05	32570	.7	75.1
SANTA ROSA	AX05	32570	.8	186.0
SANTA ROSA	AX05	32572	.9	287.0
SANTA ROSA	AX05	32570	2.6	226.4
SANTA ROSA	AY04	32565	.5	120.1
SANTA ROSA	AY05	32570	.4	42.6
SANTA ROSA	AY05	32570	.5	159.9
SANTA ROSA	AY06	32570	.2	115.8
SANTA ROSA	AZ05	32565	1.0	299.8
SANTA ROSA	AZ06	32565	.8	30.6
SANTA ROSA	AZ06	32565	1.1	356.8
SARASOTA	T01	33533	.9	199.1
SARASOTA	T01	33533	1.8	331.1
SARASOTA	T01	33533	2.2	296.8
SARASOTA	T02	33533	.2	102.3
SARASOTA	T02	33533	.4	105.4
SARASOTA	T02	33533	1.0	24.7
SARASOTA	U01	33533	.	81.2
SARASOTA	U01	33595	.2	13.2
SARASOTA	U01	33595	.2	25.7
SARASOTA	U01	33533	.2	319.7
SARASOTA	U01	33533	.2	93.4
SARASOTA	U01	33595	.2	94.3
SARASOTA	U01	33595	.4	277.3
SARASOTA	U01	33595	.4	102.5
SARASOTA	U01	33533	.4	.
SARASOTA	U01	33595	.5	128.7
SARASOTA	U01	33595	.6	.
SARASOTA	U01	33595	.8	110.4
SARASOTA	U01	33595	1.1	51.3
SARASOTA	U01	33595	1.2	88.7
SARASOTA	U01	33595	1.3	41.2
SARASOTA	U01	33595	2.0	47.1
SARASOTA	U02	33595	.2	229.8
SARASOTA	U02	33595	.2	20.5
SARASOTA	U02	33595	.2	212.0
SARASOTA	U02	33585	.2	127.7
SARASOTA	U02	33595	.2	358.8
SARASOTA	U02	33595	.9	277.2
SARASOTA	U02	33596	1.4	62.2
SARASOTA	U02	33595	1.4	191.8
SARASOTA	U02	33595	2.1	269.3
SARASOTA	U02	33595	2.9	311.8
SARASOTA	U02	33595	3.2	421.8

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
SARASOTA	U03	33596	.4	170.1
SARASOTA	U03	33596	1.4	166.3
SARASOTA	U03	33596	1.6	953.4
SARASOTA	V01	34242	.	76.5
SARASOTA	V01	33581	.2	172.5
SARASOTA	V01	33559	1.4	184.0
SARASOTA	V01	34242	1.5	290.4
SARASOTA	V02	33555	.5	77.1
SARASOTA	V02	33555	.6	238.2
SARASOTA	V02	33559	.7	43.4
SARASOTA	V02	33583	.9	172.6
SARASOTA	V02	33555	.9	255.6
SARASOTA	V02	33559	.9	536.2
SARASOTA	V02	33555	1.2	.
SARASOTA	V02	33555	1.5	319.1
SARASOTA	V02	33555	1.8	605.5
SARASOTA	V02	33583	2.2	286.6
SARASOTA	V02	33581	2.3	124.0
SARASOTA	W01	33581	.2	119.9
SARASOTA	W01	33580	.2	39.1
SARASOTA	W01	33577	.2	69.2
SARASOTA	W01	33581	.2	85.1
SARASOTA	W01	33577	.2	89.0
SARASOTA	W01	33577	.2	26.7
SARASOTA	W01	33577	.2	9.4
SARASOTA	W01	33579	.4	535.5
SARASOTA	W01	33580	.7	45.2
SARASOTA	W01	33581	.9	333.5
SARASOTA	W01	33577	1.2	111.9
SARASOTA	W01	33580	1.4	83.7
SARASOTA	W01	33577	2.3	182.3
SARASOTA	W01	33581	2.8	231.4
SARASOTA	W02	33583	.2	71.2
SARASOTA	W02	34241	.2	57.7
SARASOTA	W02	34241	.2	49.7
SARASOTA	W02	34241	.2	0.0
SARASOTA	W02	34241	.4	173.7
SARASOTA	W02	34240	.7	116.8
SARASOTA	W02	34241	.8	106.7
SARASOTA	W02	33582	1.0	198.4
SARASOTA	W02	33582	1.0	166.3
SARASOTA	W02	33583	1.1	394.5
SARASOTA	W02	34241	1.1	333.9
SARASOTA	W02	33583	1.2	66.0
SARASOTA	X02	33580	.2	11.2
SARASOTA	X02	34243	.7	13.6
SARASOTA	X03	33580	.7	.
SEMINOLE	AH11	32714	.2	57.9
SEMINOLE	AH11	32714	.2	21.5
SEMINOLE	AH11	32779	.2	.

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
SEMINOLE	AH11	32779	.2	18.0
SEMINOLE	AH11	32779	.2	60.7
SEMINOLE	AH11	32810	.6	206.5
SEMINOLE	AH11	32714	.7	58.2
SEMINOLE	AH11	32714	1.0	46.1
SEMINOLE	AH11	32714	2.0	263.5
SEMINOLE	AH12	32707	.2	14.1
SEMINOLE	AH12	32772	.2	8.5
SEMINOLE	AH12	32750	.4	39.2
SEMINOLE	AH12	32701	.5	13.2
SEMINOLE	AH12	32750	.8	24.9
SEMINOLE	AH12	32701	1.2	.
SEMINOLE	AH13	32765	.2	39.2
SEMINOLE	AH13	32765	.2	19.5
SEMINOLE	AH13	32765	.4	56.5
SEMINOLE	AH13	32765	.9	13.7
SEMINOLE	AH13	32765	.9	5.2
SEMINOLE	AH14	32766	.	35.9
SEMINOLE	AH14	32766	.2	10.3
SEMINOLE	AH14	32766	.2	6.8
SEMINOLE	AH14	32766	.2	17.5
SEMINOLE	AH14	32766	.2	9.3
SEMINOLE	AI11	32771	.7	5.9
SEMINOLE	AI12	32771	.	57.1
SEMINOLE	AI12	32771	.2	5.3
SEMINOLE	AI12	32771	.2	14.2
SEMINOLE	AI12	32771	.2	24.4
SEMINOLE	AI12	32771	.2	15.9
SEMINOLE	AI12	32772	.2	16.0
SEMINOLE	AI14	32732	.6	49.1
SUMTER	AG05	33513	.2	112.2
SUMTER	AG05	33513	1.6	101.0
SUMTER	AG05	33513	2.4	8.3
SUMTER	AG06	33597	.4	33.1
SUMTER	AG06	33597	.4	72.6
SUMTER	AG06	33597	.7	190.4
SUMTER	AG06	33597	.8	205.5
SUMTER	AG06	33597	1.0	111.9
SUMTER	AG06	33597	2.2	0.0
SUMTER	AH05	33513	1.0	125.5
SUMTER	AH05	33513	1.0	138.1
SUMTER	AH05	33513	1.5	62.3
SUMTER	AH05	33513	1.7	39.9
SUMTER	AH05	33513	2.7	210.1
SUMTER	AH05	33513	3.2	171.4
SUMTER	AH06	34267	.	196.5
SUMTER	AH06	33513	.4	71.5
SUMTER	AH06	34267	.4	45.9
SUMTER	AH06	33513	1.0	77.5
SUMTER	AH06	33513	1.2	293.5

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
SUMTER	AH06	33513	1.4	76.8
SUMTER	AH06	33513	1.6	377.1
SUMTER	AH06	33513	1.7	203.9
SUMTER	AH06	33513	4.4	177.4
SUMTER	AH07	34254	.	19.7
SUMTER	AH07	34254	1.7	1295.5
SUMTER	AH07	34254	1.8	69.6
SUMTER	AH07	34254	2.0	759.8
SUMTER	AH07	34254	3.2	20.3
SUMTER	AI05	33538	.2	40.2
SUMTER	AI05	33538	.2	9.3
SUMTER	AI05	33538	.4	1.1
SUMTER	AI05	33538	1.0	16.0
SUMTER	AI05	33538	1.5	.
SUMTER	AI06	32785	.	250.8
SUMTER	AI06	32785	.2	556.9
SUMTER	AI06	34255	.6	118.6
SUMTER	AI06	32535	.6	31.5
SUMTER	AI06	32785	.8	406.1
SUMTER	AI06	32785	1.6	210.7
SUMTER	AI06	32535	1.6	187.2
SUMTER	AI06	32785	5.3	43.7
SUMTER	AI06	32785	6.0	406.4
SUMTER	AI06	32785	7.7	565.1
SUMTER	AI06	32785	25.0	353.9
SUMTER	AJ06	32785	1.6	463.6
SUMTER	AJ06	32785	2.0	.
SUMTER	AJ06	32684	3.4	379.8
SUMTER	AJ06	32659	5.0	1138.7
SUMTER	AJ06	32684	25.3	555.9
SUWANNEE	AR19	32008	.2	29.9
SUWANNEE	AR19	32055	.6	.
SUWANNEE	AR19	32071	.6	218.8
SUWANNEE	AR19	32071	.6	36.8
SUWANNEE	AR20	32071	.	74.2
SUWANNEE	AR20	32008	.2	95.5
SUWANNEE	AR20	32071	.2	35.5
SUWANNEE	AS21	32060	1.2	39.9
SUWANNEE	AT25	32060	.2	65.1
SUWANNEE	AT26	32094	.2	36.3
SUWANNEE	AT26	32094	.5	83.3
SUWANNEE	AT26	32094	.5	61.5
SUWANNEE	AT26	32055	.7	75.7
SUWANNEE	AU32	32060	.2	106.1
SUWANNEE	AU32	32060	.8	296.9
SUWANNEE	AU32	32060	1.1	44.9
SUWANNEE	AU33	32060	.8	108.0
SUWANNEE	AU33	32060	.9	70.7
SUWANNEE	AU34	32060	.2	36.4
SUWANNEE	AU34	32060	.2	133.6

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
SUWANNEE	AU34	32060	.2	141.2
SUWANNEE	AU34	32060	.4	74.4
SUWANNEE	AU34	32060	.7	33.7
SUWANNEE	AU34	32060	3.3	166.6
SUWANNEE	AU35	32060	.2	109.1
SUWANNEE	AU35	32094	.4	137.7
SUWANNEE	AU35	32060	.7	92.1
SUWANNEE	AV36	32060	.	180.4
SUWANNEE	AV36	32060	.2	97.9
TAYLOR	AP09	32359	.2	10.4
TAYLOR	AP10	32359	.2	42.5
TAYLOR	AP10	32359	.2	29.9
TAYLOR	AQ10	32356	.2	.
TAYLOR	AR15	32347	.2	41.7
TAYLOR	AR15	32347	.2	102.5
TAYLOR	AS18	32347	.	293.6
TAYLOR	AS18	32347	.5	103.7
TAYLOR	AS18	32347	.7	148.0
TAYLOR	AS18	32347	1.0	.
TAYLOR	AS18	32347	1.7	284.2
TAYLOR	AS18	32347	2.2	386.7
TAYLOR	AT19	32347	.2	.
TAYLOR	AT19	32347	.4	65.8
TAYLOR	AT19	32347	.9	40.5
TAYLOR	AT19	32347	1.0	158.8
TAYLOR	AT19	32347	4.3	776.1
TAYLOR	AT20	32347	.	223.4
TAYLOR	AT20	32347	.6	24.8
TAYLOR	AT20	32347	.8	115.9
TAYLOR	AT20	32347	1.9	104.8
UNION	AR22	32054	6.1	.
UNION	AR22	32054	6.6	1336.1
UNION	AS26	32054	.2	43.9
UNION	AS26	32054	.4	196.1
UNION	AS26	32054	.8	41.4
UNION	AS27	32054	.2	42.6
UNION	AS28	32054	.2	34.2
UNION	AS28	32054	.2	73.5
UNION	AS28	32054	.2	108.6
UNION	AS28	32054	.5	32.8
UNION	AS28	32054	.6	20.3
UNION	AS29	32083	.2	49.1
UNION	AS29	32083	.8	211.8
VOLUSIA	AI13	32738	.8	72.1
VOLUSIA	AI16	32759	1.3	143.2
VOLUSIA	AJ12	32725	.	9.3
VOLUSIA	AJ12	32725	.2	23.2
VOLUSIA	AJ12	32713	.2	10.6
VOLUSIA	AJ12	32763	.7	27.6
VOLUSIA	AJ12	32713	.9	15.9

