

Lindenwood University

Digital Commons@Lindenwood University

Theses

Theses & Dissertations

1991

Adjusting Property Values for Power Lines: An Exploratory Study

Robert T. Hirst

Follow this and additional works at: <https://digitalcommons.lindenwood.edu/theses>



Part of the Business Commons

ADJUSTING PROPERTY VALUES FOR POWER LINES
AN EXPLORATORY STUDY

Robert T. Hirst, M.P.H.



An Abstract Presented to the Faculty of the Graduate School
of Lindenwood College in Partial Fulfillment of the
Requirements for the Degree of
Master of Valuation Sciences

Thurs
H618a
1991

ABSTRACT

For thirty years researchers warned of potential dangers of electromagnetic fields (EMF) near electrical power lines and substations. The Environmental Protection Agency is presently reviewing the research to date to see if a substantial health hazard from EMFs threaten public health.

The Appraiser studied two subdivisions built 1985-87 in Brentwood, Tennessee to see if EMF publicity stigmatized 6 homes adjoining TVA transmission lines right of way (AT) by decreasing expected sales price compared to 44 homes not adjoining right of way (NAT).

In this small sample of convenience (6 AT subjects), two sold before 1989 at a gain of value. Three sold in 1989 and one in 1991 at a loss of value from their previous sale. One NAT close to the lines but not adjoining sold in 1989 at a loss from previous sale. Five properties had a mean loss of 20% of expected value or \$50,000.

A comparison of means for ATs and NATs showed an -18.45% loss/difference for ATs, indicative of probable stigma. NAT comparables mean price/square foot (P/SF) was \$72.18. AT subjects P/SF was \$58.86.

Of Ninety NATs in the same neighborhood sold more than once since construction, only one lost value from

previous sale. Forty-four NAT comparables mean annual appreciation was +3.779% prior to 1989 and +2.74% since 1989.

The year 1989 marked an increased public awareness of research on EMF negative health effects. AT homes in the subject neighborhood increased in value prior to 1989 but lost value on sale in 1989 and thereafter compared to the general appreciation experienced between sales by neighborhood NAT homes.

**ADJUSTING PROPERTY VALUES FOR POWER LINES
AN EXPLORATORY STUDY**

Robert T. Hirst, M. P. H.

A Culminating Project Presented to the Faculty of the Graduate School
of Lindenwood College in Partial Fulfillment of the
Requirements for the Degree of
Master of Valuation Sciences

1991

Copyright: Robert T. Hirst, 1991

List of Tables

List of Exhibits

Preface

Abstract

PART ONE

Purpose

Terminology

EMF Legislation

Definition

Scope

Works Cited

COMMITTEE IN CHARGE OF CANDIDACY:

Lindenwood College
for Individualized Education

Arlene Taich, Ph.D., M.A., B.A.
Academic Dean

Ernest A. Demba, M.S., M.B.A.

Virgil O'Connor, A.B., L.L.B., J.D.

PART TWO

State of Missouri

Metropolitan

Metropolitan

Economic

County, etc.

Williamson

Subject Area

Subject Area

Indian

Description

TABLE OF CONTENTS

List of Tables.....	v
List of Exhibits and Maps.....	vi
Preface.....	viii
Abstract.....	1
PART ONE - INTRODUCTION.....	3
Purpose of this Valuation Research Study.....	5
Transmission Line EMF Value Effect.....	6
EMF Legislation.....	17
Definition of Terms.....	28
Scope and Limitations of Study.....	29
Works Cited.....	31
PART 2 - FACTUAL DESCRIPTIONS.....	33
State Analysis.....	34
Metropolitan Analysis.....	37
Metropolitan Nashville Map.....	38
Econograph - April 1991.....	39
County, City and Neighborhood Analysis.....	50
Williamson County and City of Brentwood Map.....	51
Subject Area of Study.....	58
Subject Neighborhood Map.....	59
Indian Point Subdivision Map.....	60
Descriptions of Subject Properties.....	61

Sales Summary in Subject Area.....	64
Summary of Economic Impact on Subject.....	65
Works Cited.....	67
PART THREE-ANALYSIS AND OPINIONS OF APPRAISER.....	68
Zoning of Subject Properties.....	69
Highest and Best Use of Properties as though Vacant.....	70
Highest and Best Use of Properties as Improved....	71
Appraisal Process.....	72
The Cost and Income Approaches to Value.....	76
The Comparative Market Analysis Approach to Value.	77
Understanding the Sales Comparison Grids.....	81
Cost/SF Adjustment Figures, Table 1.....	84
Market Value of Pool by Paired Study, Table 2.....	85
Annual Appreciation/Depreciation Rates, 1989.....	86
Annual Appreciation Rates, 1990, 1991.....	87
Review of Individual AT Subjects.....	88
Statistical Analysis.....	103
Subject Loss Tally.....	104
Summary Analysis.....	105
Reconciliation of Value Indicators for Properties Adjoining Electric Power Lines...	108
Summary and Conclusions of Study.....	110
Works Cited.....	112
Recommendations for Further Study.....	113

APPENDICES.....	114
Regression Analysis of Comparable Sales.....	115
Correspondence Relating to Brentwood EMF	
1. From Congressman Bob Clement (unsigned)	
to Mr. Marvin Runyon, TVA.....	117
2. From Roger Horner, City Recorder	
to Sidney D. Hemsley, Senior Legal Con-	
sultant, Municipal Technical Advisory	
Services, Knoxville, Tennessee.....	119
3. From Joseph Cashia, Resident	
to Glen Burgess, TVA	120
4. From Marvin Runyon, Chairman of Board TVA	
to Mayor Brian J. Sweeney, Brentwood,	
Tennessee.....	122
5. From Dr. Jack Fletcher, Vice Mayor,	
of Brentwood, Tennessee	
To Marvin Runyon, Chairman of Board, TVA	
in Knoxville, Tennessee.....	124
 BIBLIOGRAPHY.....	 126
 VITA AUCTORIS.....	 129

LIST OF TABLES

Table 1:	Cost/SF Adjustment Figures.....	84
Table 2:	Market Value of Pool by Paired Study.....	85
Table 3:	1989 Appreciation/Depreciation Rates.....	86
Table 4:	1990-1991 Annual Appreciation Rate for Comparable Properties.....	87
Table 5:	Sales Data Comparison Grid 1.0-1.6.....	89
Table 6:	Sales Data Comparison Grid 2.0-2.7.....	91
Table 7:	Sales Data Comparison Grid 3.0-3.5.....	93
Table 8:	Sales Data Comparison Grid 4.0-4.7.....	95
Table 9:	Sales Data Comparison Grid 5.0-5.7.....	97
Table 10:	Sales Data Comparison Grid 6.0-6.7.....	99
Table 11:	Sales Data Comparison Grid 7.0-7.5.....	102
Table 12:	Statistical Analysis.....	103
Table 13:	Subject Loss Tally.....	104

COLOR PICTURES

1.0-1.6	Subject and Comparables.....	89a
2.0-2.7	Subject and Comparables.....	91a
3.0-3.5	Subject and Comparables.....	93a
4.0-4.7	Subject and Comparables.....	95a
5.0-5.7	Subject and Comparables.....	97a
6.0-6.7	Subject and Comparables.....	99a
7.0-7.5	Subject and Comparables.....	102a

LIST OF EXHIBITS

Exhibit 1: EPRI Projects in EMF: Timetable for Results.....	10
Exhibit 2: EMDEX Profiles Personal Exposure Through the Day.....	11
Exhibit 3: Magnetic Field Sources in Perspective...	12
Exhibit 4: Residential Magnetic Fields: A Dynamic Environment.....	13
Exhibit 5: State regulations limiting field strengths on transmission line rights of way.....	18
Exhibit 6: State-Level Transmission Line Electric and Magnetic Field Limits.....	19
Exhibit 7: Brentwood law may be nation's toughest..	20
Exhibit 8: Power Line debat should be continued....	22
Exhibit 9: EMFs exist away from power lines.....	23
Exhibit 10: TVA Transmission Line Design Alternative.....	24
Exhibit 11: Econograph - April 1991.....	49

MAPS

Metropolitan Nashville.....	38
Williamson County and City of Brentwood.....	51
Subject Neighborhood.....	59
Indian Point Subdivision.....	60

PREFACE

The writing of this Culminating Project comes at a significant period in the history of appraisal science. For the first time, states will license appraisers under Federal regulation this year.

The decade of the 90's promises to be the Environmental decade. The problem of chemical contaminants that silently attended the growth of the industrial age is threatening property values in the 90's. Behind the industrial growth through the early part of this century has been the availability of electric power.

Now we are discovering that electromagnetic fields probably pose a health threat not only at "high tension" transmission lines with their ugly steel towers but at home distribution points near transformers, substations and all electrically operated devices.

The magnitude of property value adjustments yet to be made during this decade because of environmental problems can only be imagined. It could become of such importance that some multidisciplinary qualified appraisers could be employed full time in this sub-speciality.

I am indebted to and wish to thank the following individuals:

To Betty Reagan, a Commissioner for the City of Brentwood, Tennessee for her cooperative assistance in permitting me to study her file of documents dealing with this subject.

To the Committee in Charge of Candidacy for their profitable suggestions in preparation of this document for publication.

To Dr. Richard Rickert, former professor at Lindenwood College, International Valuation Sciences Institute, for insights from his current study of value adjustments for electromagnetic fields in the St. Louis area.

To Bill Parrish, a fellow candidate at Lindenwood College, for sharing those long trips from Nashville, Tennessee to St. Charles, Missouri.

To Comptroller David Kandel of Lindenwood College for his professional and thoughtful assistance in solving financial issues associated with my candidacy.

To Dr. and Mrs. Stanley Hirst, my youngest brother, for invaluable financial assistance.

To the encouragement of my wife and companion of thirty-two years, Mary Beth, whose love, loyalty, and critiques have influenced my studies.

--Bob Hirst

PART ONE
INTRODUCTION

INTRODUCTION

Since the 1970s many health effect studies of electromagnetic fields (EMF) near electric distribution lines have indicated an association with higher cancer rates (Sykes and Li 17-180), particularly leukemia and brain cancers. (Wertheimer and Leeper 273ff). Until recently, however, these inconclusive studies caused little public alarm. No loss of value due to EMF was observed for the properties near these lines. The most recent studies since 1989 suggest a positive relationship between EMF and certain brain and blood cancers. Public alarm about EMF increased since 1988 fueled by the popular press and local news media. Therefore, the Primary Hypothesis (PH) is that home buyers who have bought a home adjoining an electric power transmission line right of way before January 1, 1989 and sold it since that date have experienced a loss in value.

The Secondary Hypothesis (SH) of this study is that since January 1, 1989, home buyers are paying less for a residence adjoining transmission (AT) right of way than they are paying for a similar residence nearby not adjoining the transmission line right-of-way (NAT).

The Null Hypothesis (NH) is that there are no demonstrable effects on sale prices of AT properties for EMF close proximity location.

Purpose of Study.

The function of this valuation research study is to discover if current market values of homes in close proximity to power lines in Brentwood, Tennessee can be expected to sell for less than they would if not in line proximity.

Electromagnetic Fields Affecting Property Values.

Until 1989, the opinion generally of appraisers who studied this problem (Kinnard, 1967) was that the market did not usually reflect a AT loss of value. Kinnard's study was financed by a joint grant from the University of Connecticut, the Connecticut Light & Power Company and the Hartford Electric Light Company. The study comprised more than 1,200 property sales over a decade. The author concluded that proximity to power lines did not affect sales and market value.

Louie Reese, MAI, SREA, past national President of the Institute of Real Estate Management, reviewed Kinnard's study and was unconvinced (Reese, 1967). From his own experience he had found that it did take longer to market lots in developing subdivisions if they were close to electric transmission lines.

In 1979, a landmark study of 200 single-family housing sales near an electric transmission line in two neighborhoods of Decatur, Illinois concluded that a substantial difference existed between the selling

price of homes close to power lines (50-200 feet) and those farther away (greater than 200 feet). This was believed to be mostly due to the visual effect of the lines rather than any health reason (Colwell and Foley, 1979).

The study reviewed 164 properties adjoining existing transmission lines "double-circuit 138-thousand-volt conductors supported by four-legged steel towers within 400 feet [of the center of the electric transmission line] of all properties in the sample." The easements for the lines were acquired in 1926-1927 and the subdivisions were built between 1957 and 1964. The sales time period in the study was from January 1, 1968 to October 31, 1978. The researchers concluded that health hazards had no effect on value. (Colwell and Foley, 1979).

Power Lines and Rural Land Values

In 1985 Craig Solum reported opinion survey results on the perceived effect 69-161 Kv transmission line easements were expected to have on the value of rural land in northwest Wisconsin. Of 416 surveys mailed, 180 replies were received (43%). Ninety-four percent of the replies were from agricultural and recreational property owners. In answer to the question: "Do you believe the power line has affected the value of your property?", only 6% of those responding said "yes" and this because of aesthetic loss

from towers. No mention was made by the respondents of fears of EMF health hazards.

Personal interviews with respondents in this study discovered that of 23 properties sold, with one exception, all properties were sold at prices comparable to equivalent non-encumbered properties and purchased "by buyers who did not present an offer to purchase the property at lower than market prices due to the presence of the transmission line." (Solum 14f).

Another 1985 study of high voltage electric transmission lines effect on agricultural land values in the Alberta, Canada found that the effect depended upon the land use. The study was primarily concerned with owner compensation for partial takings for powerlines, pipelines and wellsites. The market value of the property is the "cumulation of the productive and consumptive components of demand for property." The authors concluded that the negative impact a high voltage line might have depended entirely on the individual attributes and characteristics of each property and could not be generalized. The method of study was the difference between the means in a paired study. No EMF value-effect was studied or noted. (Thompson & Phillips, 24-26).

In a 1988 field study of crop production costs and yields of agricultural land crossed by two types of transmission lines (115/230 kv and 500 kv), researchers found costs of working crops around towers were higher

than normal. Only cotton showed a 5% significance in lower yields of five field crops (cotton, rice, soybean, grain sorghum, and double-cropped wheat-soybeans) due to "a high-voltage electromagnetic field or by impeding aerial application of agrichemicals to the growing crop (wire effects)." (Parsch & Norman, 15-21).

Transmission Line EMF Value Effect

The Nashville area public's perception of health effect impact has significantly changed since 1988. Newspapers and magazines carried sensational stories of EMF effects that have captured the attention of health-conscious Americans (Time 1990, Kirkpatrick 1990, Brodeur 1990).

Dr. Richard Rickert dates a change in attitude in the St. Louis area to a "correlation between publication of these scientific and media reports in 1989 and 1990, creating public perceptions, and decisions with adverse effects on values of properties in proximity" to transmission lines. (Rickert, 1).

Over the past 10-12 years (Pool, 1996) researchers have changed their minds about the significance of EMF and health. David Carpenter, dean of the school of public health at the State University of New York, once was skeptical of "claims that exposure to electromagnetic radiation could promote cancer...." but now he says: "I think there is sufficient evidence to

really raise some red flags here." (Pool, 1096).

A group of New York land owners filed a \$66.5 million class-action suit "claiming that the fear of health effects has had a negative impact on the value of properties along a new 345 kV transmission line. It is estimated that over \$1.5 million in attorney and witness fees had been spent on the case through August 1988." (Nair, Morgan and Florig 73).

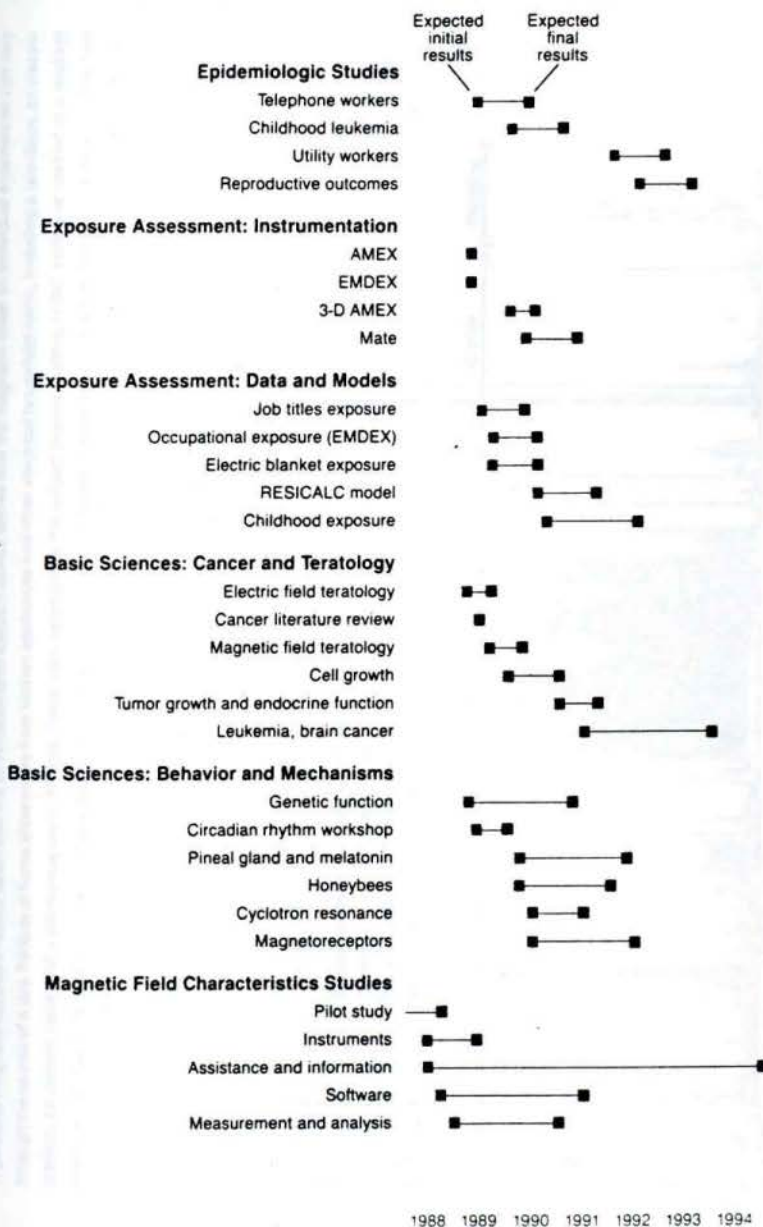
About \$15 million dollars is spent annually to study the relationship of EMF from all sources to health risk (Moore, 5 and Exhibit 1). Sweden, France, Canada and the World Health Organization in addition to U.S. agencies are studying the problem. Measurable EMF exposure comes to the average American from many electrical sources. EMF is associated with computers, television sets, electric blankets, electric razors, microwave ovens, HVAC motors, transmission/distribution lines, home wiring and electrical substations (Exhibits 2-4).

According to Greg Rauch, a project manager for the Electric Power Research Institute, Electrical Systems Division, a pilot study of home wiring identified nonstandard wiring configuration in some homes as a possible source of significant indoor magnet fields (Moore, 17).

EXHIBIT 1

EPRI Projects in EMF: Timetable for Results

Some 30 EPRI-sponsored research projects spanning epidemiology, exposure assessment, and basic science are investigating various aspects of the EMF health effects question. The horizon for expected results from most major studies is within two to four years. The work is conducted in leading universities and laboratories and is guided by an independent advisory committee of distinguished scientists. EPRI also maintains close ties with other leading national and international EMF researchers.



Source: EPRI Journal, January/February, 1990, p. 9.

Source: EPRI Journal, January/February, 1990, p. 9.

EMDEX Profiles Personal Exposure Through the Day

A personal magnetic exposure record taken with the EPRI-developed EMDEX device shows how the magnetic fields an individual experiences can vary through the course of a day. Periods at home show peaks from kitchen appliances and other electrical household items, including a television, an electric blanket, an electric razor, and a microwave oven. At work, fields were recorded as the subject passed building HVAC motors or worked at a desktop computer. Outdoors, the subject walked by neighborhood utility facilities, including an overhead transmission line and a distribution substation. The field levels shown are not necessarily typical of the sources indicated, but the EMDEX profile demonstrates that a great variety of sources contribute to an individual's total magnetic field exposure and that fields from such sources can vary widely.

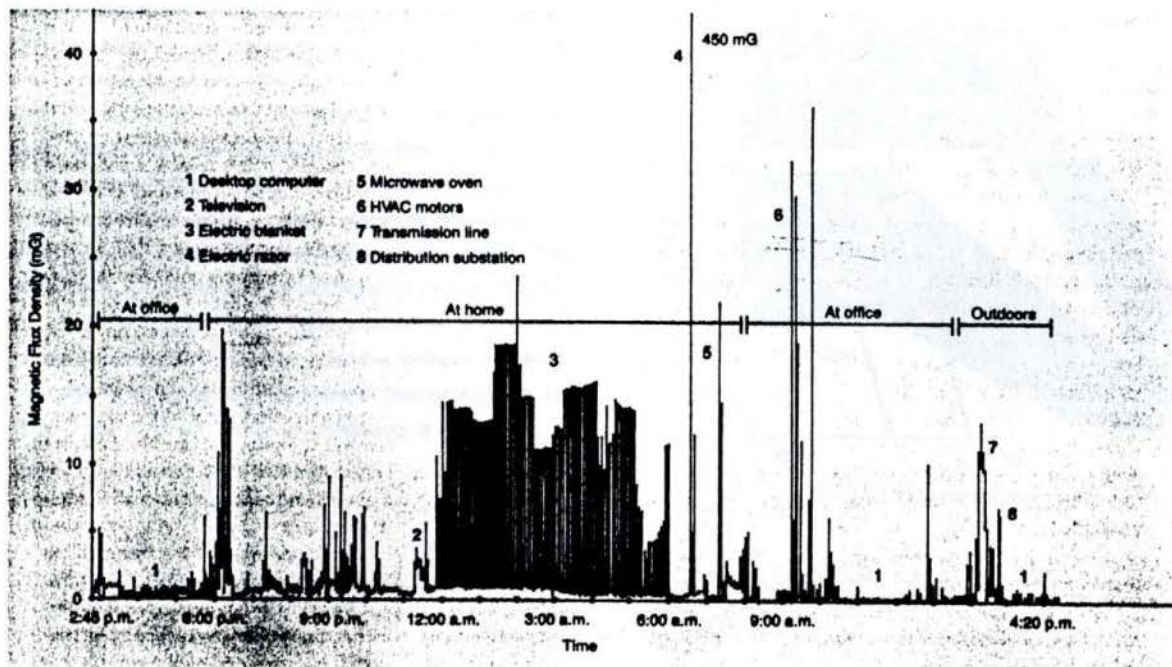


EXHIBIT 2

Source: EPRI Journal, January/February, 1990, p. 13.

Magnetic Field Sources in Perspective

The intensity of both electric and magnetic fields diminishes with distance from the source, whether it is a utility transmission or distribution line or any of a variety of electrical home appliances. Different rates of decay of field strength with distance result from the electrical properties of the various sources. As the graph indicates, magnetic field densities at close proximity to many common electrical appliances can greatly exceed those experienced directly underneath utility power lines. But fields are generated only when devices are on, while the typically lower fields from power lines tend to be more continuous. Whether brief but intense exposures from electrical appliances are more or less biologically significant than chronic, low-level exposures is not known.

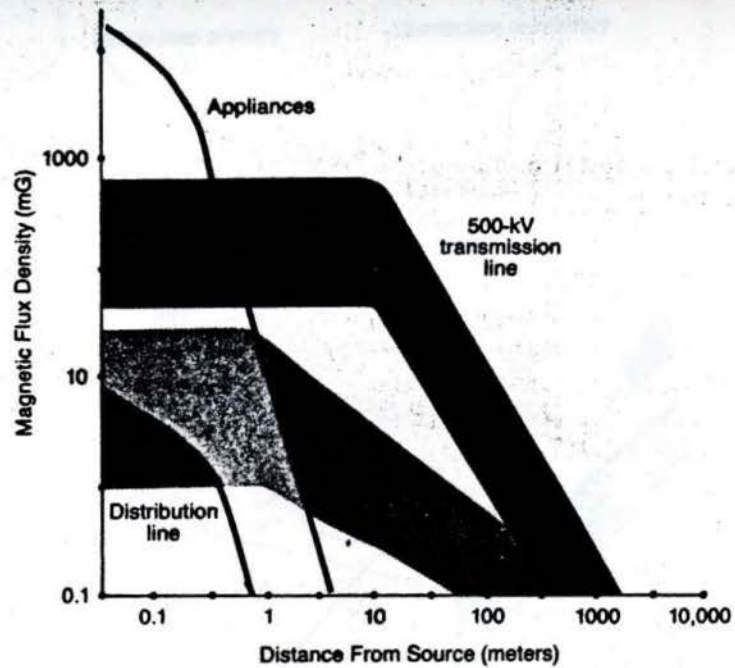


EXHIBIT 3

Source: EPRI Journal, January/February 1990, p. 13.

Residential Magnetic Fields: A Dynamic Environment

Key sources of magnetic fields in typical residential environments include overhead utility distribution lines (both primary and secondary circuits), the electrical grounding system (usually to the metallic water main), and indoor appliances (e.g., televisions). Possible other sources include unusual wiring configurations, underground distribution lines, and nearby high-voltage transmission lines. In the case of overhead distribution lines, magnetic fields in addition to those generated by balanced currents in the primary and secondary conductors can result from net currents—the vector sum of all the individual wire currents (arrows)—which fluctuate as loads change. And in buildings that are typically grounded to the same maze of underground water pipes, indoor fields can even be affected by return currents from loads in neighboring structures. A fully wired laboratory structure and distribution circuit similar to the arrangement in the diagram have been constructed at EPRI's High Voltage Transmission Research Center to study the EMF environment under different simulated loads and electrical conditions.

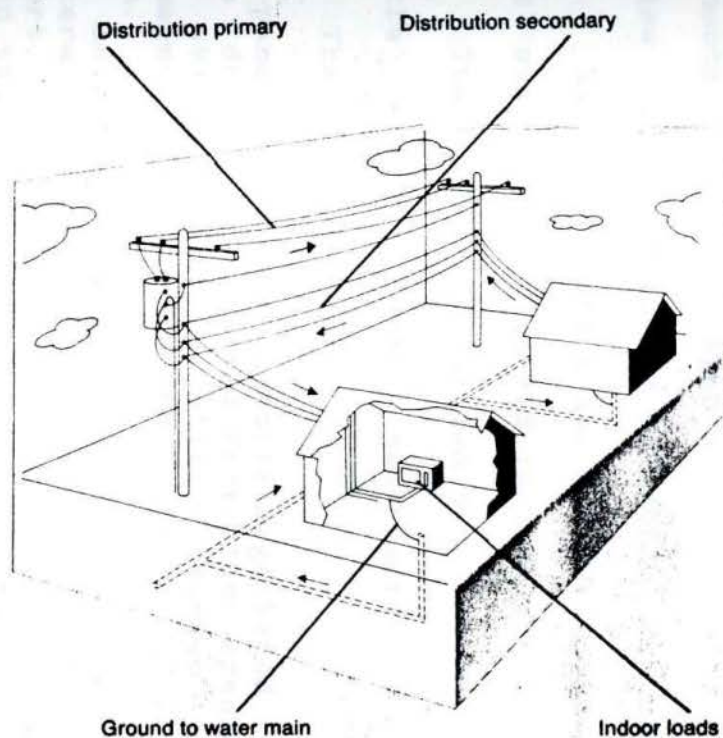


EXHIBIT 4

An Associated Press story in January of 1991 alleged that the White House attempted to influence the choice of an EMF review panel chosen by the Environmental Protection Agency (EPA). The panel was to review the studies of evidence of EMF health effects. This allegation has further heightened the public's suspicions that EMF is dangerous to healthy people. The story was carried by a Nashville paper under the headline: "EPA cancer panel snubs White House." The article began:

A panel of outside scientists gathered to review today a draft Environmental Protection Agency report citing evidence of a link between household electromagnetic fields and brain cancer and leukemia in children.