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
VOLUSIA	AJ13	32725	.2	10.8
VOLUSIA	AJ13	32725	.2	19.1
VOLUSIA	AJ13	32725	.2	4.8
VOLUSIA	AJ13	32744	.2	34.1
VOLUSIA	AJ13	32725	.4	61.6
VOLUSIA	AJ13	32725	1.4	116.9
VOLUSIA	AJ14	32069	.2	9.4
VOLUSIA	AJ14	32069	.4	32.8
VOLUSIA	AJ15	32032	.2	51.5
VOLUSIA	AJ15	32069	.2	12.1
VOLUSIA	AJ15	32069	.2	42.0
VOLUSIA	AJ15	32069	.2	67.0
VOLUSIA	AJ15	32032	.5	90.3
VOLUSIA	AJ15	32032	1.4	110.8
VOLUSIA	AK13	32720	.7	48.6
VOLUSIA	AK14	32720	.2	5.3
VOLUSIA	AK14	32722	.5	151.4
VOLUSIA	AK14	32722	.7	56.1
VOLUSIA	AK14	32724	.9	17.7
VOLUSIA	AK14	32720	.9	46.3
VOLUSIA	AK14	32720	1.0	51.8
VOLUSIA	AK15	32014	.2	25.0
VOLUSIA	AK16	32069	.	169.9
VOLUSIA	AK16	32014	.2	58.0
VOLUSIA	AK16	32069	.2	3.3
VOLUSIA	AK17	32069	.	149.7
VOLUSIA	AK17	32069	.2	112.1
VOLUSIA	AK17	32069	.2	60.5
VOLUSIA	AK17	32069	.2	60.5
VOLUSIA	AK17	32019	.4	29.7
VOLUSIA	AK17	32019	1.3	20.2
VOLUSIA	AL13	32002	.2	.
VOLUSIA	AL13	32002	.5	17.0
VOLUSIA	AL14	32080	.2	.
VOLUSIA	AL14	32005	.2	13.3
VOLUSIA	AL15	32028	.2	85.0
VOLUSIA	AL15	32028	.5	.
VOLUSIA	AL16	32014	.2	5.6
VOLUSIA	AL16	32014	.2	14.6
VOLUSIA	AL16	32074	.5	.
VOLUSIA	AL16	32014	.9	127.9
VOLUSIA	AL17	32019	.2	11.0
VOLUSIA	AL17	32019	.6	8.9
VOLUSIA	AL17	32019	.6	11.0
VOLUSIA	AL17	32019	.7	25.2
VOLUSIA	AL17	32019	1.4	24.9
VOLUSIA	AL18	32019	.	15.7√
VOLUSIA	AL18	32019	.2	33.8
VOLUSIA	AL18	32019	.4	60.0
VOLUSIA	AL18	32018	.4	25.4

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
VOLUSIA	AL18	32019	.7	9.4
VOLUSIA	AL18	32019	1.3	60.8
VOLUSIA	AM15	32090	.	13.7
VOLUSIA	AM15	32080	.2	27.9
VOLUSIA	AM15	32080	.2	26.1
VOLUSIA	AM15	32090	.2	41.8
VOLUSIA	AM15	32090	.2	11.3
VOLUSIA	AM15	32080	.2	20.6
VOLUSIA	AM17	32074	.2	3.6
VOLUSIA	AM17	32074	.7	8.4
VOLUSIA	AM18	32074	.2	.
VOLUSIA	AM18	32074	.4	107.4
VOLUSIA	AM18	32074	.5	27.4
VOLUSIA	AM18	32074	.6	18.2
VOLUSIA	AM18	32074	1.1	98.2
VOLUSIA	AM18	32074	1.3	73.9
WAKULLA	AR10	32358	.2	.
WAKULLA	AR10	32358	.2	.
WAKULLA	AR11	32358	.2	42.1
WAKULLA	AR11	32358	.5	15.6
WAKULLA	AS12	32327	.2	60.9
WAKULLA	AT11	32358	.2	21.5
WAKULLA	AT11	32358	.2	28.7
WAKULLA	AT11	32358	.2	46.9
WAKULLA	AT11	32358	.6	39.5
WAKULLA	AT11	32358	.6	61.6
WAKULLA	AT11	32358	1.6	48.9
WAKULLA	AT13	32327	.7	687.6
WAKULLA	AT14	32327	.2	24.2
WAKULLA	AT15	32327	.4	127.1
WAKULLA	AT15	32327	.5	159.2
WAKULLA	AT15	32327	.9	177.2
WALTON	AU08	32459	.4	21.1
WALTON	AU08	32459	1.6	31.6
WALTON	AU09	32459	.	47.6
WALTON	AU09	32459	.6	12.8
WALTON	AV10	32541	.	27.9
WALTON	AV10	32459	.2	51.7
WALTON	AV11	32439	.4	.
WALTON	AV11	32439	.7	10.7
WALTON	AV11	32439	.8	48.7
WALTON	AW11	32439	.2	30.2
WALTON	AW11	32439	.2	48.1
WALTON	AW11	32439	.8	47.9
WALTON	AW13	32455	.	328.8
WALTON	AW13	32455	.	55.6
WALTON	AX12	32433	.	54.9
WALTON	AX12	32433	.2	49.1
WALTON	AX12	32433	.2	31.3
WALTON	AX12	32433	.2	93.9

COUNTY	QUAD	ZIP CODE	INDOOR RADON pCi/L	SOIL RADON pCi/L
WALTON	AX12	32433	.2	139.5
WALTON	AX13	32433	.	64.5
WALTON	AX13	32433	.2	79.9
WALTON	AX13	32433	.2	50.4
WALTON	AX13	32422	.5	.
WALTON	AX13	32433	.5	0.0
WALTON	AY11	32433	.2	150.5
WALTON	AY11	32433	.2	81.1
WALTON	AY11	32433	.2	44.9
WALTON	AY11	32433	.9	163.9
WALTON	AY12	32433	1.7	268.7
WALTON	AY13	32433	1.0	157.9
WALTON	AY13	32433	1.4	371.0
WALTON	AZ12	32433	.2	159.2
WALTON	AZ12	32567	.4	101.3
WALTON	AZ12	32567	.9	.
WALTON	AZ12	32567	.9	350.0
WALTON	AZ12	32433	1.3	314.0
WALTON	AZ13	32433	.	327.6
WALTON	AZ14	32464	.2	239.6
WALTON	AZ14	32433	.2	.
WALTON	AZ14	32433	.2	78.0
WALTON	AZ14	32464	1.2	158.6
WASHINGTON	AV15	32444	.5	37.9
WASHINGTON	AW14	32462	.	16.4
WASHINGTON	AW14	32462	.2	.
WASHINGTON	AW15	32462	.	0.0
WASHINGTON	AW15	32462	.2	80.0
WASHINGTON	AW15	32428	.2	0.0
WASHINGTON	AW15	32428	.4	0.0
WASHINGTON	AW15	32462	.6	.
WASHINGTON	AW16	32428	.	13.9
WASHINGTON	AW16	32428	.	28.5
WASHINGTON	AW16	32428	.2	18.4
WASHINGTON	AW16	32428	.2	42.7
WASHINGTON	AX15	32462	.6	65.4
WASHINGTON	AX17	32428	.2	113.4
WASHINGTON	AX17	32428	1.2	157.0
WASHINGTON	AX18	32428	.5	140.3
WASHINGTON	AX18	32428	.8	157.7
WASHINGTON	AY15	32427	.	307.4
WASHINGTON	AY15	32427	.2	349.3
WASHINGTON	AY17	32428	.2	0.0
WASHINGTON	AY17	32428	.4	0.0
WASHINGTON	AY17	32428	.4	0.0
WASHINGTON	AY17	32428	.5	.
WASHINGTON	AY17	32428	.7	72.2

Appendix D

RADON RESULTS FROM POPULATION-BASED SURVEY

COUNTY	ZIP CODE	INDOOR RADON pCi/L
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.2
ALACHUA	32601	.4
ALACHUA	32601	.6
ALACHUA	32601	.7
ALACHUA	32601	.9
ALACHUA	32601	1.0
ALACHUA	32601	4.1
ALACHUA	32601	6.1
ALACHUA	32605	.2
ALACHUA	32605	.5
ALACHUA	32605	1.9
ALACHUA	32605	3.8
ALACHUA	32605	4.8
ALACHUA	32605	5.7
ALACHUA	32605	14.4
ALACHUA	32606	.2
ALACHUA	32606	.6
ALACHUA	32606	2.5
ALACHUA	32606	4.7
ALACHUA	32606	5.1
ALACHUA	32607	.2
ALACHUA	32607	.8
ALACHUA	32607	.8
ALACHUA	32607	.9
ALACHUA	32607	1.0
ALACHUA	32607	1.0
ALACHUA	32607	1.5
ALACHUA	32607	1.6
ALACHUA	32607	1.6
ALACHUA	32607	1.8
ALACHUA	32607	2.1
ALACHUA	32607	2.2
ALACHUA	32607	2.2
ALACHUA	32607	2.7
ALACHUA	32607	4.3
ALACHUA	32607	5.8
ALACHUA	32607	8.6
ALACHUA	32607	9.7
ALACHUA	32607	10.1
ALACHUA	32608	.2
ALACHUA	32608	1.1

COUNTY	ZIP CODE	INDOOR RADON pCi/L
ALACHUA	32608	1.4
ALACHUA	32608	2.2
ALACHUA	32608	4.0
ALACHUA	32609	.2
ALACHUA	32609	.2
ALACHUA	32609	.2
ALACHUA	32609	.7
ALACHUA	32609	.7
ALACHUA	32609	1.1
ALACHUA	32615	1.5
ALACHUA	32615	2.5
ALACHUA	32615	3.2
ALACHUA	32618	.6
ALACHUA	32640	2.6
ALACHUA	32643	1.6
ALACHUA	32643	4.2
ALACHUA	32667	12.6
BAKER	32040	.2
BAKER	32040	.7
BAKER	32063	.2
BAKER	32063	.2
BAKER	32063	.2
BAKER	32063	.2
BAKER	32063	.2
BAKER	32063	.2
BAKER	32063	.2
BAKER	32063	.2
BAKER	32063	.2
BAKER	32063	.5
BAKER	32063	.6
BAKER	32063	.7
BAKER	32063	.9
BAY	32401	.2
BAY	32401	.2
BAY	32401	.2
BAY	32401	1.1
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.2
BAY	32404	.4
BAY	32404	.4

COUNTY	ZIP CODE	INDOOR RADON pCi/L
BAY	32404	.4
BAY	32404	.4
BAY	32404	.5
BAY	32404	.5
BAY	32404	.6
BAY	32404	.8
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.2
BAY	32405	.5
BAY	32405	.5
BAY	32405	.6
BAY	32405	.6
BAY	32405	.7
BAY	32405	1.1
BAY	32407	.2
BAY	32407	.2
BAY	32407	.2
BAY	32407	.2
BAY	32444	.2
BAY	32444	.2
BAY	32444	.2
BAY	32444	.2
BAY	32466	.5
BRADFORD	32042	.2
BRADFORD	32042	.2
BRADFORD	32042	1.6
BRADFORD	32044	.7
BRADFORD	32091	.2
BRADFORD	32091	.2
BRADFORD	32091	.2
BRADFORD	32091	.2
BRADFORD	32091	.2
BRADFORD	32091	.2
BRADFORD	32091	.2
BRADFORD	32091	.2
BRADFORD	32091	.2
BREVARD	32754	.2
BREVARD	32754	.2
BREVARD	32754	.2
BREVARD	32754	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
BREVARD	32754	.4
BREVARD	32754	.4
BREVARD	32754	1.0
BREVARD	32754	1.4
BREVARD	32780	.2
BREVARD	32780	.2
BREVARD	32780	.2
BREVARD	32780	.2
BREVARD	32780	.4
BREVARD	32780	1.0
BREVARD	32796	.2
BREVARD	32796	.2
BREVARD	32796	.2
BREVARD	32796	.2
BREVARD	32796	.4
BREVARD	32796	.4
BREVARD	32796	.5
BREVARD	32796	.7
BREVARD	32901	.2
BREVARD	32901	.2
BREVARD	32901	.2
BREVARD	32901	.2
BREVARD	32901	.2
BREVARD	32901	.2
BREVARD	32901	.2
BREVARD	32901	.4
BREVARD	32903	.2
BREVARD	32903	.5
BREVARD	32903	1.1
BREVARD	32904	.2
BREVARD	32904	.2
BREVARD	32904	.2
BREVARD	32904	.4
BREVARD	32904	.5
BREVARD	32904	1.1
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.2
BREVARD	32905	.6
BREVARD	32905	.7