In selecting the panel, the EPA rebuffed what researchers said was a White House attempt to weaken the report.

When the panel was being chosen last summer, White House science adviser D. Allan Bromley sent the EPA a memo urging it to select candidates from a list he provided of scientists who believe that electromagnetic fields pose little or no risk. The Associated Press obtained a copy of the memorandum.

EPA officials did not select any of the people Bromley proposed....

[David] Savitz, [epidemiologist at the University of North Carolina who has studied the health risks of electromagnetic fields] who read an earlier draft of the report, said, "I thought it was good. What they were concluding is what most people who read the literature conclude: There is credible evidence of adverse health effects from these exposures. Credible does not mean conclusive. It means that it is not dismissable."

Donald Barnes of the EPA's Scientific Advisory Board office said the agency did not select any of the people Bromley proposed because they weren't considered objective. (Nashville Banner, 1991).

Louis Slesin, editor of an obscure bi-monthly newsletter called Microwave News (circulation:500) has alleged the White House modified the draft report prepared by this EPA scientific panel. Slesin says that "The battle ground [over EMF] is going to be property values." (Fortune, 85) Slesin was described in Time, July 30, 1990 as having made...

...his greatest scoop: the key paragraph of a two-year Environmental Protection Agency study recommending that so-called extremely low-frequency fields be classified as "probable human carcinogens" alongside such notorious chemical toxins as PCBs, formaldehyde and dioxin. The recommendation, which could have set off a costly chain of regulatory actions, was deleted from the final draft after review by the White House Office of Policy Development. "The EPA thing is a stunner," says Paul Brodeur, a writer for the New Yorker. "It's a clear case of suppression and politicization of a major health issue by the White House."

Whether or not EMF exposure is finally proven to be a causative or contributory agent in cancer risk to humans is not the subject of this study. That the public perceives a potential risk and that this may be translated into lower property values is the subject of this study. David Lewis, real estate consultant in Houston, Texas, estimates that houses near transmission lines in his area have dropped about 25% in value in the last 18 months. (Kirkpatrick 85). The public's perception of health threat has changed in Nashville.

Public opinions and real estate values are more shaped by the popular media sources than by publications of sound research findings. For this reason, what is said by authorities on TV, radio and in the popular media is more important to this study than what is said in scholarly journals.

The popular TV show "60 Minutes" carried a documentary segment on the dangers of electrical fields on April 7, 1991 under the title, "Stray Voltage". It dealt with Paul and Judy Vandenberg, farmers in Kalamazoo, Michigan, who described birth deformities of their cows, lowered milk production by 50% and unusual deaths. Ten cows died in one night. The utility did some tests. But the Vandenberg's continued to lose tens of thousands of dollars on animals, milking machines, veterinarians and new feeds. Then a huge storm knocked out the electric transmission lines for a full week. The cows calmed down and milk production came back up as the Vandenberg's used gasoline powered electric generators. That's when they realized that the real culprit was hazardous stray voltage from the transmission lines. (60 Minutes, 1991).

Public hearings held on March 8, 1990 by the House Interior Subcommittee on Oversight and Investigations, heard testimony by Peter H. Kostmayer:

...The research results now strongly suggest an association between exposure to electromagnetic fields at power line frequencies and certain types of cancer, central nervous system disorders, reproductive abnormalities, and other health problems. The health

impact of EMFs may very well be the most overlooked environmental hazard of the decade, and while it is the responsibility of scientists to assess the risk, it is the duty of Congress to determine whether the American public is being adequately informed about and protected from known and suspected hazards.... When the first major research finding of an EMF-cancer link was reported in 1979, only a handful of scientists took the results seriously. Now it is fair to say that only a handful of scientists familiar with the numerous studies sincerely doubt that power line frequency fields can cause health effects... (Kostmayer, 1990).

In September of 1990 Family Circle reviewed the lawsuits by consumer advocate groups against utilities for power lines running over or adjacent to public schools (Brodeur, 61-66). Locales of these disputes included California schools in Montecito, Fountain Valley and La Jolla. Houston, Texas and Palm Beach County, Florida also had litigation on this matter. The reviewer cautioned that the New York Public Service Commission has estimated "that between 10% and 15% of all childhood cancer in the United States may be caused by power-line magnetic fields."

EMF Legislation.

Some of the more progressive states are enacting legislation setting limits on electric and electromagnetic field strength at the edge of the right of way (Exhibit 5,6,7). In Tennessee the state refers all questions on EMF to the TVA for answers. A referral to EPA would be more in keeping with the Department's duty to protect the public's interest.

STATE-LEVEL TRANSMISSION LINE
ELECTRIC AND MAGNETIC FIELD LIMITS

State regulations that limit field strengths
on transmission line rights of way

State	Field Limit
Montana	1 kV/m at edge of RoW in residential areas
Minnesota	8 kV/m maximum in RoW
New Jersey	3 kV/m at edge of RoW
New York	1.6 kV/m at edge of RoW
North Dakota	9 kV/m maximum in RoW
Oregon	9 kV/m maximum in RoW
Florida	10 kV/m (for 500 kV), 8 kV/m (for 230 kV) maximum in RoW
	2 kV/m at edge of RoW all new lines, 200 mG (for 500 kV single circuit), 250 mG (for 500 kV double circuit) and 150 mG (for 230 kV) maximum at edge of RoW

Source: Electric and Magnetic Fields from 60 Hertz Electric Power: What Do We Know About Possible Health Risks?, Department of Engineering and Public Policy, Carnegie Mellon University, Pittsburg, PA 15213, p. 32.

EXHIBIT 5

Source: (Leonard et al, California Department of Health Services, Berkeley, CA)

STATE-LEVEL TRANSMISSION LINE ELECTRIC AND MAGNETIC FIELD LIMITS

AGENCY	JURISDICTION	60-Hz ELECTRIC FIELD LIMIT, kV/m		60-Hz MAGNETIC FIELD LIMIT, mG	COMMENTS
		Within Right-of-Way	At Edge of Right-of-Way	At Edge of Right-of-Way	
Minnesota Environmental Quality Board	200 kV and above	8			
Montana Board of Natural Resources and Conservation	Above 69 kV, except for lines 230 kV and below that are 10 miles or less ^a	7 ^d	1 ^b		Codified regulation, adopted after a public rulemaking hearing in 1984
New Jersey Commission on Radiation Protection	(No formal transmission line routing process)		3		Used only as a guideline for evaluating complaints
New York State Public Service Commission	125 kV and above and 1 mile or longer, or 100-125 kV and 10 miles or longer	11.8 7 or 11 ^d	1.6	200	Both electric and magnetic field limits are interim policies
North Dakota Public Service Commission	115 kV and above	9			
Oregon Energy Facility Siting Council	Above 230 kV, more than 10 miles, and routed through two or more political subdivisions ^a	9			Codified regulation, adopted after a public rulemaking hearing in 1980
Florida Department of Environmental Regulation	69 kV and above, including substations	8 (\leq 230 kV) 10 (500 kV)	2	150 (\leq 230 kV) 200 (500 kV) 250 (d.c. 500 kV) ^e	Codified regulation, adopted after a public rulemaking hearing in 1989

- a. Applied on a case by case basis unless otherwise noted
 b. Landowner may waive limit
 c. Exclusions/exemptions not specified

- d. At road crossings
 e. d.c. = double circuit

EXHIBIT 6

EXHIBIT 7

8B Kingsport Times-News / Wednesday, April 10, 1991

Brentwood law may be nation's toughest

City ordinance limits size of power lines

Associated Press

BRENTWOOD, Tenn. — City commissioners in this Nashville suburb have adopted what they think is the nation's strictest ordinance limiting the size of high-voltage power lines.

The ordinance is a result of citizens' concern over a Tennessee Valley Authority project that would have stretched additional power lines from Nashville to Columbia, 40 miles to the south.

Residents of Brentwood neighborhoods bisected by the power line were worried about electromagnetic fields, which

some medical research has linked to childhood leukemia, birth defects and brain tumors.

Under the new ordinance, electromagnetic fields stronger than 4 miligauss are prohibited from radiating the right-of-way for any 120,000-kilovolt or greater power line.

TVA's project would have doubled the capacity of a 161,000-kilovolt line by adding a second set of poles adjacent to the current right-of-way.

"It has to start somewhere, and it might as well be Brentwood, Tenn.," Mayor Joe Sweeney said of the city's stand against the power lines.

While the apparent danger of EMF is being gradually recognized by the general public, more educated and upper socio-economic groups who are well read are becoming aroused to the dangers associated with power lines. Whether or not this concern is also now associated with distribution lines and substations in the Nashville area is not known nor measured by this study.

Precipitating Cause of Current Interest.

In December of 1990, the Tennessee Valley Authority (TVA) announced that it would increase the number of power lines passing through Indian Point and Saratoga Hills subdivisions in Brentwood, Tennessee.

The residents in the affected areas began to put pressure on their elected city officials to do what they could to stop or slow down the TVA decision with hopes that a compromise could be arranged with TVA that would reduce the EMF radiation at the edge of the right-of-way to the lines. The Tennessean, the Nashville Banner, The Brentwood Journal and the Review Appeal carried stories on a weekly basis about the concerns of residents. For brevity the stories (usually front page) in the Williamson County Review Appeal are condensed here to give an idea of the public awareness of EMF in the area.

Important correspondence on the issue is in the Appendices [Runyon, Clement, Horner, Fletcher].

EXHIBIT 8

10-A • THE TENNESSEAN - Friday/DECEMBER 28, 1990

EDITORIALS

THE TENNESSEAN

John Seigenthaler
Chairman, Publisher and Chief Executive Officer

Frank Sutherland
Editor

C. W. Johnson, Jr., Managing Editor
Vickie Kilgore, Managing Editor/Features
Sandra Roberts, Executive Editor
John Bibb, Sports Editor
Ray Wong, Graphics Editor
Teresa Wasson, Deputy Managing Editor
Frank Ritter, Reader Advocate
Candy McCampbell, Executive Business Editor

Joe Pepe
President and Chief Operating Officer

Mike Christopher, Operations Director
Mike Clarimballi, Special Projects/Planning Director
Lloyd E. Esmon, Human Resources Director
Thomas L. Knowles, Circulation Director
Rick Koetz, Systems Director
Lawrence M. St. Cyr, Finance Director
Susan M. Thomas, Marketing Director

A GANNETT NEWSPAPER

Power line debate should be continued

IT has become a classic clash between the demand for growth and a cry for protection.

The debate over whether the Tennessee Valley Authority should move ahead with plans for power line expansion between Nashville and Columbia, Tenn., has put a charge into residents along the line's path.

Residents have raised concerns about the possibility of health risks related to electromagnetic fields, and city commissioners in Brentwood have passed a resolution asking TVA officials to hold the line on its expansion. The commissioners reason that delaying the installation will provide more time for analyzing information addressing health concerns.

Residents have cited medical studies that suggest possible links between exposure to radiation and childhood leukemia and brain tumors. An Environmental Protection Agency report, expected to be released next month, will address health issues regarding electromagnetic fields.

But TVA officials have countered health concerns by suggesting that residents would be little more at risk near the power lines than they would be sitting in a car. They have pointed out that by installing a second 161,000-volt line along with an existing 161,000-volt line it will actually decrease the electromagnetic field by

about 20% — with the fields of the two lines in proximity helping to cancel each other out. There are claims that greater electromagnetic fields often come from home appliances than from large power lines.

TVA has not taken the position there is no health risk involved. It has taken the view that officials don't know of any conclusive health risk and therefore it is moving ahead with its plans. The installation process for the 36-mile line is expected to be completed by next June.

TVA says growing demands for electricity have created the need for the power line. A heavy hit from winter weather would exhibit that need, its officials say. Thus far, TVA officials have been open in listening to residents' concerns. City officials in Brentwood have scheduled a public meeting Jan. 14 to hear a presentation by TVA on electromagnetic fields.

The TVA officials should continue to listen. Both the TVA and the public should continue to learn as much as possible about health risks from the installation of power lines. The agency should curtail its plans to put up additional lines until the EPA report can be released, studied and evaluated.

At this point public confidence in TVA may depend upon the agency's sensitivity about fears — whether or not the fears are based on fact. ■

EMFs exist away from power lines

By Lauren Leza
Staff Writer

Electromagnetic field readings measured Friday morning at a home next to a Tennessee Valley Authority transmission line in Brentwood were less than readings taken inside *The Review Appeal* office the same morning.

The readings seemed to back up TVA engineers' and officials' claims that exposure levels from the TVA high voltage lines running from the Radnor substation in Davidson County through Williamson County to Maury County are the same or less than levels in the home or office.

"It's all relative," said David Bennett, an electrical engineer from Chattanooga who was one of three TVA officials taking readings around 9:30 a.m. at the home of Linda and Jeff Williams in the Carriage Hills subdivision in Brentwood.

"The problem is the instrumentation has been very poor, only in the last 18 months or so has good instrumentation been developed to measure this," Bennett said.

A hand-held gaussmeter, which measures the power or energy created, placed on a Macintosh SE and hard drive recorded 20.1 milligauss; when the device was pulled back from the computer to where the operator would sit, the EMF fell to 2 milligauss.