COUNTY	ZIP CODE	INDOOR RADON pCi/L
BREVARD	32905	.8
BREVARD	32907	.2
BREVARD	32907	.2
BREVARD	32922	.2
BREVARD	32922	.2
BREVARD	32922	.2
BREVARD	32922	.2
BREVARD	32922	.2
BREVARD	32922	.4
BREVARD	32926	.2
BREVARD	32927	.2
BREVARD	32927	.2
BREVARD	32931	.2
BREVARD	32931	.2
BREVARD	32931	.2
BREVARD	32931	.4
BREVARD	32931	.5
BREVARD	32931	.6
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
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BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.2
BREVARD	32935	.5
BREVARD	32935	.5
BREVARD	32935	.6
BREVARD	32935	.6
BREVARD	32935	.6
BREVARD	32937	.2
BREVARD	32937	.2
BREVARD	32937	.2
BREVARD	32937	.2
BREVARD	32937	.2
BREVARD	32937	.2
BREVARD	32937	.2
BREVARD	32937	.2
BREVARD	32937	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
BREVARD	32937	.2
BREVARD	32937	.2
BREVARD	32937	.4
BREVARD	32937	.5
BREVARD	32937	.5
BREVARD	32937	.5
BREVARD	32937	.7
BREVARD	32949	.2
BREVARD	32949	.2
BREVARD	32949	.2
BREVARD	32951	.2
BREVARD	32951	.2
BREVARD	32951	.2
BREVARD	32951	.2
BREVARD	32951	.2
BREVARD	32951	.2
BREVARD	32951	.4
BREVARD	32951	.4
BREVARD	32951	.7
BREVARD	32951	.7
BREVARD	32951	.7
BREVARD	32951	.7
BREVARD	32951	.8
BREVARD	32951	.9
BREVARD	32951	1.4
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
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BREVARD	32952	.2
BREVARD	32952	.2
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BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.2
BREVARD	32952	.4
BREVARD	32952	.5
BREVARD	32953	.2
BREVARD	32953	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
BREVARD	32953	.2
BREVARD	32953	.2
BREVARD	32953	.2
BREVARD	32953	.2
BREVARD	32953	.2
BREVARD	32953	1.8
BREVARD	32955	.2
BREVARD	32955	.2
BREVARD	32955	.2
BREVARD	32955	.2
BREVARD	32955	.2
BREVARD	32955	.2
BROWARD	33009	.2
BROWARD	33020	.2
BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.2
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BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.2
BROWARD	33023	.7
BROWARD	33023	.7
BROWARD	33023	1.5
BROWARD	33024	.2
BROWARD	33062	.2
BROWARD	33062	.7
BROWARD	33063	.2
BROWARD	33063	.2
BROWARD	33063	.2
BROWARD	33063	.2
BROWARD	33063	.4
BROWARD	33063	.6
BROWARD	33063	.7
BROWARD	33063	1.3
BROWARD	33063	1.5
BROWARD	33063	1.9
BROWARD	33064	.2
BROWARD	33064	.2
BROWARD	33064	.2
BROWARD	33064	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
BROWARD	33064	.2
BROWARD	33064	.2
BROWARD	33064	.4
BROWARD	33064	.6
BROWARD	33064	.6
BROWARD	33065	.2
BROWARD	33065	.2
BROWARD	33066	.2
BROWARD	33066	.2
BROWARD	33066	.2
BROWARD	33068	.2
BROWARD	33068	.2
BROWARD	33068	.4
BROWARD	33068	.5
BROWARD	33068	1.4
BROWARD	33069	.2
BROWARD	33069	.5
BROWARD	33071	2.0
BROWARD	33301	.2
BROWARD	33301	.2
BROWARD	33309	.2
BROWARD	33309	.2
BROWARD	33309	.2
BROWARD	33309	.2
BROWARD	33309	.2
BROWARD	33309	.2
BROWARD	33309	.5
BROWARD	33312	.2
BROWARD	33312	.2
BROWARD	33312	.2
BROWARD	33312	.2
BROWARD	33312	.2
BROWARD	33312	.2
BROWARD	33312	.2
BROWARD	33312	.2
BROWARD	33312	.2
BROWARD	33312	.6
BROWARD	33312	.8
BROWARD	33312	1.2
BROWARD	33313	.2
BROWARD	33313	.2
BROWARD	33313	.2
BROWARD	33313	.2
BROWARD	33313	.2
BROWARD	33313	.6
BROWARD	33313	2.7
BROWARD	33316	.2
BROWARD	33316	.2
BROWARD	33317	.2
BROWARD	33317	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
BROWARD	33317	.2
BROWARD	33317	.6
BROWARD	33317	.8
BROWARD	33319	.2
BROWARD	33319	.2
BROWARD	33319	.7
BROWARD	33319	.9
BROWARD	33319	1.0
BROWARD	33319	1.2
BROWARD	33319	1.9
BROWARD	33319	2.3
BROWARD	33321	.2
BROWARD	33322	.2
BROWARD	33322	.2
BROWARD	33322	.2
BROWARD	33322	.2
BROWARD	33322	.2
BROWARD	33322	.2
BROWARD	33322	.5
BROWARD	33322	.6
BROWARD	33323	.2
BROWARD	33324	.2
BROWARD	33330	.7
BROWARD	33334	.2
BROWARD	33334	.2
BROWARD	33334	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.2
BROWARD	33441	.5
BROWARD	33441	.7
BROWARD	33441	.8
CALHOUN	32421	.2
CALHOUN	32421	.2
CALHOUN	32421	.4
CALHOUN	32421	.6
CALHOUN	32424	.2
CALHOUN	32424	.2
CALHOUN	32424	.2
CALHOUN	32424	.2
CALHOUN	32424	.6
CALHOUN	32430	.2
CALHOUN	32449	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
CALHOUN	32449	.6
CALHOUN	32449	1.3
CHARLOTTE	33533	1.7
CHARLOTTE	33533	2.4
CHARLOTTE	33533	2.4
CHARLOTTE	33948	1.1
CHARLOTTE	33948	1.2
CHARLOTTE	33948	5.1
CHARLOTTE	33948	6.1
CHARLOTTE	33950	.2
CHARLOTTE	33950	2.5
CHARLOTTE	33952	.2
CHARLOTTE	33952	.2
CHARLOTTE	33952	.2
CHARLOTTE	33952	.4
CHARLOTTE	33952	.4
CHARLOTTE	33952	.4
CHARLOTTE	33952	.7
CHARLOTTE	33952	.7
CHARLOTTE	33952	.9
CHARLOTTE	33952	1.0
CHARLOTTE	33952	1.1
CHARLOTTE	33952	1.2
CHARLOTTE	33952	1.6
CHARLOTTE	33952	1.6
CHARLOTTE	33952	1.8
CHARLOTTE	33952	2.0
CHARLOTTE	33952	2.3
CHARLOTTE	33952	2.4
CHARLOTTE	33952	2.5
CHARLOTTE	33952	2.6
CHARLOTTE	33952	3.0
CHARLOTTE	33952	3.2
CHARLOTTE	33952	4.0
CHARLOTTE	33954	1.2
CHARLOTTE	33955	.2
CHARLOTTE	33955	.2
CHARLOTTE	33955	.2
CHARLOTTE	33955	.5
CHARLOTTE	33955	1.2
CHARLOTTE	33955	4.4
CITRUS	32629	.4
CITRUS	32636	1.9
CITRUS	32650	.2
CITRUS	32650	.2
CITRUS	32650	.2
CITRUS	32650	.2
CITRUS	32650	.2
CITRUS	32650	.2
CITRUS	32650	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
CITRUS	32650	.2
CITRUS	32650	.2
CITRUS	32650	.2
CITRUS	32650	.2
CITRUS	32650	.4
CITRUS	32650	.4
CITRUS	32650	.6
CITRUS	32650	.7
CITRUS	32650	.7
CITRUS	32650	.9
CITRUS	32650	.9
CITRUS	32650	1.0
CITRUS	32650	1.0
CITRUS	32650	1.1
CITRUS	32650	1.1
CITRUS	32650	1.1
CITRUS	32650	1.2
CITRUS	32650	1.5
CITRUS	32650	1.5
CITRUS	32650	2.2
CITRUS	32650	2.4
CITRUS	32650	2.6
CITRUS	32650	2.9
CITRUS	32650	7.5
CITRUS	32652	.2
CITRUS	32652	.5
CITRUS	32652	.7
CITRUS	32652	.7
CITRUS	32652	.9
CITRUS	32652	1.1
CITRUS	32652	1.7
CITRUS	32652	1.9
CITRUS	32652	2.3
CITRUS	32652	2.7
CITRUS	32652	3.1
CITRUS	32652	3.8
CITRUS	32652	5.6
CITRUS	32652	7.4
CITRUS	32652	10.1
CITRUS	32652	15.9
CLAY	32043	.2
CLAY	32043	.2
CLAY	32043	.6
CLAY	32043	.7
CLAY	32043	.8
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.2
CLAY	32073	.4
CLAY	32073	.4
CLAY	32073	.4
CLAY	32073	.5
CLAY	32073	.7
CLAY	32073	.8
CLAY	32073	.9
CLAY	32073	1.0
CLAY	32656	.2
CLAY	32656	.2
CLAY	32656	.2
CLAY	32656	.2
CLAY	32656	.2
CLAY	32656	.2
CLAY	32656	.7
COLLIER	33934	1.0
COLLIER	33934	1.2
COLLIER	33937	1.1
COLLIER	33937	2.1
COLLIER	33939	.4
COLLIER	33940	.2
COLLIER	33940	.2
COLLIER	33940	.2
COLLIER	33940	.2
COLLIER	33940	.2
COLLIER	33940	.2
COLLIER	33940	.2
COLLIER	33940	.2
COLLIER	33940	.6
COLLIER	33940	.6
COLLIER	33940	.7
COLLIER	33940	.8
COLLIER	33940	.8
COLLIER	33940	.9
COLLIER	33940	1.2
COLLIER	33940	1.3

COUNTY	ZIP CODE	INDOOR RADON pCi/L
COLLIER	33940	1.7
COLLIER	33940	7.5
COLLIER	33942	.5
COLLIER	33942	.6
COLLIER	33942	1.8
COLLIER	33942	1.9
COLLIER	33962	.2
COLLIER	33962	.2
COLLIER	33962	.2
COLLIER	33962	.2
COLLIER	33962	.2
COLLIER	33962	.2
COLLIER	33962	.2
COLLIER	33962	.4
COLLIER	33962	.4
COLLIER	33962	.5
COLLIER	33962	.6
COLLIER	33962	.8
COLLIER	33962	.8
COLLIER	33962	.8
COLLIER	33962	.9
COLLIER	33962	.9
COLLIER	33962	1.0
COLLIER	33962	1.0
COLLIER	33962	1.5
COLLIER	33962	1.7
COLLIER	33963	.2
COLLIER	33963	1.3
COLLIER	33963	1.9
COLLIER	33999	.2
COLUMBIA	32055	.2
COLUMBIA	32055	.2
COLUMBIA	32055	.2
COLUMBIA	32055	.2
COLUMBIA	32055	.2
COLUMBIA	32055	.2
COLUMBIA	32055	.2
COLUMBIA	32055	.2
DADE	33014	.2
DADE	33014	.2
DADE	33014	.2
DADE	33014	.4
DADE	33014	.7
DADE	33030	1.8
DADE	33030	2.9
DADE	33030	5.3
DADE	33055	.2
DADE	33055	.2
DADE	33055	.2
DADE	33055	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
DADE	33055	.2
DADE	33055	.4
DADE	33055	.5
DADE	33055	.5
DADE	33055	1.3
DADE	33056	.2
DADE	33126	1.2
DADE	33133	.2
DADE	33133	.2
DADE	33133	.4
DADE	33134	3.6
DADE	33138	.2
DADE	33143	.2
DADE	33143	.2
DADE	33143	.2
DADE	33143	.2
DADE	33143	.2
DADE	33143	.2
DADE	33143	2.2
DADE	33144	1.9
DADE	33155	.2
DADE	33155	.2
DADE	33155	.2
DADE	33155	.4
DADE	33155	.4
DADE	33155	1.0
DADE	33155	1.3
DADE	33155	1.6
DADE	33155	2.3
DADE	33156	.2
DADE	33156	.5
DADE	33156	.8
DADE	33157	.2
DADE	33157	.2
DADE	33157	.7
DADE	33157	.9
DADE	33161	.2
DADE	33161	.2
DADE	33161	.2
DADE	33161	.2
DADE	33161	.2
DADE	33162	.2
DADE	33165	.2
DADE	33165	.2
DADE	33165	.5
DADE	33165	2.2
DADE	33169	.2
DADE	33169	.2
DADE	33169	.4
DADE	33175	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
DADE	33175	.4
DADE	33176	1.5
DADE	33176	2.0
DADE	33177	.6
DADE	33177	1.5
DADE	33177	2.1
DADE	33177	2.8
DADE	33186	1.6
DADE	33186	2.5
DESOTO	33821	.2
DESOTO	33821	.2
DESOTO	33821	.2
DESOTO	33821	.2
DESOTO	33821	.2
DESOTO	33821	.4
DESOTO	33821	.4
DESOTO	33821	.5
DESOTO	33821	.6
DESOTO	33821	.8
DESOTO	33821	.9
DESOTO	33821	1.4
DESOTO	33821	1.5
DESOTO	33821	1.6
DESOTO	33821	3.5
DIXIE	32628	.2
DIXIE	32628	.2
DIXIE	32628	.2
DIXIE	32628	.2
DIXIE	32648	.2
DIXIE	32648	.2
DIXIE	32648	.2
DIXIE	32648	.6
DIXIE	32680	.2
DIXIE	32680	.2
DIXIE	32692	.2
DIXIE	32692	.2
DUVAL	32205	.2
DUVAL	32205	.2
DUVAL	32205	.2
DUVAL	32205	.2
DUVAL	32205	.2
DUVAL	32205	.6
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.2
DUVAL	32207	.4
DUVAL	32208	.2
DUVAL	32208	.2
DUVAL	32208	.2
DUVAL	32208	.2
DUVAL	32208	.2
DUVAL	32208	.2
DUVAL	32209	.2
DUVAL	32209	.2
DUVAL	32209	.2
DUVAL	32209	.4
DUVAL	32210	.2
DUVAL	32210	.2
DUVAL	32210	.2
DUVAL	32210	.2
DUVAL	32210	.2
DUVAL	32210	.2
DUVAL	32210	.4
DUVAL	32210	.4
DUVAL	32210	.4
DUVAL	32210	.5
DUVAL	32211	.2
DUVAL	32211	.2
DUVAL	32211	.2
DUVAL	32211	.2
DUVAL	32211	.2
DUVAL	32211	.4
DUVAL	32211	.4
DUVAL	32211	.7
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2
DUVAL	32216	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
DUVAL	32216	.2
DUVAL	32216	.6
DUVAL	32217	.2
DUVAL	32217	.2
DUVAL	32217	.2
DUVAL	32217	.2
DUVAL	32217	.2
DUVAL	32217	.2
DUVAL	32217	.2
DUVAL	32217	.2
DUVAL	32217	.2
DUVAL	32217	.4
DUVAL	32217	.4
DUVAL	32217	.5
DUVAL	32217	.7
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.2
DUVAL	32218	.4
DUVAL	32218	.5
DUVAL	32218	.6
DUVAL	32218	.9
DUVAL	32219	.2
DUVAL	32220	.2
DUVAL	32220	.5
DUVAL	32220	.6
DUVAL	32221	.2
DUVAL	32221	.2
DUVAL	32221	.7
DUVAL	32222	.2
DUVAL	32223	.2
DUVAL	32223	.2
DUVAL	32223	.2
DUVAL	32225	.2
DUVAL	32225	.2
DUVAL	32225	.5
DUVAL	32233	.2
DUVAL	32233	.2
DUVAL	32233	.2
DUVAL	32233	.2
DUVAL	32233	.2
DUVAL	32233	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
DUVAL	32233	.2
DUVAL	32233	.2
DUVAL	32233	.6
DUVAL	32233	1.3
DUVAL	32244	.2
DUVAL	32244	.2
DUVAL	32244	.4
DUVAL	32244	.6
DUVAL	32250	.2
DUVAL	32250	.2
DUVAL	32250	.4
DUVAL	32250	.5
ESCAMBIA	32501	.6
ESCAMBIA	32503	.4
ESCAMBIA	32503	.6
ESCAMBIA	32503	.6
ESCAMBIA	32503	.8
ESCAMBIA	32503	1.1
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.2
ESCAMBIA	32504	.4
ESCAMBIA	32504	.8
ESCAMBIA	32504	1.1
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.2
ESCAMBIA	32505	.4
ESCAMBIA	32505	.4
ESCAMBIA	32505	.5
ESCAMBIA	32505	.6
ESCAMBIA	32505	.6
ESCAMBIA	32505	.6

COUNTY	ZIP CODE	INDOOR RADON pCi/L
ESCAMBIA	32505	.9
ESCAMBIA	32505	.9
ESCAMBIA	32505	1.0
ESCAMBIA	32505	1.1
ESCAMBIA	32506	.2
ESCAMBIA	32506	.2
ESCAMBIA	32506	.2
ESCAMBIA	32506	.6
ESCAMBIA	32506	.6
ESCAMBIA	32506	.8
ESCAMBIA	32506	.8
ESCAMBIA	32506	.8
ESCAMBIA	32506	.9
ESCAMBIA	32506	1.0
ESCAMBIA	32506	1.0
ESCAMBIA	32507	.2
ESCAMBIA	32507	.2
ESCAMBIA	32507	.2
ESCAMBIA	32507	.2
ESCAMBIA	32507	.2
ESCAMBIA	32507	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.2
ESCAMBIA	32514	.4
ESCAMBIA	32514	.5
ESCAMBIA	32514	.5
ESCAMBIA	32514	.6
ESCAMBIA	32514	.6
ESCAMBIA	32514	.7
ESCAMBIA	32514	.8
ESCAMBIA	32514	.9
ESCAMBIA	32514	1.0
ESCAMBIA	32514	1.2
ESCAMBIA	32514	1.5
ESCAMBIA	32533	.2
ESCAMBIA	32533	.2
ESCAMBIA	32533	.5
ESCAMBIA	32533	.7
ESCAMBIA	32533	1.1
ESCAMBIA	32561	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
ESCAMBIA	32561	.2
ESCAMBIA	32561	.2
FLAGLER	32036	.2
FLAGLER	32036	.2
FLAGLER	32036	.2
FLAGLER	32036	.2
FLAGLER	32036	.7
FRANKLIN	32320	.2
FRANKLIN	32320	.2
FRANKLIN	32320	.4
FRANKLIN	32320	.4
FRANKLIN	32320	.8
FRANKLIN	32323	.2
FRANKLIN	32323	.2
FRANKLIN	32323	.2
FRANKLIN	32328	.2
GADSDEN	32324	.2
GADSDEN	32324	.2
GADSDEN	32324	.2
GADSDEN	32333	.2
GADSDEN	32333	.2
GADSDEN	32351	.2
GADSDEN	32351	.2
GADSDEN	32351	.2
GADSDEN	32351	.7
GADSDEN	32351	.7
GADSDEN	32351	2.3
GILCHRIST	32619	.2
GILCHRIST	32693	.2
GILCHRIST	32693	.2
GILCHRIST	32693	.2
GILCHRIST	32693	.2
GILCHRIST	32693	.4
GILCHRIST	32693	.5
GILCHRIST	32693	.6
GILCHRIST	32693	.9
GILCHRIST	32693	2.1
GILCHRIST	32693	2.9
GILCHRIST	32693	3.1
GILCHRIST	32693	3.5
GILCHRIST	32693	5.2
GILCHRIST	32693	7.2
GLADES	33474	.2
GLADES	33474	.2
GLADES	33474	.2
GLADES	33474	.2
GLADES	33474	.2
GLADES	33474	1.1
GULF	32453	.2
GULF	32453	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
GULF	32453	.2
GULF	32456	.2
GULF	32456	.2
GULF	32456	.2
GULF	32456	.2
GULF	32456	.2
GULF	32456	.2
GULF	32465	.2
GULF	32465	.2
HAMILTON	32052	.2
HAMILTON	32052	.2
HAMILTON	32053	.2
HAMILTON	32053	.2
HAMILTON	32096	.2
HAMILTON	32096	.2
HAMILTON	32096	.2
HAMILTON	32096	.4
HAMILTON	32096	.5
HARDEE	33865	.2
HARDEE	33865	.2
HARDEE	33873	.2
HARDEE	33873	.2
HARDEE	33873	.2
HARDEE	33873	.2
HARDEE	33873	.2
HARDEE	33873	.2
HARDEE	33873	.4
HARDEE	33873	.6
HARDEE	33873	.6
HARDEE	33873	.6
HARDEE	33873	.7
HARDEE	33873	3.1
HARDEE	33873	3.9
HENDRY	33440	.2
HENDRY	33440	.2
HENDRY	33440	.2
HENDRY	33440	.2
HENDRY	33440	.2
HENDRY	33440	.2
HENDRY	33440	.2
HENDRY	33440	.2
HENDRY	33440	.6
HENDRY	33440	.7
HENDRY	33440	1.6
HENDRY	33440	1.6
HENDRY	33440	2.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2

COUNTY	ZIP CODE	RADON pCi/L
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.2
HERNANDO	33526	.4
HERNANDO	33526	.4
HERNANDO	33526	.4
HERNANDO	33526	.4
HERNANDO	33526	.5
HERNANDO	33526	.5
HERNANDO	33526	.5
HERNANDO	33526	.6
HERNANDO	33526	.6
HERNANDO	33526	.6
HERNANDO	33526	.7
HERNANDO	33526	.7
HERNANDO	33526	.7
HERNANDO	33526	.7
HERNANDO	33526	.7
HERNANDO	33526	.7
HERNANDO	33526	.7
HERNANDO	33526	.8
HERNANDO	33526	.8
HERNANDO	33526	.8
HERNANDO	33526	.8
HERNANDO	33526	.9
HERNANDO	33526	.9
HERNANDO	33526	.9
HERNANDO	33526	1.0
HERNANDO	33526	1.0
HERNANDO	33526	1.1
HERNANDO	33526	1.2
HERNANDO	33526	1.4
HIGHLANDS	33825	.2
HIGHLANDS	33825	.2
HIGHLANDS	33825	.2
HIGHLANDS	33825	.2
HIGHLANDS	33825	.2
HIGHLANDS	33825	.2
HIGHLANDS	33825	.4
HIGHLANDS	33825	.5

COUNTY	ZIP CODE	INDOOR RADON pCi/L
HIGHLANDS	33825	.5
HIGHLANDS	33825	.6
HIGHLANDS	33825	.7
HIGHLANDS	33825	.8
HIGHLANDS	33825	1.0
HIGHLANDS	33825	1.0
HIGHLANDS	33825	1.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.2
HIGHLANDS	33870	.5
HIGHLANDS	33870	.5
HIGHLANDS	33870	.6
HIGHLANDS	33870	.7
HIGHLANDS	33870	.7
HILLSBOROUGH	33511	.2
HILLSBOROUGH	33511	.2
HILLSBOROUGH	33511	.2
HILLSBOROUGH	33511	.2
HILLSBOROUGH	33511	.2
HILLSBOROUGH	33511	.4
HILLSBOROUGH	33511	.5
HILLSBOROUGH	33511	.7
HILLSBOROUGH	33511	.7
HILLSBOROUGH	33511	.7
HILLSBOROUGH	33511	.9
HILLSBOROUGH	33511	1.3
HILLSBOROUGH	33511	1.4
HILLSBOROUGH	33511	8.3
HILLSBOROUGH	33511	17.8
HILLSBOROUGH	33534	1.3
HILLSBOROUGH	33556	.2
HILLSBOROUGH	33556	.2
HILLSBOROUGH	33556	.4
HILLSBOROUGH	33566	.2
HILLSBOROUGH	33566	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
HILLSBOROUGH	33566	.2
HILLSBOROUGH	33566	.2
HILLSBOROUGH	33566	.2
HILLSBOROUGH	33566	.2
HILLSBOROUGH	33566	.7
HILLSBOROUGH	33566	.9
HILLSBOROUGH	33566	.9
HILLSBOROUGH	33566	1.2
HILLSBOROUGH	33566	1.6
HILLSBOROUGH	33566	2.0
HILLSBOROUGH	33566	2.2
HILLSBOROUGH	33566	2.3
HILLSBOROUGH	33566	3.6
HILLSBOROUGH	33570	.2
HILLSBOROUGH	33570	.2
HILLSBOROUGH	33570	.2
HILLSBOROUGH	33570	.7
HILLSBOROUGH	33570	.7
HILLSBOROUGH	33570	1.0
HILLSBOROUGH	33570	1.0
HILLSBOROUGH	33570	1.1
HILLSBOROUGH	33570	1.5
HILLSBOROUGH	33570	1.6
HILLSBOROUGH	33570	1.7
HILLSBOROUGH	33570	1.7
HILLSBOROUGH	33570	1.8
HILLSBOROUGH	33570	2.3
HILLSBOROUGH	33570	2.5
HILLSBOROUGH	33570	2.6
HILLSBOROUGH	33570	4.3
HILLSBOROUGH	33594	3.2
HILLSBOROUGH	33594	10.1
HILLSBOROUGH	33598	.2
HILLSBOROUGH	33598	.7
HILLSBOROUGH	33598	.9
HILLSBOROUGH	33598	2.2
HILLSBOROUGH	33598	5.4
HILLSBOROUGH	33603	.2
HILLSBOROUGH	33604	.2
HILLSBOROUGH	33604	.2
HILLSBOROUGH	33604	.2
HILLSBOROUGH	33604	.2
HILLSBOROUGH	33604	.5
HILLSBOROUGH	33605	.2
HILLSBOROUGH	33607	.2
HILLSBOROUGH	33609	.2
HILLSBOROUGH	33609	.2
HILLSBOROUGH	33609	.2
HILLSBOROUGH	33609	.2
HILLSBOROUGH	33609	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
HILLSBOROUGH	33609	.4
HILLSBOROUGH	33610	.2
HILLSBOROUGH	33610	.2
HILLSBOROUGH	33610	.2
HILLSBOROUGH	33610	.2
HILLSBOROUGH	33610	.8
HILLSBOROUGH	33610	1.0
HILLSBOROUGH	33610	1.0
HILLSBOROUGH	33610	1.3
HILLSBOROUGH	33611	.2
HILLSBOROUGH	33613	.2
HILLSBOROUGH	33613	.2
HILLSBOROUGH	33613	.2
HILLSBOROUGH	33613	.7
HILLSBOROUGH	33613	.7
HILLSBOROUGH	33613	.7
HILLSBOROUGH	33614	.2
HILLSBOROUGH	33614	.2
HILLSBOROUGH	33614	.2
HILLSBOROUGH	33614	.2
HILLSBOROUGH	33614	.2
HILLSBOROUGH	33614	.2
HILLSBOROUGH	33615	.2
HILLSBOROUGH	33615	.2
HILLSBOROUGH	33615	.4
HILLSBOROUGH	33615	1.3
HILLSBOROUGH	33615	1.8
HILLSBOROUGH	33616	.2
HILLSBOROUGH	33616	.2
HILLSBOROUGH	33616	.2
HILLSBOROUGH	33616	.2
HILLSBOROUGH	33616	.2
HILLSBOROUGH	33616	.2
HILLSBOROUGH	33616	.2
HILLSBOROUGH	33616	.2
HILLSBOROUGH	33616	.4
HILLSBOROUGH	33616	.5
HILLSBOROUGH	33617	.2
HILLSBOROUGH	33617	.2
HILLSBOROUGH	33617	.2
HILLSBOROUGH	33617	.2
HILLSBOROUGH	33617	.2
HILLSBOROUGH	33617	.2
HILLSBOROUGH	33618	1.3
HILLSBOROUGH	33619	.2
HILLSBOROUGH	33619	.2
HILLSBOROUGH	33619	.2
HILLSBOROUGH	33624	.2
HILLSBOROUGH	33624	.2
HILLSBOROUGH	33624	.8