When engineers took readings directly under a steel TVA tower in



Staff photo by Michael Clancy

TVA electrical engineer David Bennett measures the electromagnetic field in the back yard of Jeff and Linda Williams' home in Brentwood.

Please see EMFs, Page A10

A-10 THE REVIEW APPEAL Sunday, February 3, 1991

EMFs

Continued from the Front Page
the Carriage Hills subdivision off Wilson Pike which carries 161-kilovolts, 11.45 milligauss were recorded. Fifty feet away from the tower, at the Williams' back fence, 4.2 milligauss were recorded. A milligauss is simply a unit of measurement.

"You're not going to be exposed to any more than if you stayed in your office," said Bennett.

At the intersection of the Williams' driveway and backyard fence, the gaussmeter registered 1.2 milligauss.

But, back at *The Review Appeal* office, a microwave oven in use generated 22 milligauss six inches from the oven.

When the gaussmeter was placed on top of the oven, it recorded 232 milligauss, and Roy Kennedy, of TVA's Chattanooga office, said the reading would be higher if the gaussmeter were placed at the back of the microwave where the power source is.

Theoretically, it will be impossible for TVA to comply with a proposed Brentwood ordinance limiting the EMFs recorded outside the utility's right of way to zero, Kennedy said.

"It will become lower, but you can never get it to go to zero," he said.

The height of the conductors and the configuration of the lines can lower the EMFs because EMFs are

dissipated through distance and through the physical properties of electromagnetic fields.

"People get concerned because they hear the voltage is going to be increased, but by going to a higher voltage you have a lower current flow," Bennett said.

Bennett gave an analogy using water lines — the pressure of the water is comparable to the voltage of the lines and the amount of water flowing through the pipe is comparable to the electric current. The "pressure" or voltage is constant.

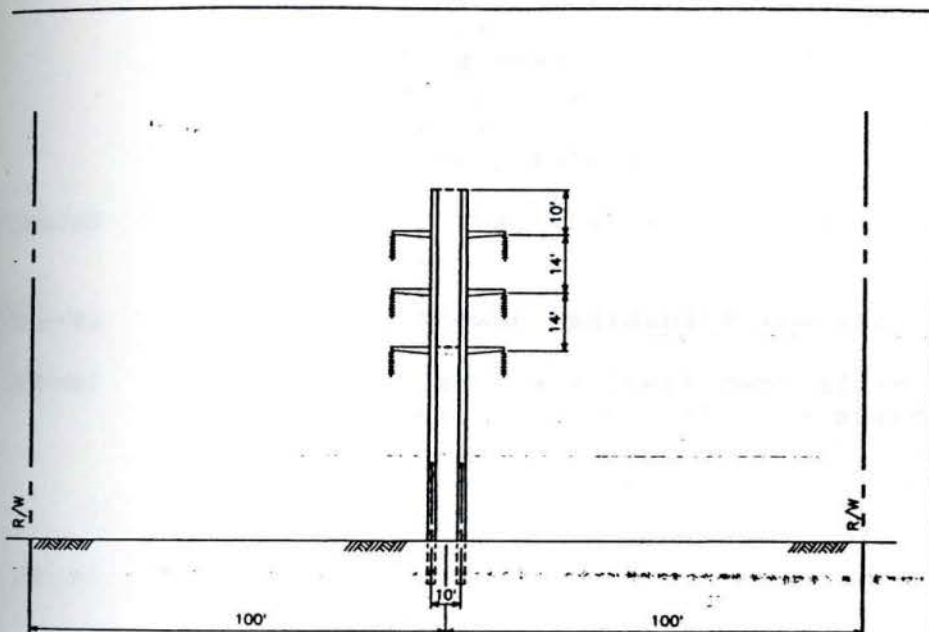
"The concepts are difficult to grasp," he said. "It's hard to make someone see that a higher voltage is better."

For six years, TVA has planned to add the 161-kilovolt line currently under construction next to a 161-kilovolt line built in the 1950s from the Radnor substation to Columbia, according to TVA's Nashville District engineer Calvin Duncan.

Residents of the Indian Point and Foxboro subdivisions in Brentwood, where the transmission lines also pass, have asked the city commissioners to attempt to delay construction on the new line until more information is available on the effects of exposure to EMFs. Although studies on EMFs have been done since the 1950s, less than 50 have involved studying the effects on human, with results still inconclusive.

EXHIBIT 9

EXHIBIT 10



MODIFICATION

TENNESSEE VALLEY AUTHORITY
 TRANSMISSION SYSTEM ENGINEERING PROJECTS
 MAURY-RADNOR & FRANKLIN-RADNOR
 161KV TRANSMISSION LINE
 DESIGN ALTERNATIVE

REV. NO.	DATE	DSGN	DRWN	CHKD	SUPV	SUBM	MF
DSGN	WS	SUPV.		DATE 1-23-91			
DRWN	JMM	W. O. 44047		SUBMITTED		APPROVED	
CHKD	WS	PROJ. ENGR. DLL		SCALE N.T.S.		CLASS. CODE	
							SHEET 1 OF 1 SHEETS
							MSK-765

R 0

Date	Headline in "... " and Story condensation
12-19-90	"Residents to take TVA problem before board." Brentwood homeowners seek the aid of Brentwood Board of Commissioners tomorrow night to delay TVA construction.
12-26-90	"Research Agency Fights TVA Power Lines." The new lines could carry as much as 1.2 million volts. Residents oppose. Phoenix Foundation announced Friday that Federal Judge L. Clure Morton dismissed a lawsuit seeking to halt the TVA construction. He noted that "a federal agency cannot be sued without its permission..."
12-26-90	"Come on, TVA, Let's Hear Your Side." Editorial.
01-13-91	"TVA to Answer Resident's Queries."
01-16-91	"EMF Concerns are Overblown" Editorial. "TVA cannot realistically be asked to abandon its right of way now simply because these homeowners are worried about inconclusive reports.
02-03-91	"EMFs Exist Away From Power Lines." Although studies on EMFs have been done since the 1950s, less than 50 have involved studying the effects on humans.
02-13-91	"Brentwood Commissioners Postpone Radiation Ordinance Vote." City Commissioners are distressed because they have not heard anything from TVA officials in Knoxville despite sending a resolution to Marvin Runyon, Chairman of the board of directors, asking TVA to delay construction of a new 161 Kilovolt transmission line through Brentwood.
02-22-91	"TVA Brentwood Officials to Meet Seeking a Compromise." Florida Dept. of Environmental Regulation adopted regulations on acceptable levels of EMF within the utility right of way and on the edge of the right of way but does not address it as two fields (electric and electromagnetic) but only as one field.

Review Appeal stories continue...

Date	Headline in "... " and Story condensation
02-24-91	<p>"Brentwood Commissioners want to move forward with EMF Ordinance." Commissioner Alex Noble said, "I can see where this thing is going nowhere... They're telling us that either we get EMFs and get power or we get no EMFs and no power..." Changing their poles (to reduce magnetic fields) will cost them money, like it cost (sic) money to take asbestos out of the schools," he said. "I don't see any compromise from TVA. The poles are going up in people's yards."</p>
03-03-91	<p>"TVA, Brentwood inch toward EMF Compromise." Brentwood officials asked TVA to delay construction of the new line. Becky McSwain, TVA manager of regional communications said, "Your ordinance invites every community across the valley to set a level of EMF and TVA has to live with it." Maximum EMFs on one side of the right of way is about 20 milleguass. The existing transmission line was established in 1941. This is the only TVA transmission line through Brentwood.</p>
03-10-91	<p>"Brentwood looks for Compromise with TVA." Vice Mayor Jack Fletcher [DDS] said, "We'll work with you if you'll work with us."</p>
03-27-91	<p>"Compromise Eludes Brentwood, TVA." Mike Walker says it will cost \$7000 per homeowner to reconfigure the line [to reduce EMFs.] The current proposed ordinance for restricting EMFs would be the only one in the U.S. that gives utilities 5 years to bring lines carrying 120 kilovolts electricity or more into compliance with no EMF spillage outside a utility's right of way.</p>

Review Appeal continued...

Date Headline "... " and story condensation.

- 04-05-91 "TVA, Brentwood out of Sync on EMFs"
The new transmission line will cost \$335,000/mile. City wants EMFs lowered from 9 milligauss to 4 miligauss. Electrical engineers and physicists testified before the City Commission that it's impossible to eliminate EMFs", said Sidney Helmsley, senior law consultant for Municipal Technical Advisory Service.
- 04-10-91 "Brentwood Challenges TVA with EMF law."
The new ordinance in Brentwood restricts TVA outside its right of way to four milligauss. It passed on vote.
- 04-10-91 "City, TVA Head for EMF Battle."
Editorial. The new law takes effect in 15 days. The fines for breaking the law are \$50/day.

DEFINITION OF TERMS

- AT: Residence Adjoining a Transmission right of way.
- EMF: Electromagnetic Field
- EPA: Environmental Protection Agency, a federal government agency devoted to protecting the environment.
- EPRI: Electric Power Research Institute, a research group funded by the electric power companies.
- GUASS: A measurement of EMF strength.
- NAT: Residences not adjoining a Transmission Line right of way.
- PH: Principle Hypothesis.
- SH: Secondary Hypothesis.
- TVA: Tennessee Valley Authority, a utility company owned and operated by the federal government.

SCOPE AND LIMITATIONS OF STUDY

The scope of this study is limited to a single neighborhood comprised of two subdivisions in the City of Brentwood, County of Williamson, State of Tennessee. The city is a part of the Nashville Metropolitan Statistical Area. The two subdivisions are Indian Point and Saratoga Hills.

The subject properties (AT) are a sample of convenience being six homes on lots adjoining the TVA right of way and one other home nearby on an affected street, all of which are two story homes that have sold at least twice since construction.

It was decided after a review of the properties adjoining the TVA easement both north and south of Concord Road that the study should be limited to Indian Point and Saratoga Hills Subdivisions. There were several reasons for this decision.

1. The AT homes in these subdivisions were about the same distance to the power lines.
2. The homes were similar in construction, two story traditionally styled.
3. Examination of county tax records showed that six of the AT homes sold more than once by owner occupants. This was to be the primary test of a AT.
4. Topography and all other external features were similar for both AT and NAT properties.
5. The subdivisions were built out in 1985-1987, prior to the emphasis on EMF in the popular press.

6. The Indian Point subdivision, particularly the properties along the TVA easement were the subject of review by Dennis Donovan, MAI, prior to the construction of these homes. At that time it was Mr. Donovan's opinion that the TVA easement had not caused any loss of value to the residential lots which sale price had established a lot value of \$11,500 per lot.

Limitations

1. The small size of the AT sample of convenience does not permit conclusions about the other RATs that have not sold more than once nor to the Greater Nashville area as the stigma for location may be limited to the subject area.

2. The available data on all the properties in the study was from county tax records. Such records are known to often be incomplete at best. A regression analysis of the 44 comparable properties yielded a moderate degree of correlation ($R^2=0.7700$) with 26 degrees of freedom. Standard error of the Y estimate was r 582.3. The tax records are notably accurate in the date of sale and the amount of sale, both critical facts for this study.

3. No interior examination of the properties in this study was possible so data was limited to tax records and street observations.

4. The data was that available via the MLS records and TAXSTAR as of May 10, 1991.

WORKS CITED

- Brodeur, P. "Danger in the Schoolyard," Family Circle,
Sept. 25, 1990.
- Colwell, P. F., Foley, K. W. "Electric Transmission
Lines and the Selling Price of Residential
Property", The Appraisal Journal, Oct., 1979.
- Kinnard, W. N. Jr. "Tower Lines and Residential
Property Values", The Appraisal Journal, April,
1967.
- Kirkpatrick, D. "Can Power Lines Give You Cancer?",
Fortune, Dec. 31, 1990.
- Moore, T. "Pursuing the Science of EMF", EPRI Journal,
Jan.-Feb. 1990.
- Nair, I., Morgan, G., Florig, H. K. Biological
Effects of Power Frequency, Electric and Magnetic
Fields, Department of Engineering and Public
Policy, Carnegie Mellon University, Pittsburg, PA
15213. A background paper performed for the
U. S. Office of Technology Assessment. OTA-BP-E-
53 U. S. Government Printing Office, May 1989.
- Nashville Banner, "EPA cancer panel snubs White
House," Jan. 14, 1991.
- Parsch, L. D., Norman, M. D. "Impact of Powerlines on
Cost of Production," Right of Way, International
Right of Way Association, April 1988.
- Pool, R. "Is There an EMF-Cancer Connection?",
Science, vol. 249, Sept. 7, 1990.

Reese, L. "The Puzzle of the Power Line", The Appraisal Journal, Oct., 1967.

Review Appeal, Franklin, Tennessee. 1990, 1991.

Rickert, R. "Effects of Market Perceptions of ELF/ETL Impacts on Property Values," Demba-Bank Associates, St. Louis, Mo 63104. Paper written April 9, 1991.

"60 Minutes," transcript of April 7, 1991.

Solum, C. L. "Transmission Line Easement Effect on Rural Land in Northwest Wisconsin," Right of Way, International Right of Way Association, 1984.

Sykes, T., Li, P. "Possible Health Effects of Electric and Magnetic Fields from Electric Power Lines: A Summary of Scientific Studies." Washington State Institute for Public Policy. Jan., 1990.

Thompson, R. R., Phillips, W. E. "Agricultural Land Value Changes from Electric Transmission Lines: Implications for Compensation," Right of Way, International Right of Way Association, Dec., 1985.

Time, "Hidden Hazards of the Airwaves", July 30, 1990.

Wertheimer, N., Leeper, E. "Electrical Wiring Configurations and Childhood Cancer," American Journal of Epidemiology, Vol. 109, No. 3, 1979.

The State
topography
natural resour
major metropo
the compass, the
Tennessee regi
Middle Tennesse
and Knoxville
had a solid p
this growth
Tennessee.

PART TWO
FACTUAL DESCRIPTIONS

1960
4,501,023
Business in Te
Business
encouraged to
state governan
created a clie
and expansions
Since 19
expanded plant
direct investm
state's econom

STATE ANALYSIS

The State of Tennessee has great variety in topography, weather, plant and animal species, natural resources and employment opportunities. Four major metropolitan areas mark the four directions of the compass, Nashville in the north central or Middle Tennessee region, Chattanooga in the south central or Middle Tennessee region, Memphis in western Tennessee and Knoxville in eastern Tennessee. The state has had a solid growth pattern over the past decade and this growth has been concentrated in Middle Tennessee.

TENNESSEE POPULATION CENSUS

<u>1980</u>	<u>1990</u>	<u>Change</u>	<u>% Growth</u>
4,591,023	4,866,185	286,162	6.2%

Business in Tennessee.

Businesses outside the state are strongly encouraged to relocate to Tennessee. In this effort state government has had great success. It has created a climate conducive to business relocations and expansions.

Since 1978, there have been 2,310 new or expanded plant projects, \$12.4 billion dollars of direct investment, and over 250,000 jobs added to the state's economy. A 1985 survey of 325 Tennessee

manufacturers cited four major factors why companies located or expanded in Tennessee: right-to-work laws, less union influence, a pro-business attitude of state government, and high worker productivity. In addition, housing, climate, health care, low crime statistics, recreation and the arts were cited as further inducements of importance. The state has a AAA bond rating.

The stated goal of Tennessee State Government articulated by Governor Ned McWherter, is to create the most favorable climate for business possible. The governor's commitment to good roads, quality education and low tax rates attract businesses considering a Sunbelt relocation. At present Tennessee has no personal income tax though the Governor introduced such a measure to the legislature in order to fund an improved education program. The legislature rejected the proposed tax, the educational reform program and the Governor's budget. The Governor had to cut the budget drastically and reduce services throughout the state with \$40 million alone cut from the educational program. The effect of a reduction of services will undoubtedly be to prompt the major portion of the population to support a tax of some sort to adequately fund education and needed services.

Although Tennessee has no personal income tax, it has one of the nation's highest sales taxes and lowest property taxes. Yet the total tax burden is still one of the lowest state and local tax burdens in the southeast, averaging only \$93 per \$1000 income per individual.

... largest city ...
... county ...
By the year ...
exceed ...
government ...
located with ...
of the largest ...
include ...
Cincinnati ...
Louis ...

Geographic ...
The ...
gently rolling ...
500 feet. The ...
the Gulf of ...
Canada. The ...
winter with a ...
and a relative ...
temperature ...

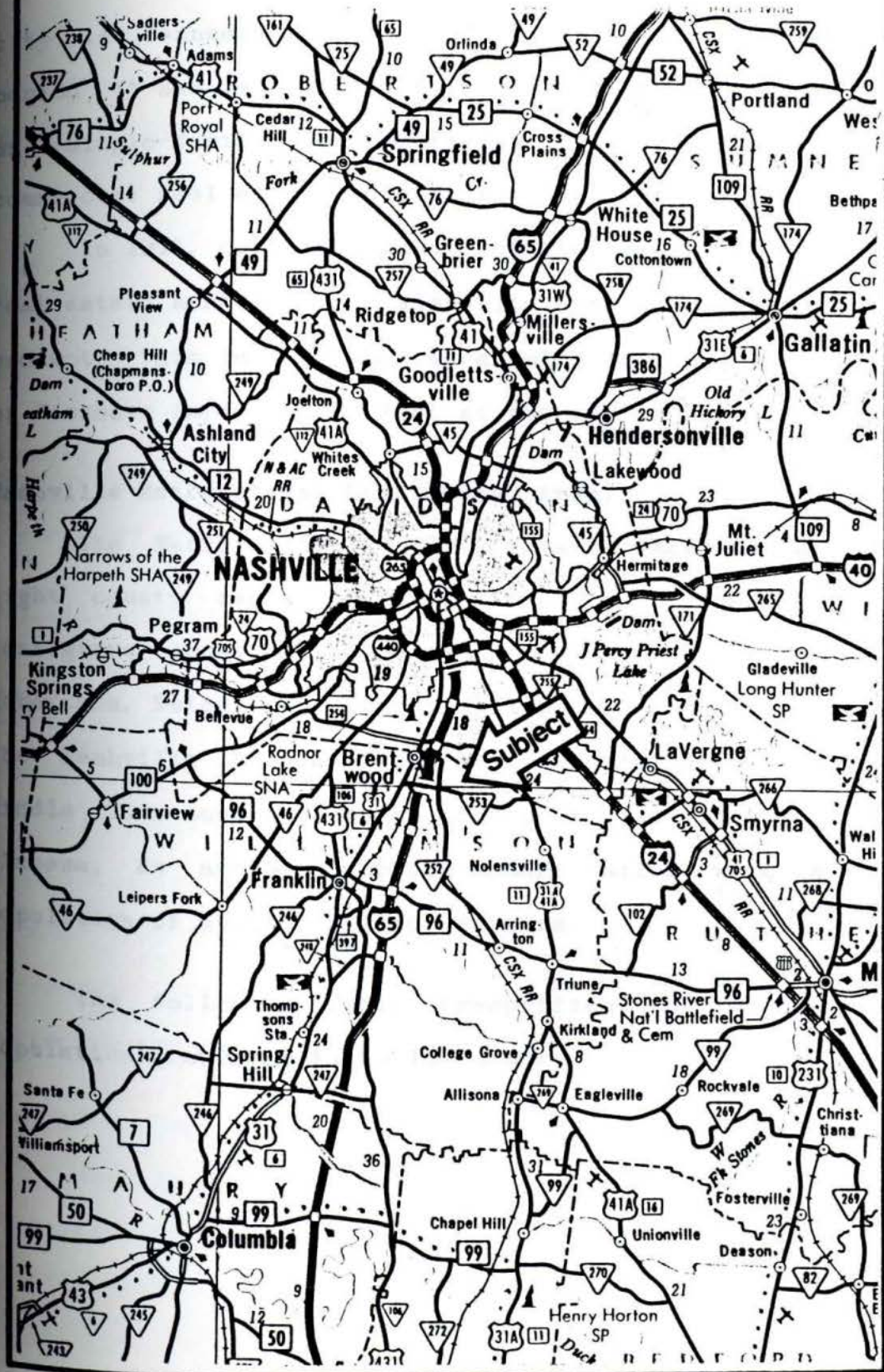
METROPOLITAN AREA ANALYSIS

The Nashville Metropolitan area is located in north central Tennessee along a series of major bends in the Cumberland River. The city is the capital of Tennessee and the county seat of Davidson County which encompasses 532 square miles. Nashville is the second largest city in Tennessee and has grown to a current estimated population of 510,784 persons and the eight county Metropolitan Statistical Area to 985,026 (1990). By the year 2,000, the Nashville region is projected to exceed 1.2 million residents. According to state government figures, 50% of the U. S. population is located within a 600 mile radius of the city. Several of the larger metropolitan centers within this radius include Atlanta (246 miles), Chicago (466 miles), Cincinnati (275 miles), Memphis (209 miles), and St. Louis (321 miles).

Geographic Features and Climate

The topography of Nashville is characterized by gently rolling hills interspersed with high domes up to 600 feet. The rich topsoil is warmed by air masses from the Gulf of Mexico and cooled by air masses from Canada. The resulting climate is relatively mild in winter with a January mean temperature of 38.4 degrees and a relatively mild and humid summer with a July mean temperature of 79.6 degrees.

METROPOLITAN NASHVILLE



Nashville's Growth.

Nashville has been the fastest growing major city in Tennessee since 1986. During this time period it has led the state in the number and value of single-family and multi-family home starts, commercial real estate construction and job creation.

In 1991, certain segments of the Nashville area real estate market in the Nashville area have excess product. This is described more fully in the Summary of Economic Impact on Subject at the end of Part Two.

Nashville Metropolitan Statistical Area.

The Metropolitan Statistical Area (MSA) is an eight county region made up of Davidson and its contiguous counties: Cheatham, Davidson, Dickson, Robertson, Rutherford, Sumner, Williamson and Wilson. The Nashville Retail Trade area comprises all of Middle Tennessee, southern Kentucky and northern Alabama, an area of 23,335 square miles with a population of about 2 million persons.

The following table exemplifies the steady population growth of Nashville's MSA.

POPULATION STATISTICS (000's)

	<u>1960</u>	<u>1970</u>	<u>1975</u>	<u>1980</u>	<u>1990</u>
Nashville- Davidson Co.	403.4	451.5	465.8	480.1	521.0
MSA (8 County)	604.6	707.0	787.0	861.9	985.0

	<u>% Change</u>	<u>%Change</u>	<u>%Change</u>
	<u>1960-70</u>	<u>1970-80</u>	<u>1980-90</u>
Nashville- Davidson Co.	11.9%	6.3%	8.5%
MSA (8 County)	16.9%	21.9%	5.2%

Source: U. S. Department of Commerce-Bureau of Census indicates a population of 1,204,400 persons by the year 2,000. Current prospects are good for strong and steady growth for the Nashville area.

Effective Buying Income.

Effective buying income (or "disposable personal income") is defined as personal income less taxes. The total median household EBI has increased in the Nashville MSA significantly since 1980. Median household income has increased 49% in Davidson County from 1980 through 1986. Sales and Marketing Management projects continued growth and further increases through 1991.

Cost of Living.

The following table indicates the city of Nashville continues to have a reasonable cost of living when compared to similar size metro areas.

AMERICAN CHAMBER OF COMMERCE
AACRA COST OF LIVING INDEX

Second Quarter 1987

City	Index All Items U.S. Average=100
Boston, MA.....	153.0
New York, NY.....	145.0
San Diego, CA.....	124.4
Philadelphia, PA.....	121.6
Chicago, IL.....	119.6
Dallas, TX.....	108.7
Phoenix, AZ.....	106.8
Denver, CO.....	104.1
*NASHVILLE, TN.....	101.8
Cleveland, OH.....	101.5
Columbus, OH.....	101.5
Houston, TX.....	100.2
Jacksonville, FL.....	100.1
Memphis, TN.....	98.5
San Antonio, TX.....	98.0
Indianapolis, IN.....	96.6
New Orleans, LA.....	96.4

Source: American Chamber of Commerce Researcher's Association collected data from 171 metropolitan areas with a population of 500,000 or more. The ACCRA report includes costs of housing, transportation, medical care, food and most major expenses but does not account for taxes.

In comparison to the participating cities, the all-items index for Nashville was 101.8, 1.8 above the nationwide average of 100. In Nashville, the six component indexes were 98.0 for grocery items, 112.9 for housing, 103.3 for utilities, 99.2 for transportation, 88.2 for health care and 99.7 for miscellaneous goods and services. In addition, a recent study of municipalities across the country indicates it is five percent less expensive to live in Nashville than in the average American city.

Nashville's Economic Rank Among Cities.

The Nashville economy is renowned for its diversity and strength. The Economic Base of American Cities ranked Nashville as number eighty out of the top 101 cities in the nation. Advertising Age ranked Nashville among the top 10 growth markets in the country. According to the Tennessee Department of Employment Security, employment distribution is extremely well-balanced. Inc. magazine ranks Nashville 15th among 154 metropolitan areas in the nation as a "hot spot" for new business formation.

Factors Enhancing Nashville's Potential.

Several factors enhance Nashville's stable and diverse business climate, attracting growing attention from other sectors of the country. They are the major reasons behind the many corporate headquarters who have moved to Nashville: central location, direct air flights, access to major markets from a city with an excellent quality of life, a strong cultural valuing of the family and low taxes.

Nashville's Business Development.

Unlike eastern Tennessee's reliance on textile and furniture manufacturing or western Tennessee's dependence on soybean/tobacco and other agricultural products, Nashville has a service sector dominated

economy with a broad base. The city contains one of the largest printing industries in the United States.

It is the home of country and western music performers, publishers, recording studios and the Grand Ole Opry. The Grand Ole Opry was founded in 1925 and currently is in its 63rd year of continuous live broadcasting from Nashville. Nashville is considered to be the world headquarters for the country music industry. It has spawned a tide of tourism valued in excess of \$500 million per year. Nashville has 102 hotels providing 16,462 rooms.

Business Types.

Major firms headquartered or with divisional offices in Nashville include: Northern Telecom, Aladdin Industries, IBM, Xerox, Viacom Cablevision, Hewlett Packard, Endata, Wal-Mart Stores, Bridgestone Tire Company, American General Insurance and First American Bank.

Local industries that support the Nashville economy also include tool and die, heat treating, foundry, heavy hardware, sheet metal, lubricants, and welding supplies.

Since 1980, more than 250 businesses have located in the growing Middle Tennessee area, greatly benefitting Nashville. Several recent developments in the area have added to the overall Nashville

economy and have contributed to Nashville's status as a "second-tier" American city.

Auto Manufacturers.

Nissan Motors, U.S.A., with Divisional Headquarters in Nashville, announced the opening of its light truck and compact car manufacturing plant in 1980 and has since invested over \$800 million. This facility employs approximately 3,000 workers.

In July 1985, General Motors decided to locate its new Saturn plant in Spring Hill, Tennessee. Spring Hill is 35 miles south of Nashville. Brentwood is located midway between Spring Hill and Nashville. Ninety per cent of the workers live in the adjoining counties.

Chosen from over 1,000 possible sites in thirty-eight states, the Spring Hill facility represents the largest single investment by a United States corporation in history. Of the original \$3.5 billion investment slated for the Saturn plant, approximately \$1.9 billion has been spent on phase one now completed. The plant created 4,000 permanent jobs and 700 contract jobs as of January 1, 1991 and is increasing at approximately 100 new jobs a week.