COUNTY	ZIP CODE	INDOOR RADON pCi/L
HILLSBOROUGH	33629	.2
HILLSBOROUGH	33634	.2
HILLSBOROUGH	33634	.2
HILLSBOROUGH	33634	.4
HILLSBOROUGH	33634	.5
HILLSBOROUGH	33634	.7
HILLSBOROUGH	33635	.5
HILLSBOROUGH	33637	.2
HILLSBOROUGH	33637	.2
HILLSBOROUGH	33637	.2
HILLSBOROUGH	33637	.4
HILLSBOROUGH	33637	.6
HILLSBOROUGH	33637	.6
HOLMES	32425	.2
HOLMES	32425	.2
HOLMES	32425	.2
HOLMES	32425	.2
HOLMES	32425	.2
HOLMES	32425	.2
HOLMES	32425	.4
HOLMES	32425	.5
HOLMES	32425	.7
HOLMES	32425	.9
HOLMES	32425	1.1
INDIAN RIVER	32948	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.2
INDIAN RIVER	32960	.5
INDIAN RIVER	32960	.6
INDIAN RIVER	32960	.7
INDIAN RIVER	32960	.7

COUNTY	ZIP CODE	INDOOR RADON pCi/L
INDIAN RIVER	32960	.7
INDIAN RIVER	32960	1.0
INDIAN RIVER	32960	1.0
INDIAN RIVER	32960	1.1
INDIAN RIVER	32962	.2
INDIAN RIVER	32962	.2
INDIAN RIVER	32962	.2
INDIAN RIVER	32962	.2
INDIAN RIVER	32962	.2
INDIAN RIVER	32962	.2
INDIAN RIVER	32962	.2
INDIAN RIVER	32962	.2
INDIAN RIVER	32962	.4
INDIAN RIVER	32962	.4
INDIAN RIVER	32962	.5
INDIAN RIVER	32962	.5
INDIAN RIVER	32962	.7
INDIAN RIVER	32963	.2
INDIAN RIVER	32963	.2
INDIAN RIVER	32963	.2
JACKSON	32431	.2
JACKSON	32431	.2
JACKSON	32431	.2
JACKSON	32431	.2
JACKSON	32431	.2
JACKSON	32431	.4
JACKSON	32431	.5
JACKSON	32431	.5
JACKSON	32432	.9
JACKSON	32446	.2
JACKSON	32446	.5
JEFFERSON	32337	.2
JEFFERSON	32337	.2
JEFFERSON	32344	.2
JEFFERSON	32344	.2
JEFFERSON	32344	.2
JEFFERSON	32344	.2
JEFFERSON	32361	.2
JEFFERSON	32361	.5
LAFAYETTE	32013	.5
LAFAYETTE	32013	.7
LAFAYETTE	32066	.2
LAFAYETTE	32066	.2
LAFAYETTE	32066	.2
LAFAYETTE	32066	.2
LAFAYETTE	32066	.4
LAFAYETTE	32066	.5
LAFAYETTE	32066	.6
LAFAYETTE	32066	.7
LAFAYETTE	32066	.8

COUNTY	ZIP CODE	INDOOR RADON pCi/L
LAFAYETTE	32066	.8
LAKE	32659	.2
LAKE	32659	.2
LAKE	32659	.4
LAKE	32659	.4
LAKE	32659	2.0
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.2
LAKE	32726	.4
LAKE	32726	.5
LAKE	32726	.7
LAKE	32726	.8
LAKE	32726	.8
LAKE	32731	.2
LAKE	32731	.5
LAKE	32748	.2
LAKE	32748	.2
LAKE	32748	.2
LAKE	32748	.2
LAKE	32748	.2
LAKE	32748	.2
LAKE	32748	.2
LAKE	32748	.2
LAKE	32748	.4
LAKE	32757	.2
LAKE	32757	.2
LAKE	32757	.5
LAKE	32757	.6
LAKE	32776	.2
LAKE	32776	.5
LAKE	32776	.7
LAKE	32788	.2
LAKE	32788	.2
LAKE	32788	.2
LEE	33901	.2
LEE	33901	.2
LEE	33901	.2
LEE	33901	.2
LEE	33901	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
LEE	33901	.2
LEE	33901	.2
LEE	33901	.4
LEE	33901	.5
LEE	33901	1.1
LEE	33901	2.8
LEE	33901	3.5
LEE	33903	.2
LEE	33903	.5
LEE	33903	1.0
LEE	33903	1.9
LEE	33903	2.4
LEE	33904	.2
LEE	33904	.2
LEE	33904	.2
LEE	33904	.2
LEE	33904	.4
LEE	33904	.4
LEE	33904	1.0
LEE	33904	1.5
LEE	33904	1.8
LEE	33904	4.8
LEE	33904	4.8
LEE	33905	.2
LEE	33905	.5
LEE	33905	1.2
LEE	33905	1.7
LEE	33905	1.8
LEE	33905	1.9
LEE	33905	2.7
LEE	33905	3.0
LEE	33905	3.3
LEE	33905	5.5
LEE	33905	13.6
LEE	33907	.2
LEE	33907	.2
LEE	33907	.2
LEE	33907	.2
LEE	33907	.2
LEE	33907	.4
LEE	33907	.5
LEE	33907	.5
LEE	33907	.6
LEE	33907	.6
LEE	33907	.6
LEE	33907	.7
LEE	33907	.7
LEE	33907	.8
LEE	33907	.8
LEE	33907	.8

COUNTY	ZIP CODE	INDOOR RADON pCi/L
LEE	33907	1.0
LEE	33907	1.2
LEE	33907	1.2
LEE	33907	1.3
LEE	33907	1.4
LEE	33907	1.5
LEE	33907	1.5
LEE	33907	1.5
LEE	33907	1.7
LEE	33907	2.0
LEE	33907	2.3
LEE	33907	2.3
LEE	33908	.2
LEE	33908	.4
LEE	33908	1.0
LEE	33908	1.8
LEE	33908	2.7
LEE	33908	3.7
LEE	33912	.2
LEE	33912	.2
LEE	33912	.2
LEE	33912	.2
LEE	33912	.4
LEE	33912	.4
LEE	33912	.5
LEE	33912	.6
LEE	33912	.7
LEE	33912	.8
LEE	33912	.8
LEE	33912	1.3
LEE	33912	1.7
LEE	33912	2.1
LEE	33912	2.1
LEE	33912	2.2
LEE	33912	3.2
LEE	33920	4.5
LEE	33920	28.2
LEE	33931	.2
LEE	33936	.2
LEE	33936	.2
LEE	33936	1.0
LEE	33936	1.4
LEE	33936	1.5
LEE	33936	1.6
LEE	33936	2.5
LEE	33936	3.1
LEON	32301	.2
LEON	32301	.2
LEON	32301	.4
LEON	32301	.6

COUNTY	ZIP CODE	INDOOR RADON pCi/L
LEON	32301	1.0
LEON	32301	1.1
LEON	32301	1.3
LEON	32301	1.5
LEON	32301	1.8
LEON	32301	2.0
LEON	32301	2.1
LEON	32301	2.4
LEON	32301	4.2
LEON	32301	5.3
LEON	32303	.2
LEON	32303	.2
LEON	32303	.2
LEON	32303	.4
LEON	32303	.5
LEON	32303	.5
LEON	32303	.7
LEON	32303	.7
LEON	32303	.8
LEON	32303	1.6
LEON	32304	.5
LEON	32304	.7
LEON	32304	1.7
LEON	32304	3.2
LEON	32304	3.6
LEON	32304	5.5
LEON	32308	2.1
LEON	32308	2.6
LEON	32308	2.7
LEON	32308	2.7
LEON	32312	.2
LEON	32312	.2
LEON	32312	.2
LEON	32312	.2
LEON	32312	.4
LEON	32312	.5
LEON	32312	.6
LEON	32312	.8
LEON	32312	.8
LEON	32312	1.1
LEON	32312	1.2
LEON	32312	1.2
LEON	32312	2.5
LEON	32312	4.2
LEON	32312	5.1
LEON	32312	6.4
LEON	32312	7.0
LEVY	32625	.2
LEVY	32649	.2
LEVY	32649	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
LEVY	32649	.8
LEVY	32649	1.4
LEVY	32649	2.0
LEVY	32649	4.1
LEVY	32668	.2
LEVY	32668	.8
LEVY	32668	14.0
LEVY	32696	.2
LIBERTY	32321	.2
LIBERTY	32321	.2
LIBERTY	32321	.2
LIBERTY	32321	.4
LIBERTY	32321	.8
LIBERTY	32334	.2
LIBERTY	32334	.2
LIBERTY	32334	.2
LIBERTY	32334	.2
LIBERTY	32334	.2
LIBERTY	32334	.4
LIBERTY	32334	.8
MADISON	32331	.2
MADISON	32331	.2
MADISON	32340	.4
MADISON	32340	.5
MADISON	32340	1.8
MADISON	32350	.2
MADISON	32350	.2
MADISON	32350	.2
MANATEE	33501	.2
MANATEE	33501	.2
MANATEE	33505	.2
MANATEE	33505	.2
MANATEE	33505	.2
MANATEE	33505	.2
MANATEE	33505	.2
MANATEE	33505	.2
MANATEE	33505	.5
MANATEE	33505	.7
MANATEE	33505	.7
MANATEE	33505	1.4
MANATEE	33505	2.0
MANATEE	33507	.2
MANATEE	33507	.2
MANATEE	33507	.2
MANATEE	33507	.2
MANATEE	33507	.2
MANATEE	33507	.2
MANATEE	33507	.2
MANATEE	33507	.2
MANATEE	33507	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
MANATEE	33507	.2
MANATEE	33507	.4
MANATEE	33507	.4
MANATEE	33507	.8
MANATEE	33508	.2
MANATEE	33508	.2
MANATEE	33508	.4
MANATEE	33508	1.1
MANATEE	33508	1.1
MANATEE	33508	1.4
MANATEE	33508	2.3
MANATEE	33510	.2
MANATEE	33510	.2
MANATEE	33510	.2
MANATEE	33510	.2
MANATEE	33510	.2
MANATEE	33510	.5
MANATEE	33510	1.2
MANATEE	33522	.2
MANATEE	33529	.2
MANATEE	33529	.2
MANATEE	33529	.2
MANATEE	33529	.2
MANATEE	33529	.2
MANATEE	33529	.2
MANATEE	33529	.2
MANATEE	33529	.2
MANATEE	33529	.4
MANATEE	33529	1.4
MANATEE	33529	1.5
MANATEE	33548	.2
MANATEE	33548	.2
MANATEE	33561	.2
MANATEE	33561	.2
MANATEE	33561	1.5
MANATEE	33564	.4
MANATEE	33564	13.3
MANATEE	33581	1.0
MANATEE	34203	.2
MANATEE	34203	.2
MANATEE	34203	2.0
MANATEE	34243	.2
MANATEE	34243	.2
MANATEE	34243	.6
MANATEE	34243	.8
MANATEE	34243	1.9
MANATEE	34243	4.1
MARION	32617	4.6
MARION	32627	1.2
MARION	32630	1.1