New cars have begun rolling off the modern robot controlled production line. Capacity production of the plant is 350,000 cars a year. (Saturn, 1991).

Health Care Industry.

The health care industry is a major business segment of Nashville. In addition to health insurance companies, Hospital Corporation of America has its principal offices in Nashville. It is the world's largest for-profit health care system and owner of the world's largest for-profit hospital, Centennial Medical Center in Nashville,

Nashville also has many non-profit hospitals including Baptist Hospital, Nashville Memorial Hospital, St. Thomas Hospital, Tennessee Christian Medical Center and Vanderbilt University Hospital.

A total of eighteen hospitals, 6,501 beds, fifty clinics, 1,406 doctors, 335 dentists and two medical schools insure excellent quality care for the Nashville area.

Air Transportation.

The new Nashville International Airport opened in August 1987. The 46 gate terminal is three times the size of its predecessor and is serviced by 13 airline companies traveling to over 100 markets each day with about 500 flights.

American Airlines.

A positive influence on the Nashville MSA economy was the decision in 1987 by American Airlines

to make Nashville it's third hub city behind Dallas/Forth Worth and Chicago. American Airlines has 132 flights daily to and from Nashville with over 12,000 passenger seats available. American Eagle has 83 additional connecting commuter flights. AA has 25 gates at the new Nashville International Airport and 1200 full time employees.

The most important benefit resulting from AA making Nashville a hub city has been the relocation of company headquarters to Nashville.

Commercial Freight Transportation.

Nashville is one of only three American cities with three connecting interstate highways that radiate out in six directions. Additionally, nine Federal highways help shuttle the 140 motor freight lines from 100 freight terminals to destinations throughout the country.

Rail transportation is adequate. Nashville is one of seven major rail yards in the CSX rail system. CSX Corporation is the nation's largest transportation and natural resources company. It services a major portion of the eastern half of the United States, linking twenty-two states from the Great Lakes to the Gulf of Mexico. Eighty trains per day (4,500 cars) and a modern piggyback and container loading system, service Nashville in the CSX system.

Shipping by barge on the Cumberland River is an important means of Nashville commerce. In 1986, fifty-one operators moved over 23.5 million tons of freight along the Cumberland with 3.7 million tons handled directly at the Port of Nashville. Barge traffic connects conveniently with railway and truck lines for rapid and efficient shipment of cement, sand, coal, grain, chemicals, oil, lime, zinc and iron. The \$2 billion Tennessee-Tombigee Waterway has been completed and greatly shortens the distance between Nashville and the gulf port of Mobile, Alabama.

Greyhound Bus Lines operates from Nashville, providing transportation to all parts of the country. The central location and diversified, growing transportation industry ensures Nashville ready access to national markets for both supply and distribution.

Growth and Development.

The Metropolitan Nashville government is presently in a development mode for a separate storm sewer system from the regular sewer system. Electricity is provided by the Tennessee Valley Authority through the efficient Nashville Electric Service. Natural gas service is available throughout the county from Nashville Gas.

Nashville a Financial Center.

Nine banks with combined assets of over \$7.5 billion and seven Savings & Loan Associations with combined assets of over \$2.1 billion anchor a financial sector that also includes seven life insurance companies. The largest of these seven, American General Life and Accident Insurance Co., boasts assets of over \$3.7 billion. Abundant stock, bond, and commodity brokerage firms service the financial sector and confirm Nashville's image as a major financial center in the Mid-South.

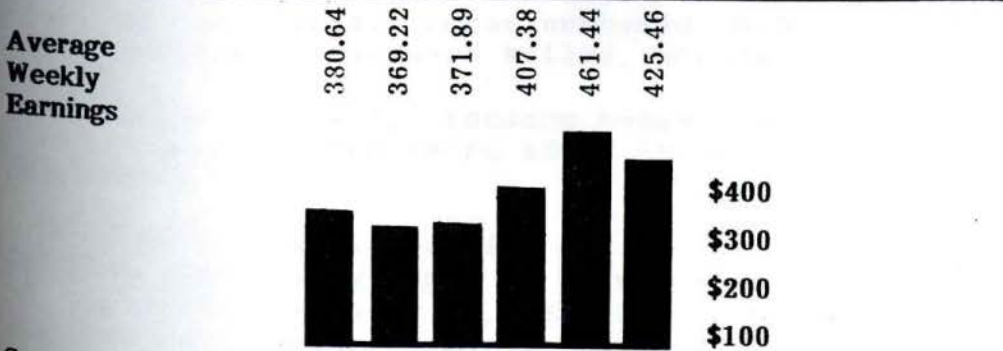
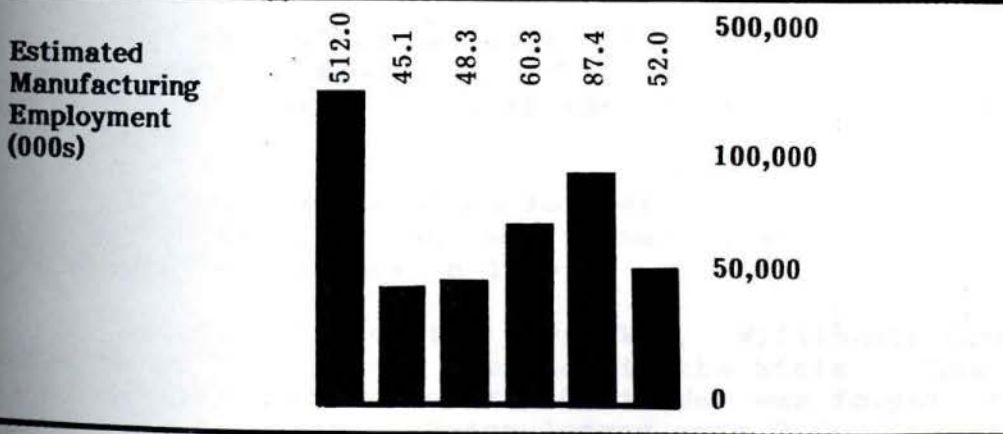
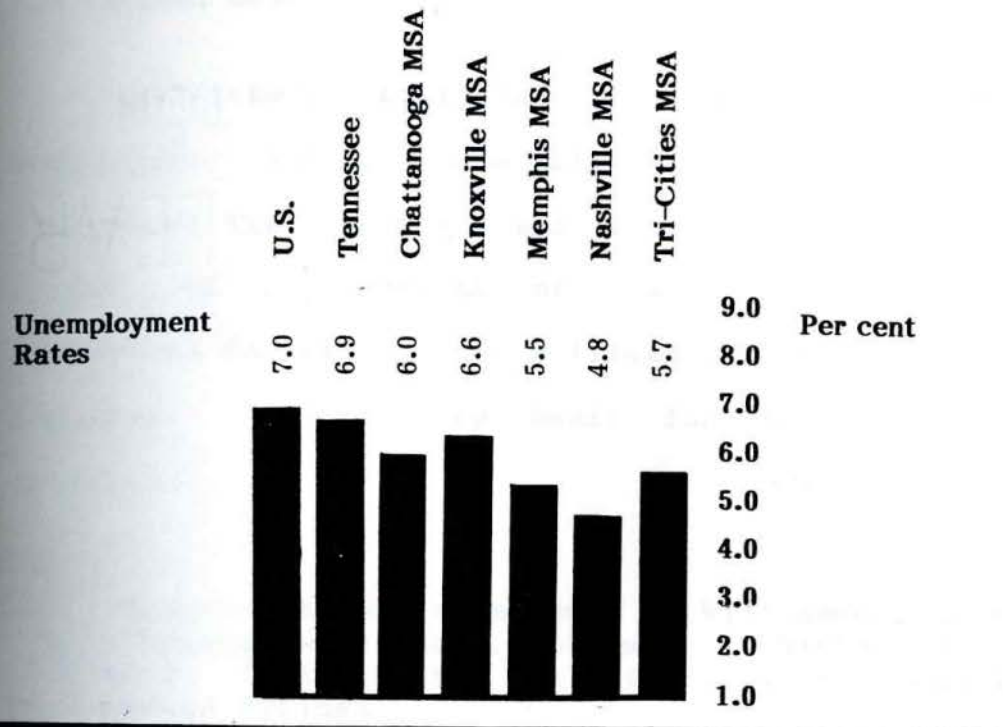
Additional Business Sectors.

In addition to government, health, transportation and finance, other major sectors of the Nashville economy include printing, tourism, and the dynamic music industry. Nashville is the home of the Printing Industry Association of the South, the Southern Baptist Convention's publishing house, and Thomas Nelson Co., the worlds largest printer and distributor of Bibles.

Nashville's Employment Statistics.

Nashville's commitment to education has been cited recently by several firms as a major factor in their decision to locate in the area.

ECONOGRAPH - APRIL 1991



Source: Tennessee Labor Market Report pub. by Tennessee Dept. of Employment Security



COUNTY, CITY AND NEIGHBORHOOD ANALYSIS

Williamson County.

Williamson County is south and slightly west of Nashville. Thomas Vance Little studied the early history of the county and his description appears in a number of publications of the Williamson County Historical Society and the Williamson County Chamber of Commerce. It is the basis for this background material.

Before the white men came to Williamson County, the Indians were here, Creeks, Chickasaws and Cherokees. Indian mounds are still visible at Old Town and Boiling Springs.

In the 1700s settlers moved from Fort Nashboro (early name for Nashville) to the Mill Creek Valley and then Harpeth Valley. After the 1800s they came by the thousands.

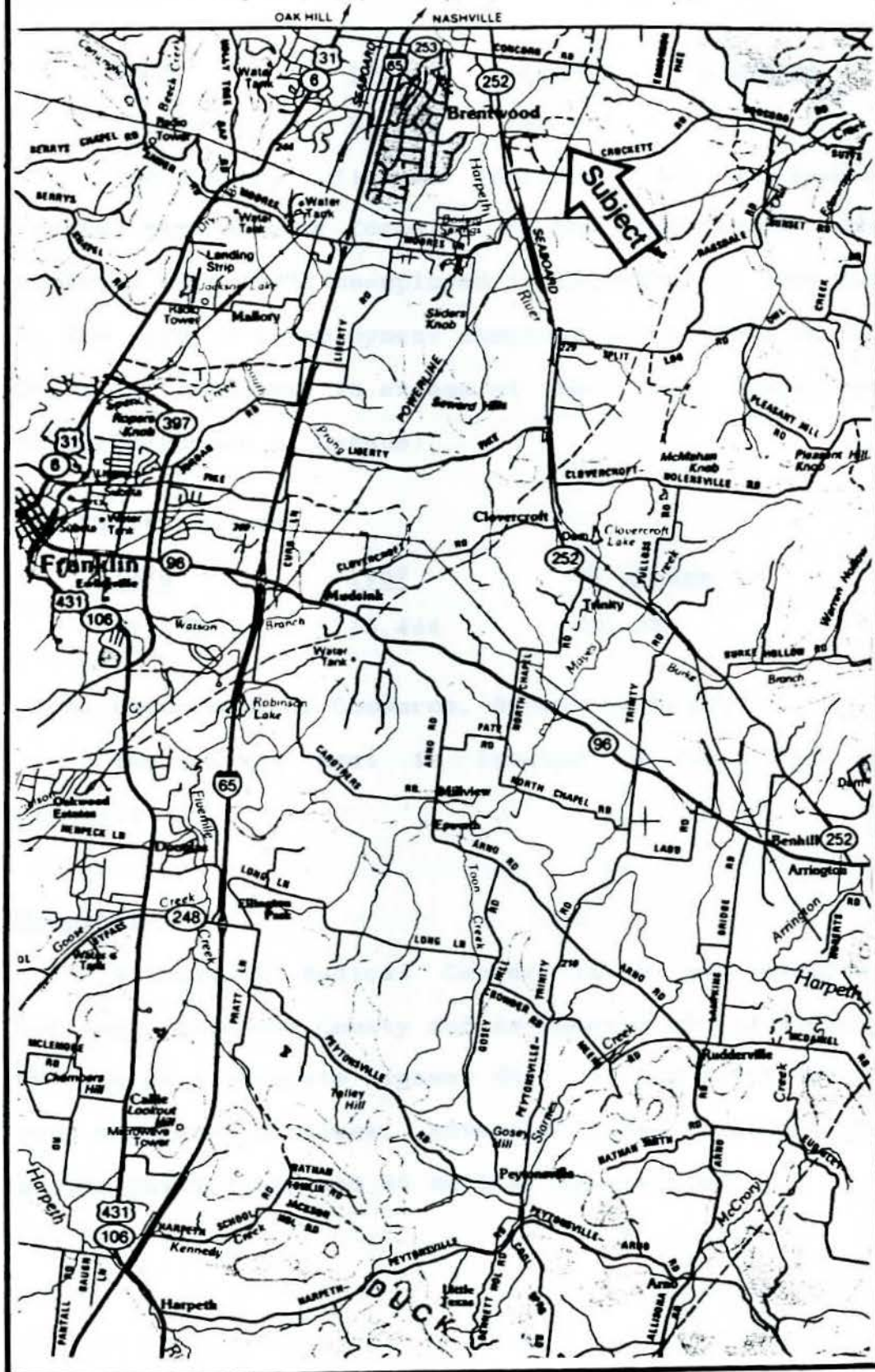
The county was named for General Hugh Williamson of North Carolina and was formed by an act of the Tennessee legislature in 1799.

By the time of the Civil War, Williamson County was one of the richest counties in the State. One of the decisive battles of the Civil War was fought just north of Franklin. Union losses were 2,000 soldiers and the Confederate losses numbered 6,000. Thirteen Confederate generals were killed, wounded or captured.

After the war, tobacco became the county's cash crop. For a hundred years after the war the population was stable.

Then in the 1960s with the growth of Nashville's suburbs, the county began to grow. With the completion of Interstate highway 65, Williamson County was again the fastest growing county in the State. (Little).

WILLIAMSON COUNTY AND CITY OF BRENTWOOD



Population.

<u>1980</u>	<u>1990</u>	<u>Growth</u>	<u>% Change</u>
58,108	81,021	22,913	39.4

Preliminary figures indicate that Williamson County has a labor force of 42,880 and 41,610 are employed with 1,250 unemployed in September of 1990 for a 2.9 rate of unemployment compared to the rate in the State of Tennessee in excess of 5%. (U.S. Dept. of Commerce-Bureau of Census).

Per Capita Income

<u>1979</u>	<u>1987</u>	<u>% Change</u>
\$8,489	15,444	81.9%

(U.S. Department of Commerce, Bureau of Census).

The county seat is located in the City of Franklin.

Hospital

Williamson Medical Center is a new hospital serving Williamson County and is located at the Highway 96 exit on Interstate Highway 65. It has 140 beds, 24 hour emergency services, advanced cancer treatment, 70 active physicians, and 20 medical specialties.

City of Brentwood

The city was incorporated in 1969 and is considered to be one of the fastest growing and most progressive cities in the Southeast. Its incorporated area covers 30.4 square miles or 19,449 acres. It ranks 25th in size by population of Tennessee cities with a 1990 census of 16,392, a 53.2% increase since the 1980 census. Per capita income is \$20,714. (Chamber of Commerce and U. S. Bureau of Census).

City Government

Brentwood has the Commission-Manager form of government after recognizing the need for non-partisan professional management of the new city. Five commissioners are elected at large for staggered four-year terms. They meet on the second and fourth Mondays of each month at 7:00 p.m. in the Brentwood Municipal Center unless otherwise announced. The City Manager is appointed by the Board of Commissioners for an indefinite term.

Police Department

In April of 1971, two years after the city was incorporated, the Brentwood Police Department was started. The force is composed of 46 personnel, of which 36 are officers. There are 18 police cars. Brentwood is the only city in the U.S. that has it's

own 911 emergency system. Police station is located at 5211 Maryland Way. (Brentwood-Watson).

Fire Department

Brentwood has a paid fire fighting force of 35 employees. It has 3 engines, a ladder truck, a tanker and a rescue truck. The department is classed ISO. It receives an average of 10-20 calls per week. (Brentwood-Duffield).

Water and Sewer Department

The City of Brentwood has contracts with Metropolitan Nashville government for both water and sewer services. The contract calls for up to 1.5 million gallons of water per day and 3 million gallons of sewage. Brentwood also has a contract with Harpeth Valley Water District for 3 million gallons of water per day. (Brentwood-Grissom).

Public Schools

Crockett Elementary	K-5	506 students
Lipscomb Elementary	K-5	623 students
Scales Elementary	K-5	540 students
Brentwood Middle	6-8	852 students
Brentwood High	9-12	1200 students

Private Schools

Christ Presbyterian Academy	K-9	411 students
Harpeth Academy	K-6	213 students
Oak Hill	K-6	430 students
Brentwood Academy	7-12	420 students
Franklin Road Academy	7-12	690 students

Brentwood High School

It is located on 52 acres on Murray Lane and was built in 1988. The buildings have classrooms, library, labs, gymnasiums, auditorium, computer studies, science labs and a horticulture center. There are 1200 students with a student/faculty ratio of 21.5 to 1. Over 92% of the students go on to attend college. About 50% of the faculty have master's degrees. Students taking the ACT test in 1986-87 scored 20.7 compared with the national average of 18.7. (Brentwood High School).

Churches

Brentwood has 26 area churches including Baptist, Church of Christ, Presbyterian, Catholic, Methodist, Episcopal and Nazarene.

City Parks and Recreation

There are 3 city parks with jogging trails, ball fields and tennis courts. Brentwood Civitan Park has five lighted baseball fields. There are two private golf courses and four private swimming and tennis clubs in Brentwood.

Child Care

There are 14 area child care centers caring for children from 6 weeks to 12 years of age.

Public Library

The public library at 5105 Maryland Way has 28,000 volumes, 150 periodical titles and subscribes to nine newspapers. It also has meeting and seminar facilities.

Building Permits

In 1990 there were 160 residential building permits issued by the City of Brentwood as compared with 228 in 1989. Since January 1, 1991 through April of 1991 there have been 51 building permits issued compared to 66 in 1990. This is evidence of some slowing in the growth rate for new homes in the city. (Brentwood-Helen). Residential market activity in the last 13 months: 301 resales, 179 new homes. Price range of the homes: \$110,000-\$500,000. Single family dwellings make up 45% of the area of the city while multi-family dwellings make up only .6% of the city's area. (Chamber of Commerce). Brentwood commercial building permit valuation in 1989 amounted to \$62.8 million.

Transportation

Brentwood is only 15 minutes southwest of the Nashville International Airport.

Interstate highway access to Brentwood is via I-65 at exits #74 (Old Hickory Blvd.), #71 (Concord Road) and #69 (Moores Lane). (Brentwood Chamber of Commerce 1991).

Taxes and Revenues

City Sales Tax	.75%
County Sales Tax	1.50%
State Sales Tax	5.50%
City Property Tax	\$.69/\$100 assessed value
County Property Tax	\$2.68/\$100 assessed value

The city revenues were \$8,966,750 for their 1990 operating budget. Total city expenditures were \$8,331,666.

Fees

Public Works Project Fee	\$495
Water tap fee	\$1500
Sewer tap fee	\$2500
Sewer inspection fee	\$15
Plumbing permit	\$2.50/fixture + \$10
Building permit	Based on valuation
Williamson Co. impact fee	\$.70/sq.ft. of living space

(Brentwood Chamber of Commerce, 1991).

Commercial/Retail

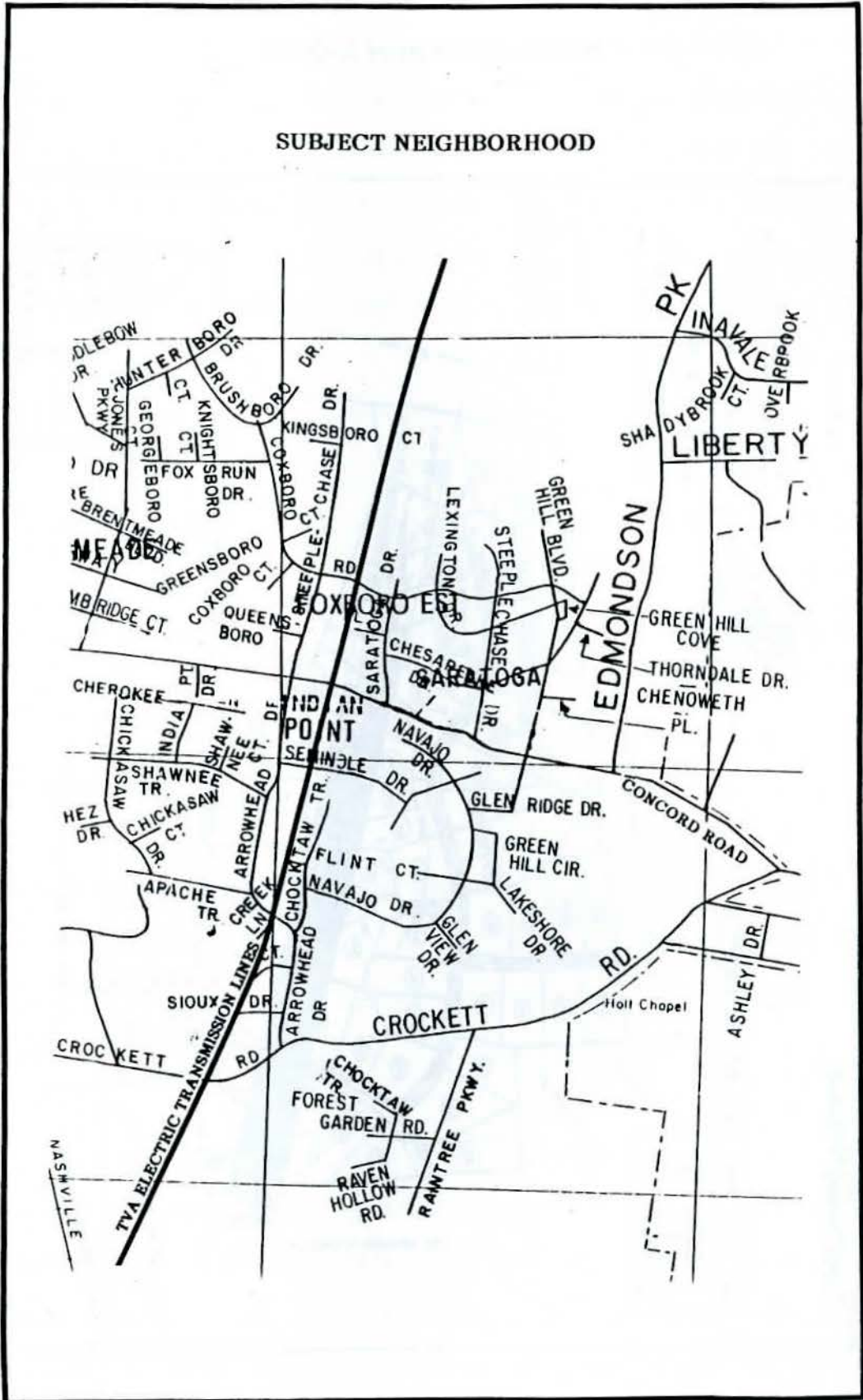
More than 850 permitted businesses operate in Brentwood. 1,050 acres are devoted to commercial use, 177 acres to industrial use and 8,710 acres to either agricultural or vacant use (44.8% of the land). The vacancy rate on the available office market is running about 19-22% for 1989 (Brentwood Chamber of Commerce, 1991). Annual retail sales are \$158.6 million for 1989-90.

SUBJECT AREA OF STUDY

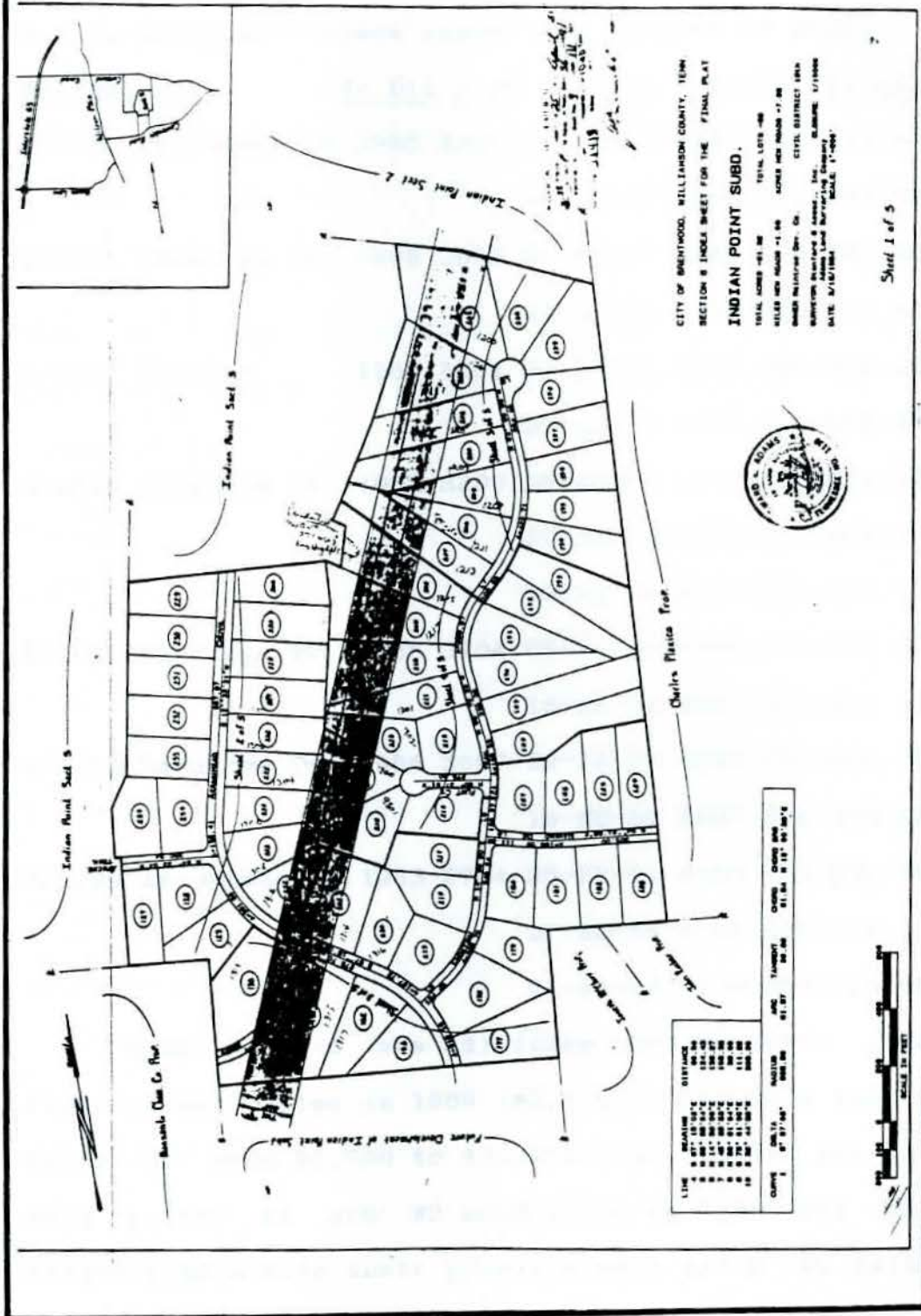
The neighborhood in this research study is the area surrounding the TVA lines where they cross Concord Road in Brentwood, Tennessee.