COUNTY	ZIP CODE	INDOOR RADON pCi/L
MARION	32630	1.3
MARION	32630	2.0
MARION	32630	2.1
MARION	32663	2.9
MARION	32663	15.5
MARION	32670	1.3
MARION	32670	1.4
MARION	32670	2.4
MARION	32670	4.6
MARION	32671	.2
MARION	32671	1.3
MARION	32671	2.5
MARION	32671	2.8
MARION	32671	13.4
MARION	32671	25.4
MARION	32673	.7
MARION	32674	.2
MARION	32676	.7
MARION	32676	.9
MARION	32676	1.0
MARION	32676	1.1
MARION	32676	1.3
MARION	32676	3.2
MARION	32676	4.2
MARION	32676	8.1
MARION	32676	18.5
MARION	32682	.5
MARION	32686	3.9
MARION	32686	12.1
MARION	32690	1.3
MARION	32691	.2
MARION	32691	.2
MARION	32691	2.9
MARION	32691	4.5
MARION	32691	6.9
MARION	32691	8.7
MARTIN	33455	.2
MARTIN	33456	.2
MARTIN	33456	.2
MARTIN	33456	.2
MARTIN	33456	.2
MARTIN	33456	.7
MARTIN	33457	.2
MARTIN	33457	.2
MARTIN	33457	.2
MARTIN	33457	.2
MARTIN	33469	.4
MARTIN	33490	.4
MARTIN	33490	.4
MARTIN	33494	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
MARTIN	33494	.2
MARTIN	33494	.2
MARTIN	33494	.2
MARTIN	33494	.2
MARTIN	33494	.2
MARTIN	33494	.5
MARTIN	33494	.5
MARTIN	33497	.2
MARTIN	33497	.2
MONROE	33042	.2
MONROE	33042	.2
MONROE	33042	.2
MONROE	33050	.2
MONROE	33050	.2
MONROE	33050	.2
MONROE	33050	.2
MONROE	33050	.2
MONROE	33050	.2
NASSAU	32011	.4
NASSAU	32011	.5
NASSAU	32034	.2
NASSAU	32034	.2
NASSAU	32034	.2
NASSAU	32034	.2
NASSAU	32034	.2
NASSAU	32034	.2
NASSAU	32034	.2
NASSAU	32034	.2
NASSAU	32034	.2
NASSAU	32034	.5
NASSAU	32034	.6
NASSAU	32034	.7
NASSAU	32097	.2
NASSAU	32097	.2
NASSAU	32097	.2
NASSAU	32097	.2
OKALOOSA	32536	.2
OKALOOSA	32536	.2
OKALOOSA	32536	.5
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.2
OKALOOSA	32548	.4
OKALOOSA	32548	.5
OKALOOSA	32548	.5
OKALOOSA	32548	.6
OKALOOSA	32548	.6
OKALOOSA	32548	.7
OKALOOSA	32548	.7
OKALOOSA	32564	.9
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.2
OKALOOSA	32578	.4
OKALOOSA	32578	.4
OKALOOSA	32578	.7
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.2
OKALOOSA	32579	.4
OKALOOSA	32579	.4
OKALOOSA	32579	.5
OKALOOSA	32579	.8
OKALOOSA	32579	1.3
OKEECHOBEE	33472	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
OKEECHOBEE	33472	.2
OKEECHOBEE	33472	.2
OKEECHOBEE	33472	1.0
OKEECHOBEE	33474	.2
OKEECHOBEE	33474	.2
OKEECHOBEE	33474	.2
OKEECHOBEE	33474	.2
OKEECHOBEE	33474	.2
OKEECHOBEE	33474	.4
OKEECHOBEE	33474	.4
OKEECHOBEE	33474	.4
OKEECHOBEE	33474	1.0
ORANGE	32703	.2
ORANGE	32712	.5
ORANGE	32751	.2
ORANGE	32751	.2
ORANGE	32751	.9
ORANGE	32751	1.6
ORANGE	32761	.2
ORANGE	32761	.2
ORANGE	32761	.2
ORANGE	32761	.2
ORANGE	32761	.2
ORANGE	32761	.2
ORANGE	32761	.2
ORANGE	32761	.4
ORANGE	32761	.4
ORANGE	32761	.7
ORANGE	32761	.8
ORANGE	32761	1.1
ORANGE	32761	1.7
ORANGE	32787	.6
ORANGE	32789	.2
ORANGE	32789	.2
ORANGE	32789	.2
ORANGE	32789	1.4
ORANGE	32789	4.1
ORANGE	32792	.2
ORANGE	32792	.2
ORANGE	32792	.2
ORANGE	32792	.2
ORANGE	32792	.2
ORANGE	32792	.2
ORANGE	32792	.2
ORANGE	32792	.4
ORANGE	32792	.4
ORANGE	32803	.2
ORANGE	32803	.2
ORANGE	32803	.2
ORANGE	32803	.9

COUNTY	ZIP CODE	INDOOR RADON pCi/L
ORANGE	32804	.2
ORANGE	32804	.2
ORANGE	32804	.2
ORANGE	32804	.2
ORANGE	32804	.2
ORANGE	32804	.2
ORANGE	32804	.2
ORANGE	32804	.4
ORANGE	32804	.5
ORANGE	32804	.7
ORANGE	32804	1.0
ORANGE	32804	1.4
ORANGE	32805	.2
ORANGE	32805	.2
ORANGE	32805	.2
ORANGE	32805	.6
ORANGE	32805	.9
ORANGE	32805	1.7
ORANGE	32805	1.9
ORANGE	32806	.2
ORANGE	32806	.2
ORANGE	32806	.2
ORANGE	32806	.2
ORANGE	32806	.2
ORANGE	32806	.2
ORANGE	32806	.4
ORANGE	32806	.9
ORANGE	32806	1.5
ORANGE	32806	1.5
ORANGE	32806	2.3
ORANGE	32806	2.4
ORANGE	32807	.2
ORANGE	32807	.2
ORANGE	32807	.2
ORANGE	32807	.2
ORANGE	32807	.7
ORANGE	32808	.2
ORANGE	32808	.2
ORANGE	32808	.2
ORANGE	32808	.2
ORANGE	32808	.2
ORANGE	32808	.2
ORANGE	32808	.2
ORANGE	32808	.2
ORANGE	32808	1.1
ORANGE	32809	.2
ORANGE	32809	.2
ORANGE	32809	.2
ORANGE	32809	.2
ORANGE	32809	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
ORANGE	32809	.2
ORANGE	32809	.4
ORANGE	32809	.5
ORANGE	32809	.5
ORANGE	32809	.5
ORANGE	32809	.6
ORANGE	32809	.6
ORANGE	32809	.6
ORANGE	32809	.8
ORANGE	32809	.9
ORANGE	32809	1.2
ORANGE	32809	1.3
ORANGE	32809	4.6
ORANGE	32809	4.6
ORANGE	32810	.2
ORANGE	32810	.2
ORANGE	32810	.2
ORANGE	32810	.2
ORANGE	32810	.2
ORANGE	32810	.2
ORANGE	32810	.8
ORANGE	32811	.2
ORANGE	32811	.2
ORANGE	32811	.2
ORANGE	32811	.2
ORANGE	32811	.2
ORANGE	32811	.5
ORANGE	32812	.2
ORANGE	32812	.4
ORANGE	32817	.2
ORANGE	32817	.2
ORANGE	32817	.2
ORANGE	32817	.2
ORANGE	32817	.2
ORANGE	32817	.2
ORANGE	32817	.2
ORANGE	32817	.4
ORANGE	32817	.5
ORANGE	32817	.5
ORANGE	32817	.6
ORANGE	32817	.7
ORANGE	32817	.7
ORANGE	32817	.8
ORANGE	32817	.9
ORANGE	32817	1.8
ORANGE	32818	.2
ORANGE	32818	.2
ORANGE	32818	.2
ORANGE	32818	.4
ORANGE	32818	.4

COUNTY	ZIP CODE	INDOOR RADON pCi/L
ORANGE	32818	.5
ORANGE	32818	.5
ORANGE	32818	.5
ORANGE	32818	1.0
ORANGE	32818	1.5
ORANGE	32819	.2
ORANGE	32819	.2
ORANGE	32819	.2
ORANGE	32819	.2
ORANGE	32819	.2
ORANGE	32819	.2
ORANGE	32819	.2
ORANGE	32819	.2
ORANGE	32819	.4
ORANGE	32822	.9
ORANGE	32825	.2
ORANGE	32825	.2
ORANGE	32825	.2
ORANGE	32825	.7
OSCEOLA	32741	.2
OSCEOLA	32741	.2
OSCEOLA	32741	.2
OSCEOLA	32741	.8
OSCEOLA	32743	.2
OSCEOLA	32743	.2
OSCEOLA	32743	.2
OSCEOLA	32743	.2
OSCEOLA	32743	.2
OSCEOLA	32743	.2
OSCEOLA	32743	.2
OSCEOLA	32743	.5
OSCEOLA	32743	.5
OSCEOLA	32743	.7
OSCEOLA	32758	.2
OSCEOLA	32758	.2
OSCEOLA	32769	.2
OSCEOLA	32769	.2
OSCEOLA	32769	.2
OSCEOLA	32769	.2
OSCEOLA	32769	.2
OSCEOLA	32769	.2
OSCEOLA	32769	.4
OSCEOLA	32769	.5
OSCEOLA	32769	.5
OSCEOLA	32769	.6
OSCEOLA	32769	1.2
OSCEOLA	32769	1.4
PALM BEACH	33403	.2
PALM BEACH	33404	.2
PALM BEACH	33404	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PALM BEACH	33404	.2
PALM BEACH	33404	.5
PALM BEACH	33405	.2
PALM BEACH	33405	.2
PALM BEACH	33405	.2
PALM BEACH	33405	.2
PALM BEACH	33405	.2
PALM BEACH	33406	.2
PALM BEACH	33406	.2
PALM BEACH	33406	.2
PALM BEACH	33407	.2
PALM BEACH	33407	.2
PALM BEACH	33407	.2
PALM BEACH	33407	.2
PALM BEACH	33407	.4
PALM BEACH	33407	.5
PALM BEACH	33407	.8
PALM BEACH	33408	.2
PALM BEACH	33408	.2
PALM BEACH	33408	.2
PALM BEACH	33408	.2
PALM BEACH	33408	.2
PALM BEACH	33408	.2
PALM BEACH	33408	.2
PALM BEACH	33409	.2
PALM BEACH	33409	.2
PALM BEACH	33409	.2
PALM BEACH	33409	.2
PALM BEACH	33409	.7
PALM BEACH	33411	.2
PALM BEACH	33411	.2
PALM BEACH	33411	.2
PALM BEACH	33411	.2
PALM BEACH	33411	.2
PALM BEACH	33411	.2
PALM BEACH	33411	.2
PALM BEACH	33411	.4
PALM BEACH	33411	.6
PALM BEACH	33411	.9
PALM BEACH	33411	1.4
PALM BEACH	33411	1.5
PALM BEACH	33411	2.2
PALM BEACH	33413	.2
PALM BEACH	33413	.2
PALM BEACH	33413	.2
PALM BEACH	33413	.5
PALM BEACH	33415	.2
PALM BEACH	33415	.2
PALM BEACH	33415	.2
PALM BEACH	33415	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PALM BEACH	33415	.2
PALM BEACH	33415	.2
PALM BEACH	33418	.2
PALM BEACH	33418	.2
PALM BEACH	33418	.2
PALM BEACH	33418	.2
PALM BEACH	33418	.2
PALM BEACH	33418	.7
PALM BEACH	33428	.2
PALM BEACH	33428	.2
PALM BEACH	33428	.2
PALM BEACH	33428	.6
PALM BEACH	33428	.6
PALM BEACH	33428	.8
PALM BEACH	33428	1.4
PALM BEACH	33428	2.3
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.2
PALM BEACH	33431	.4
PALM BEACH	33431	.6
PALM BEACH	33431	1.2
PALM BEACH	33432	.2
PALM BEACH	33432	.2
PALM BEACH	33432	.2
PALM BEACH	33432	.2
PALM BEACH	33432	.2
PALM BEACH	33432	.2
PALM BEACH	33432	.2
PALM BEACH	33432	.4
PALM BEACH	33432	.4
PALM BEACH	33432	.5
PALM BEACH	33432	.5
PALM BEACH	33432	.6
PALM BEACH	33433	.5
PALM BEACH	33433	.7
PALM BEACH	33435	.2
PALM BEACH	33435	.2
PALM BEACH	33435	.2
PALM BEACH	33435	.2
PALM BEACH	33435	.2
PALM BEACH	33435	.2
PALM BEACH	33435	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PALM BEACH	33435	.2
PALM BEACH	33435	.2
PALM BEACH	33435	.4
PALM BEACH	33435	.4
PALM BEACH	33435	.4
PALM BEACH	33435	.6
PALM BEACH	33435	.6
PALM BEACH	33435	.7
PALM BEACH	33435	.7
PALM BEACH	33435	.7
PALM BEACH	33435	.9
PALM BEACH	33435	1.1
PALM BEACH	33435	1.3
PALM BEACH	33435	1.6
PALM BEACH	33436	.2
PALM BEACH	33445	1.1
PALM BEACH	33458	.2
PALM BEACH	33461	.2
PALM BEACH	33461	.2
PALM BEACH	33461	.2
PALM BEACH	33461	.2
PALM BEACH	33461	.2
PALM BEACH	33461	.2
PALM BEACH	33461	.2
PALM BEACH	33461	.2
PALM BEACH	33462	.2
PALM BEACH	33462	.2
PALM BEACH	33462	.2
PALM BEACH	33462	.2
PALM BEACH	33462	.2
PALM BEACH	33462	1.0
PALM BEACH	33463	.2
PALM BEACH	33463	.2
PALM BEACH	33463	.2
PALM BEACH	33463	.7
PALM BEACH	33463	.8
PALM BEACH	33467	.2
PALM BEACH	33467	1.2
PASCO	33525	.2
PASCO	33525	.2
PASCO	33525	.2
PASCO	33525	.2
PASCO	33525	.2
PASCO	33525	.2
PASCO	33525	.2
PASCO	33525	.4
PASCO	33525	1.4
PASCO	33525	1.5
PASCO	33525	1.5
PASCO	33525	5.4

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PASCO	33525	5.5
PASCO	33525	5.9
PASCO	33526	.2
PASCO	33526	.2
PASCO	33539	.8
PASCO	33552	.2
PASCO	33552	.2
PASCO	33552	.2
PASCO	33552	.2
PASCO	33552	.2
PASCO	33552	.2
PASCO	33552	.2
PASCO	33552	.2
PASCO	33552	.6
PASCO	33552	.7
PASCO	33552	.8
PASCO	33552	.8
PASCO	33553	.2
PASCO	33553	.2
PASCO	33553	.2
PASCO	33553	.4
PASCO	33553	.4
PASCO	33553	.4
PASCO	33553	1.0
PASCO	33562	.8
PASCO	33562	2.6
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.2
PASCO	33567	.4
PASCO	33567	.4
PASCO	33567	.4
PASCO	33567	.4
PASCO	33567	.5
PASCO	33567	.5
PASCO	33567	.5
PASCO	33567	.5
PASCO	33567	.6

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PASCO	33567	1.0
PASCO	33567	1.0
PASCO	33567	1.0
PASCO	33567	1.5
PASCO	33568	.2
PASCO	33568	.2
PASCO	33568	.2
PASCO	33568	.2
PASCO	33568	.2
PASCO	33568	.5
PASCO	33568	.7
PASCO	33568	1.2
PASCO	33568	1.3
PASCO	33568	1.7
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.2
PASCO	33590	.4
PASCO	33590	.4
PASCO	33590	.4
PASCO	33590	.7
PASCO	33590	.7
PASCO	33590	.8
PASCO	33590	1.2
PASCO	34248	.2
PASCO	34248	.2
PASCO	34248	.2
PASCO	34248	.2
PASCO	34248	.2
PASCO	34248	.2
PASCO	34248	.5
PASCO	34248	.5
PASCO	34248	.6
PASCO	34248	.6
PASCO	34248	.7
PASCO	34248	.7
PASCO	34248	.8
PASCO	34248	.9
PASCO	34248	1.0

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PASCO	34248	1.2
PASCO	34248	1.8
PASCO	34248	2.2
PASCO	34248	3.0
PASCO	34248	3.5
PASCO	34248	6.7
PASCO	34248	7.6
PASCO	34248	8.0
PASCO	34249	.5
PINELLAS	33515	.2
PINELLAS	33515	.2
PINELLAS	33515	.2
PINELLAS	33515	.2
PINELLAS	33515	.2
PINELLAS	33515	.2
PINELLAS	33515	.2
PINELLAS	33515	.2
PINELLAS	33515	.2
PINELLAS	33515	.4
PINELLAS	33515	.7
PINELLAS	33515	.9
PINELLAS	33516	.2
PINELLAS	33516	.2
PINELLAS	33516	.2
PINELLAS	33516	.2
PINELLAS	33516	.2
PINELLAS	33516	.2
PINELLAS	33516	.2
PINELLAS	33516	.2
PINELLAS	33516	.2
PINELLAS	33516	.4
PINELLAS	33516	.4
PINELLAS	33516	.5
PINELLAS	33516	.8
PINELLAS	33519	.2
PINELLAS	33519	.2
PINELLAS	33519	.2
PINELLAS	33519	.2
PINELLAS	33519	.2
PINELLAS	33519	.2
PINELLAS	33519	1.0
PINELLAS	33528	.2
PINELLAS	33528	.2
PINELLAS	33528	.5
PINELLAS	33540	.2
PINELLAS	33540	.2
PINELLAS	33540	.2
PINELLAS	33540	.2
PINELLAS	33540	1.8
PINELLAS	33541	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.2
PINELLAS	33542	.4
PINELLAS	33542	.4
PINELLAS	33542	.4
PINELLAS	33542	.8
PINELLAS	33542	1.0
PINELLAS	33543	.2
PINELLAS	33543	.2
PINELLAS	33543	.2
PINELLAS	33543	.2
PINELLAS	33543	.2
PINELLAS	33543	.2
PINELLAS	33543	.9
PINELLAS	33544	.2
PINELLAS	33544	.2
PINELLAS	33544	.2
PINELLAS	33544	.2
PINELLAS	33544	.2
PINELLAS	33544	.2
PINELLAS	33544	.2
PINELLAS	33544	.2
PINELLAS	33544	.5
PINELLAS	33546	.2
PINELLAS	33546	.4
PINELLAS	33546	.5
PINELLAS	33546	.5
PINELLAS	33546	.6
PINELLAS	33546	.7
PINELLAS	33557	.2
PINELLAS	33557	.9
PINELLAS	33563	.2
PINELLAS	33563	.2
PINELLAS	33563	.2
PINELLAS	33563	.2
PINELLAS	33563	.4
PINELLAS	33563	.6

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PINELLAS	33563	1.5
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.2
PINELLAS	33565	.5
PINELLAS	33565	.8
PINELLAS	33572	.2
PINELLAS	33572	.2
PINELLAS	33572	.2
PINELLAS	33572	.2
PINELLAS	33572	.2
PINELLAS	33572	.2
PINELLAS	33572	.2
PINELLAS	33572	.6
PINELLAS	33572	.9
PINELLAS	33572	1.2
PINELLAS	33572	1.3
PINELLAS	33572	1.3
PINELLAS	33572	4.4
PINELLAS	33589	.2
PINELLAS	33589	.2
PINELLAS	33589	.2
PINELLAS	33589	.5
PINELLAS	33702	.2
PINELLAS	33702	.2
PINELLAS	33702	.2
PINELLAS	33702	.2
PINELLAS	33702	.4
PINELLAS	33703	.2
PINELLAS	33703	.2
PINELLAS	33703	.2
PINELLAS	33703	.2
PINELLAS	33703	.2
PINELLAS	33703	.2
PINELLAS	33703	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
PINELLAS	33703	.2
PINELLAS	33703	.2
PINELLAS	33704	.2
PINELLAS	33704	.2
PINELLAS	33704	.2
PINELLAS	33704	.2
PINELLAS	33704	.5
PINELLAS	33704	.5
PINELLAS	33704	2.6
PINELLAS	33706	.2
PINELLAS	33706	.2
PINELLAS	33706	.4
PINELLAS	33707	.2
PINELLAS	33707	.2
PINELLAS	33707	.2
PINELLAS	33707	.2
PINELLAS	33708	1.3
PINELLAS	33709	.2
PINELLAS	33709	.2
PINELLAS	33709	.2
PINELLAS	33709	.4
PINELLAS	33710	.2
PINELLAS	33710	.2
PINELLAS	33710	.2
PINELLAS	33710	.2
PINELLAS	33710	.2
PINELLAS	33710	.4
PINELLAS	33711	1.4
PINELLAS	33712	.2
PINELLAS	33712	.5
PINELLAS	33713	.2
PINELLAS	33713	.2
PINELLAS	33713	.2
PINELLAS	33713	.2
PINELLAS	33713	.2
PINELLAS	33713	.2
PINELLAS	33713	.2
PINELLAS	33713	.2
PINELLAS	33713	.2
PINELLAS	33713	.5
PINELLAS	33713	.9
PINELLAS	33714	.2
PINELLAS	33714	.2
PINELLAS	33714	.2
POLK	32758	.2
POLK	32758	.2
POLK	32758	.2
POLK	32758	.2
POLK	33801	.2
POLK	33801	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.2
POLK	33801	.4
POLK	33801	.4
POLK	33801	.4
POLK	33801	.4
POLK	33801	.5
POLK	33801	.5
POLK	33801	.5
POLK	33801	.6
POLK	33801	.6
POLK	33801	1.2
POLK	33801	1.2
POLK	33803	.2
POLK	33803	.2
POLK	33803	.7
POLK	33803	.8
POLK	33803	.8
POLK	33803	1.1
POLK	33803	1.5
POLK	33803	1.7
POLK	33803	2.0
POLK	33803	2.1
POLK	33803	2.2
POLK	33803	2.3
POLK	33803	2.5
POLK	33803	2.9
POLK	33803	2.9
POLK	33803	3.2
POLK	33803	5.3
POLK	33803	6.8
POLK	33803	9.0
POLK	33805	.2
POLK	33805	.2
POLK	33805	.4
POLK	33805	.6
POLK	33805	.7
POLK	33805	.8
POLK	33805	.8
POLK	33805	.9
POLK	33805	1.1

COUNTY	ZIP CODE	INDOOR RADON pCi/L
POLK	33809	.4
POLK	33809	1.0
POLK	33811	1.2
POLK	33813	.2
POLK	33823	.2
POLK	33823	.6
POLK	33823	.7
POLK	33830	.9
POLK	33830	1.5
POLK	33830	2.0
POLK	33830	15.1
POLK	33835	.2
POLK	33835	.2
POLK	33835	.4
POLK	33838	.2
POLK	33841	.6
POLK	33841	.8
POLK	33841	1.8
POLK	33844	.2
POLK	33844	.2
POLK	33844	.2
POLK	33844	.2
POLK	33844	.2
POLK	33844	.4
POLK	33844	.5
POLK	33844	.6
POLK	33853	.2
POLK	33853	.2
POLK	33853	.2
POLK	33853	.2
POLK	33860	.2
POLK	33860	.4
POLK	33860	1.4
POLK	33860	2.7
POLK	33868	.2
POLK	33880	.2
POLK	33880	.2
POLK	33880	.2
POLK	33880	.2
POLK	33880	.2
POLK	33880	.4
POLK	33880	.5
POLK	33880	.6
POLK	33880	1.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.2
POLK	33881	.4
POLK	33881	.4
POLK	33881	.5
POLK	33881	.6
POLK	33881	.7
POLK	33881	1.4
PUTNAM	32057	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.2
PUTNAM	32077	.5
PUTNAM	32077	.5
PUTNAM	32093	.2
SAINT JOHNS	32082	.2
SAINT JOHNS	32082	.2
SAINT JOHNS	32082	.5

COUNTY	ZIP CODE	INDOOR RADON pCi/L
SAINT JOHNS	32084	.2
SAINT JOHNS	32084	.2
SAINT JOHNS	32084	.2
SAINT JOHNS	32084	.2
SAINT JOHNS	32084	.2
SAINT JOHNS	32084	.2
SAINT JOHNS	32084	.4
SAINT JOHNS	32084	.4
SAINT JOHNS	32084	.7
SAINT JOHNS	32086	.2
SAINT JOHNS	32086	.2
SAINT JOHNS	32086	.4
SAINT JOHNS	32086	.4
SAINT JOHNS	32223	.2
SAINT LUCIE	33449	.2
SAINT LUCIE	33449	.6
SAINT LUCIE	33450	.2
SAINT LUCIE	33450	.2
SAINT LUCIE	33450	.2
SAINT LUCIE	33450	.2
SAINT LUCIE	33450	.2
SAINT LUCIE	33450	.2
SAINT LUCIE	33450	.2
SAINT LUCIE	33450	.4
SAINT LUCIE	33450	.5
SAINT LUCIE	33450	.7
SAINT LUCIE	33450	.8
SAINT LUCIE	33451	.2
SAINT LUCIE	33451	.2
SAINT LUCIE	33451	1.2
SAINT LUCIE	33452	.2
SAINT LUCIE	33452	.2
SAINT LUCIE	33452	.2
SAINT LUCIE	33452	.2
SAINT LUCIE	33452	.2
SAINT LUCIE	33452	.2
SAINT LUCIE	33452	.2
SAINT LUCIE	33452	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.2
SAINT LUCIE	33482	.4
SAINT LUCIE	33482	.4
SAINT LUCIE	33482	.5
SAINT LUCIE	33482	.7
SAINT LUCIE	33482	.7
SAINT LUCIE	33482	.8
SAINT LUCIE	33482	1.0
SAINT LUCIE	33482	1.0
SANTA ROSA	32561	.2
SANTA ROSA	32561	.2
SANTA ROSA	32561	.2
SANTA ROSA	32561	.2
SANTA ROSA	32561	.2
SANTA ROSA	32561	.2
SANTA ROSA	32565	.2
SANTA ROSA	32565	1.1
SANTA ROSA	32565	1.2
SANTA ROSA	32570	.2
SANTA ROSA	32570	.2
SANTA ROSA	32570	.2
SANTA ROSA	32570	.2
SANTA ROSA	32570	.2
SANTA ROSA	32570	.2
SANTA ROSA	32570	.4
SANTA ROSA	32570	.4
SANTA ROSA	32570	.4
SANTA ROSA	32570	.5
SANTA ROSA	32570	.5
SANTA ROSA	32570	.6
SANTA ROSA	32570	1.2
SANTA ROSA	32570	1.4
SANTA ROSA	32570	2.5
SARASOTA	33533	.2
SARASOTA	33533	.2
SARASOTA	33533	1.2
SARASOTA	33533	3.1
SARASOTA	33548	.2
SARASOTA	33548	.4
SARASOTA	33555	.2
SARASOTA	33555	2.1
SARASOTA	33555	2.3
SARASOTA	33555	4.2
SARASOTA	33559	.4
SARASOTA	33559	.7
SARASOTA	33559	5.6

COUNTY	ZIP CODE	INDOOR RADON pCi/L
SARASOTA	33577	.2
SARASOTA	33577	.2
SARASOTA	33577	.2
SARASOTA	33577	.2
SARASOTA	33577	.2
SARASOTA	33577	.7
SARASOTA	33577	.9
SARASOTA	33577	1.2
SARASOTA	33579	.2
SARASOTA	33579	.2
SARASOTA	33579	.2
SARASOTA	33579	.2
SARASOTA	33579	.9
SARASOTA	33579	2.0
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.2
SARASOTA	33580	.4
SARASOTA	33580	.5
SARASOTA	33580	.7
SARASOTA	33580	1.1
SARASOTA	33580	1.3
SARASOTA	33581	.2
SARASOTA	33581	.2
SARASOTA	33581	.2
SARASOTA	33581	.4
SARASOTA	33581	.4
SARASOTA	33581	.5
SARASOTA	33581	.5
SARASOTA	33581	.7
SARASOTA	33581	1.3
SARASOTA	33581	1.5
SARASOTA	33581	1.7
SARASOTA	33582	.2
SARASOTA	33582	.2
SARASOTA	33582	.2
SARASOTA	33582	.2
SARASOTA	33582	.2
SARASOTA	33582	.2
SARASOTA	33582	.2
SARASOTA	33582	.4
SARASOTA	33582	.4
SARASOTA	33582	.5

COUNTY	ZIP CODE	INDOOR RADON pCi/L
SARASOTA	33582	.6
SARASOTA	33582	.8
SARASOTA	33582	.9
SARASOTA	33582	1.0
SARASOTA	33582	1.2
SARASOTA	33582	2.0
SARASOTA	33582	2.3
SARASOTA	33582	2.5
SARASOTA	33583	.2
SARASOTA	33583	.2
SARASOTA	33583	.2
SARASOTA	33583	.2
SARASOTA	33583	.9
SARASOTA	33583	.9
SARASOTA	33583	1.0
SARASOTA	33583	1.1
SARASOTA	33583	1.1
SARASOTA	33583	1.3
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.2
SARASOTA	33595	.4
SARASOTA	33595	.4
SARASOTA	33595	.5
SARASOTA	33595	.8
SARASOTA	33595	1.1
SARASOTA	33595	1.2
SARASOTA	33595	1.3
SARASOTA	33595	1.3
SARASOTA	33595	1.4
SARASOTA	33595	1.7
SARASOTA	33596	.2
SARASOTA	33596	.2
SARASOTA	33596	.2
SARASOTA	33596	.2
SARASOTA	33596	.4
SARASOTA	33596	.4
SARASOTA	33596	.5
SARASOTA	33596	.5
SARASOTA	33596	.7
SARASOTA	33596	.8

COUNTY	ZIP CODE	INDOOR RADON pCi/L
SARASOTA	33596	.9
SARASOTA	33596	1.0
SARASOTA	33596	1.0
SARASOTA	33596	1.0
SARASOTA	33596	1.1
SARASOTA	33596	1.5
SARASOTA	33596	1.6
SARASOTA	33596	2.8
SARASOTA	34240	.2
SARASOTA	34241	.2
SARASOTA	34241	.8
SARASOTA	34242	.2
SARASOTA	34242	.2
SARASOTA	34242	.2
SARASOTA	34242	.2
SARASOTA	34242	.2
SARASOTA	34242	.2
SARASOTA	34242	.2
SARASOTA	34242	1.3
SARASOTA	34243	.2
SARASOTA	34243	1.2
SARASOTA	34243	2.7
SEMINOLE	32701	.2
SEMINOLE	32701	.2
SEMINOLE	32701	.2
SEMINOLE	32701	.4
SEMINOLE	32701	.4
SEMINOLE	32701	.6
SEMINOLE	32701	1.2
SEMINOLE	32701	1.2
SEMINOLE	32701	1.3
SEMINOLE	32701	1.7
SEMINOLE	32701	2.0
SEMINOLE	32701	2.3
SEMINOLE	32707	.2
SEMINOLE	32707	.2
SEMINOLE	32707	.2
SEMINOLE	32707	.6
SEMINOLE	32708	.2
SEMINOLE	32708	.2
SEMINOLE	32708	.2
SEMINOLE	32708	.2
SEMINOLE	32708	.2
SEMINOLE	32708	.4
SEMINOLE	32708	.4
SEMINOLE	32708	.5
SEMINOLE	32708	.7
SEMINOLE	32714	.2
SEMINOLE	32714	.2
SEMINOLE	32714	.6

COUNTY	ZIP CODE	INDOOR RADON pCi/L
SEMINOLE	32750	.2
SEMINOLE	32750	.4
SEMINOLE	32750	1.0
SEMINOLE	32750	4.4
SEMINOLE	32751	.2
SEMINOLE	32751	.2
SEMINOLE	32751	.8
SEMINOLE	32751	1.2
SEMINOLE	32751	1.7
SEMINOLE	32765	.2
SEMINOLE	32765	.2
SEMINOLE	32765	.2
SEMINOLE	32771	.2
SEMINOLE	32771	.2
SEMINOLE	32771	.2
SEMINOLE	32771	.2
SEMINOLE	32771	.2
SEMINOLE	32771	.2
SEMINOLE	32771	.9
SEMINOLE	32779	.2
SEMINOLE	32779	.2
SEMINOLE	32779	1.1
SEMINOLE	32792	.2
SEMINOLE	32792	.2
SEMINOLE	32792	.2
SEMINOLE	32792	.2
SEMINOLE	32792	.2
SEMINOLE	32792	.2
SEMINOLE	32792	.2
SEMINOLE	32792	.2
SEMINOLE	32792	.2
SEMINOLE	32792	.4
SEMINOLE	32792	.6
SEMINOLE	32792	.7
SEMINOLE	32792	.7
SEMINOLE	32792	.7
SEMINOLE	32792	1.2
SUMTER	32684	.2
SUMTER	32684	.4
SUMTER	32684	.7
SUMTER	32684	2.3
SUMTER	32684	7.2
SUMTER	32684	8.5
SUMTER	33538	.2
SUMTER	33538	.2
SUMTER	33538	.4
SUMTER	33538	1.2
SUMTER	34254	.2
SUMTER	34254	1.1
SUMTER	34254	3.6

COUNTY	ZIP CODE	INDOOR RADON pCi/L
SUMTER	34255	.2
SUMTER	34255	2.8
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.2
SUWANNEE	32060	.5
SUWANNEE	32060	.5
SUWANNEE	32060	3.7
TAYLOR	32347	.2
TAYLOR	32347	.2
TAYLOR	32347	.2
TAYLOR	32347	.2
TAYLOR	32347	.2
TAYLOR	32347	.5
TAYLOR	32347	.7
TAYLOR	32347	1.2
TAYLOR	32347	1.6
TAYLOR	32347	1.6
TAYLOR	32347	2.1
UNION	32054	.2
UNION	32054	.2
UNION	32054	.2
UNION	32054	.2
UNION	32054	.5
UNION	32054	.5
UNION	32054	.6
UNION	32054	.6
UNION	32054	.7
UNION	32054	.8
UNION	32054	.9
UNION	32054	.9
UNION	32054	1.0
UNION	32054	1.0
UNION	32054	1.4
UNION	32083	.2
UNION	32697	1.5
UNION	32697	1.6
VOLUSIA	32005	.2
VOLUSIA	32014	.2
VOLUSIA	32017	.2
VOLUSIA	32017	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
VOLUSIA	32017	.2
VOLUSIA	32017	.2
VOLUSIA	32017	.4
VOLUSIA	32017	1.1
VOLUSIA	32017	1.2
VOLUSIA	32018	.2
VOLUSIA	32018	.2
VOLUSIA	32018	.6
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.2
VOLUSIA	32019	.4
VOLUSIA	32019	.4
VOLUSIA	32019	.5
VOLUSIA	32019	.6
VOLUSIA	32019	.7
VOLUSIA	32019	.7
VOLUSIA	32019	.8
VOLUSIA	32019	.9
VOLUSIA	32019	1.1
VOLUSIA	32019	1.2
VOLUSIA	32019	1.3
VOLUSIA	32028	.2
VOLUSIA	32032	.2
VOLUSIA	32032	.2
VOLUSIA	32032	.6
VOLUSIA	32032	.8
VOLUSIA	32069	.2
VOLUSIA	32069	.2
VOLUSIA	32069	.2
VOLUSIA	32069	.2
VOLUSIA	32069	.2
VOLUSIA	32069	.2
VOLUSIA	32069	.4
VOLUSIA	32069	.5
VOLUSIA	32069	.6
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.2
VOLUSIA	32074	.4
VOLUSIA	32074	.4
VOLUSIA	32074	.4
VOLUSIA	32074	.5
VOLUSIA	32074	.5
VOLUSIA	32074	.6
VOLUSIA	32074	.6
VOLUSIA	32074	.8
VOLUSIA	32074	.8
VOLUSIA	32074	.8
VOLUSIA	32074	.9
VOLUSIA	32074	1.5
VOLUSIA	32074	1.7
VOLUSIA	32080	.2
VOLUSIA	32080	1.0
VOLUSIA	32706	.8
VOLUSIA	32713	.2
VOLUSIA	32713	.2
VOLUSIA	32713	.2
VOLUSIA	32720	.2
VOLUSIA	32720	.4
VOLUSIA	32720	.6
VOLUSIA	32720	1.1
VOLUSIA	32724	.2
VOLUSIA	32724	.2
VOLUSIA	32724	.2
VOLUSIA	32724	.2
VOLUSIA	32724	.7
VOLUSIA	32724	.8
VOLUSIA	32724	1.0
VOLUSIA	32725	.2
VOLUSIA	32725	.2
VOLUSIA	32725	.2
VOLUSIA	32725	.2
VOLUSIA	32725	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
VOLUSIA	32725	.2
VOLUSIA	32725	.2
VOLUSIA	32725	.2
VOLUSIA	32725	.4
VOLUSIA	32725	.5
VOLUSIA	32725	.5
VOLUSIA	32725	.6
VOLUSIA	32725	.7
VOLUSIA	32725	.7
VOLUSIA	32725	.8
VOLUSIA	32725	.9
VOLUSIA	32738	.2
VOLUSIA	32738	.2
VOLUSIA	32738	.2
VOLUSIA	32738	.2
VOLUSIA	32738	.4
VOLUSIA	32738	.5
VOLUSIA	32738	.6
VOLUSIA	32744	.4
VOLUSIA	32744	1.0
VOLUSIA	32763	.2
VOLUSIA	32763	1.0
WAKULLA	32327	.2
WAKULLA	32327	1.1
WAKULLA	32346	.2
WAKULLA	32355	.2
WAKULLA	32358	.2
WAKULLA	32358	.2
WAKULLA	32358	.7
WALTON	32433	.2
WALTON	32433	.2
WALTON	32433	.2
WALTON	32433	.2
WALTON	32433	.2
WALTON	32433	.2
WALTON	32433	.2
WALTON	32433	.2
WALTON	32433	.2
WALTON	32433	.4
WALTON	32433	.4
WALTON	32433	.6
WALTON	32433	.7
WALTON	32434	.2
WALTON	32434	.2
WALTON	32434	.2
WALTON	32439	.2
WALTON	32439	.2
WASHINGTON	32427	.2
WASHINGTON	32427	.2
WASHINGTON	32427	.2

COUNTY	ZIP CODE	INDOOR RADON pCi/L
WASHINGTON	32427	.5
WASHINGTON	32427	.6
WASHINGTON	32427	.8
WASHINGTON	32428	.2
WASHINGTON	32428	.5
WASHINGTON	32428	1.0