Brentwood is an upscale suburb of Nashville Metropolitan SMA. Homes in the neighborhood are fairly new. The oldest studied as a comparable sale was built in 1983 but most were built between 1985 and 1989. A few date their construction from 1990. The prices of these homes range from \$150,000 to \$300,000 with an average price about \$235,000. Most of the homes are two story traditional brick homes. A single level home is unusual and does not conform to the area.

SUBJECT NEIGHBORHOOD



INDIAN POINT SUBDIVISION



CITY OF BRENTWOOD, WILLIAMSON COUNTY, TENN.
SECTION 8 INDEX SHEET FOR THE FINAL PLAT

INDIAN POINT SUBD.

TOTAL ACRES - 81.86 TOTAL LOTS - 488
 SELLER NEW MAKEUP - 1.84 ACRES NEW MAKEUP - 17.88
 BARNHART REALTY CO. CIVIL DISTRICT 1874
 BARNHART REALTY CO. CIVIL DISTRICT 1874
 DATE: 8/10/1984



LINE	BEARING	DISTANCE	ARC	TANGENT	CHORD	CHORD BEARING
1	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
2	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
3	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
4	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
5	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
6	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
7	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
8	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
9	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W
10	S 89° 15' 00" E	124.10	81.87	81.84	81.84	S 11° 00' 00" W

Sheet 1 of 5



DESCRIPTION OF SUBJECT PROPERTIES

Two story AT homes, Indian Point and Saratoga Hills Subdivisions and Sold More Than Once Since Construction (sf=square feet, Date=sale date, Pr/sf=price/sq. ft., No. is assigned Subject number for purpose of study.)

<u>No./Address</u>	<u>/Yr.Blt</u>	<u>/ sf</u>	<u>/ Date</u>	<u>/ Price</u>	<u>/Pr/sf)</u>
1/1306 Arrowhead Dr.	1985	3200	01-JA-85	\$191,500	\$59.84
			26-SE-86	\$198,000	\$61.88
2/1011 Saratoga Dr.	1986	3605	02-MY-87	\$245,000	\$67.96
			31-AU-88	\$259,000	\$71.84
3/1217 Choctaw	1986	4481	20-FE-87	\$260,000	\$58.02
			27-AP-89	\$245,000	\$54.68
4/9307 Seminole Dr.	1985	3200	28-AU-86	\$186,750	\$58.36
			23-JA-88	\$205,750	\$64.30
			10-JL-89	\$173,820	\$54.32
5/1015 Saratoga Dr.	1986	3704	05-JA-86	\$265,280	\$71.62
			18-OC-89	\$260,000	\$70.19
6/1005 Saratoga Dr.	1986	3697	09-JA-87	\$243,000	\$65.73
			18-SE-89	\$237,500	\$64.24
7/1209 Arrowhead Dr.	1983	2784	26-FE-91	\$155,000	\$55.67
			07-NO-86	\$186,000	\$66.81
			01-JA-83	\$129,900	\$46.66

Homes No. 1-6 are adjoining the TVA power lines right of way. Sales in 1989 (#3,4,5,6) showed a loss of value of from \$5,500 to \$31,930 over their previous sale price. #1 and #2 sold prior to 1989 and both showed a gain over their previous sale price (#1 gained

\$7,000 and #2 gained \$14,000). Average last sale price of the four homes sold in 1989 is \$229,080 compared to a subdivision average of \$245,335, a difference of \$16,255.

The residence at 9307 Seminole Drive showed a \$31,930 loss in it's last sale and is located very close to the power lines. It was sold by Equitable Relocations so it is likely that seller motivation contributed 10-15% to a lower price.

The following Residences Sold Only Once after Construction and Adjoining the TVA Right of Way in Indian Point.

Address	/	Yr.	Blt/sf	/	Date	/	Price
1314 Arrowhead Dr.		1985	3875		25-AP-86		223,900
1312 Arrowhead Dr.		1985	3495		01-MR-86		184,000
1315 Arrowhead Dr.		1986	3246		27-MY-86		220,000
1300 Arrowhead Dr.		1986	2752		30-JL-87		200,000
1302 Arrowhead Dr.		1985	2974		08-JA-86		189,900
1304 Arrowhead Dr.		1985	3462		01-JA-85		lot only
1310 Arrowhead Dr.		1985	2624		01-JA-85		lot only
1308 Arrowhead Dr.		1985	3275				lot only
1313 Arrowhead Dr.		1986	2525		15-AU-86		lot only
Seminole Dr.		1980	3080		31-OC-88		145,000
9301 Flint Ct.		1986	3255		01-AU-86		220,000
9302 Flint Ct.		1986	2988		26-SE-86		180,000
1207 Choctaw Tr.		1987	3247		17-FE-89		178,000
1213 Choctaw Tr.		1986	4077		17-DE-86		259,900

Address	Built	sf	Sale Date	Price
1215 Choctaw Tr.	1986	3238	14-OC-86	226,000
1219 Choctaw Tr.	1985	3527	26-FE-86	183,300
1301 Choctaw Tr.	1986	3684	30-JA-87	235,000
1209 Choctaw Tr.	1987	3474	01-AU-86	lot only
1205 Choctaw Tr.	1990	2944		

Single Story Residences Adjoining TVA Right of Way

9300 Flint Ct.	1989	2580		
1211 Choctaw Tr.	1988	3615	18-JA-89	271,500

SALES SUMMARY IN SUBJECT AREA

Statistical Summary of Sales 01/01/90 - 04/10/91

Williamson County

Based on 1000 sales.

Mean List Price: \$257,999.

Mean Sale Price: \$245,335.

Median List Price: \$249,900

Median Sale Price: \$237,500

City of Brentwood

Based on 495 sales.

Mean List Price: \$227,606

Mean Sale Price: \$215,948

Median List Price: \$209,000

Median Sale Price: \$200,000

Subdivisions in the Subject Property Area

Based on 90 sales.

Mean List Price: \$257,999

Mean Sale Price: \$245,335

Median List Price: \$249,900

Median Sale Price: \$237,500

Source: Nashville MLS records.

SUMMARY OF ECONOMIC IMPACT ON SUBJECT

Location.

The subject area is well located in the middle of the U.S. on three major interstate highways, a major railroad and a major waterway. It is also in middle Tennessee, the fastest growing area of the state. It is located between the new auto manufacturing centers with their supporting industries and the financial centers in downtown Nashville. It is a "new money" residential area for executives, upper management and successful entrepreneurs.

Population Growth Trend.

The Nashville MSA is the fastest growing area of the state having experienced a 5.2% growth over the past decade. Williamson County had a growth of 39.4% in that period.

Income.

Nashville MSA household income increased 49% compared to 81.9% for Williamson County.

Cost of Living Index.

The cost of living (housing, transportation, medical care, food) in Nashville is only 1.8% above the nationwide average for 171 metropolitan areas.

Unemployment.

In April of 1991, the Nashville's rate of 4.8% compared to the national rate of 7.0%.

Rankings of Economic Strength.

Nashville's economic strength has been ranked variously from 10th to 15th most desirable among the U.S. cities by various economic authorities.

Real Estate Sales Trends.

NASHVILLE MLS

<u>Year</u>	<u>#Sold</u>	<u>Total-Sales</u> <u>Millions \$</u>	<u>Avg-Price</u> <u>Thousands \$</u>	<u>Percent</u> <u>Change</u> <u>in Avg.</u> <u>Price</u>
1986	12,822	1,129	89.5	+10.91%
1987	11,349	1,011	89.2	-00.34%
1988	10,637	1,000	94.1	+ 5.49%
1989	10,480	1,007	96.1	+ 2.13%
1990	10,228	987	96.5	+00.42%

WILLIAMSON COUNTY

1986	1,469	198	135.1	-
1987	1,280	188	147.3	+ 9.03%
1988	1,192	187	157.9	+ 7.34%
1989	1,324	220	165.8	+ 5.00%
1990	1,300	208	160.1	- 3.44%

Real estate prices in the Nashville area were flat in the period of 1989-1990. Williamson County prices averaged a 5% increase in 1989 and had an average loss of 3.44% in 1990. The Subject subdivisions of this study showed an average annual appreciation in both 1989 and 1990. The AT Subjects all lost value. The average losses in Williamson County are attributed by many real estate experts in the area to an excess of homes in 1990. This may account for the one percent slowing of appreciation of NATs during 1990.

WORKS CITED

American Chamber of Commerce, Researcher's Association,
AACRA Cost of Living Index, 1987.

Brentwood Chamber of Commerce, pamphlets. 1991.

Brentwood, City Offices. Phone Conversations on May
16, 1991 to various departments for information.

"Helen" for Planning, Building permits.

John Grissom, Director of Water and Sewer Dept.

Captain Ricky Watson, Police Department.

Captain Mark Duffield, Fire Department.

Brentwood High School, brochure published by the
Academic Committee of the Bruins Club. Undated.

General Motors Corporation: Saturn Plant, Spring Hill,
Tennessee. Phone conversation with the
Communications Department, 2/19/91.

U. S. Department of Commerce, Bureau of Census.
Printout prepared by Tennessee State Planning
Office 2/90.

U. S. Department of Labor, Statistics, 1991.

Williamson County Chamber of Commerce, pamphlets. 1991.

PART THREE
ANALYSIS AND OPINIONS OF THE APPRAISER

ZONING OF SUBJECT PROPERTIES

The area under study is zoned residential and there are no businesses or commercial establishments in the neighborhood.

HIGHEST AND BEST USE OF LAND AS THOUGH VACANT

Highest and best use is defined by the American Institute of Real Estate Appraisers as "The use, from among reasonably probable and legal alternative uses, found to be physically possible, appropriately supported, financially feasible, that results in highest land value." (Appraisal Institute, 29).

In estimating the highest and best use, we consider the following criteria. (Boyce & Kinnard, 160).

1. **Possible Use (Physical).** What uses are physically possible on the subject site or in the subject improvements given the physical characteristics revealed by property analysis?
2. **Permissible use (Legal).** What uses are permitted under existing zoning and other land use regulations and controls, and under existing deed restrictions, for the subject property?
3. **Feasible use (Appropriate Use).** Among legally permitted and physically possible uses for the subject property, which are appropriate given the characteristics revealed by market, Neighborhood and Property Analysis?
4. **Highest and Best Use:** The appropriate or feasible uses for the subject property,

which will produce the highest present value; that which is maximally productive.

The highest and best use of the subject properties is the present use permitted by its zoning, namely, residential.

While it might serve many possible physical uses, there is only one "legal" and "appropriate use" for the property and that is a residential subdivision.

HIGHEST AND BEST USE OF PROPERTIES AS IMPROVED

There are several methods of calculating the cost new of improvements. All of these methods require careful measurements and physical examination of the buildings before completing the cost estimate of replacement. Since it will be impossible to physically examine the buildings and since we are reliant upon the measurements of the tax assessors, no cost replacement estimate will be developed based on any of the available cost estimating methods.

The highest value of the land is as improved by residences. Only this value is feasible, legal and possible.

APPRAISAL PROCESS

Approaches to Value

An appraisal problem is ordinarily solved through the use of three generally accepted valuation techniques. Each technique has an individual valuation concept and provides a separate indication of value for the subject property. The three separately conceived value indications tend to form a zone of reasonability, and under the process known as correlation, the final value conclusion is found within this zone.

The entire valuation process is comprised of integrated, interrelated, and inseparable procedures with the common objective of arriving at a convincing and reliable estimate of value. Although the approaches may be documented and explained on different pages of the appraisal report, they are rarely truly independent and unrelated...and some appraisers prefer the "one-approach" concept..." (Ackerson, 5)

Within the **Cost Approach**, there are four basic steps required to arrive at a value indication. The first step is to estimate the value of the land as if vacant and available for development to its highest and best use. A replacement cost estimate of the existing improvements is then made. An estimate of depreciation from all causes is then subtracted from the developed replacement cost estimate of the improvements. The depreciation estimate includes consideration of deterioration of the physical qualities of the improvements as well as obsolescence attributed to both

functional and economic considerations. The final step in the Cost Approach is the compilation of the depreciated estimated replacement cost of the improvements to which is added the estimated land value, giving a value estimate of the property by the Cost Approach. Cerone and Haber say that:

There are several methods of calculating the cost new of improvements. The most exacting is the Quantity Survey Method, sometimes referred to as Trade Breakdown Method. In this method, the appraiser estimates the cost of material and labor of all individual items used in construction... the professional appraiser may reserve it for use in select appraisal assignments. This method, used in part, can be extremely helpful in estimating curable depreciation...

Though slightly less technical and considerably less time consuming than the Quantity Survey Method, the Unit in Place Method offers quite accurate results when properly applied. In some cost estimating manuals this method is referred to as the Segregated Method and has received strong acceptance in the appraisal field.

In the Unit in Place Method, major construction components are segregated. Their reported costs include the cost of labor and materials for each integral item within the major component. The sum of the components is the aggregate cost new of a structure by the Unit in Place Method...

The simplest and least time consuming cost estimating process is the Square Foot Method. Certain cost manuals have chosen to label the method differently. However, the actual process is premised on square footage. As a word of caution, the calculation of square footage is obtained by measuring the exterior dimensions of the structure and not interior dimensions. (Carnahan, Cerone & Haber, 78-80).

Application of the Sales Comparison Approach
produces a value estimate by comparing similar properties which have been recently sold or are currently under contract with all contingencies removed

to the subject property. An estimate of the degree of comparability is made by comparing such value factors as location, construction, age and condition, utility, equipment and marketability. Sale properties judged to be comparable tend to set a range in which the value of the subject property will fall. The Principle of Substitution is the controlling factor in this approach to value. Ackerson says this principle "affirms the limits of prices, rents, and rates tend to be set by the prevailing prices, rents and rates for equally desirable substitutes..." (Ackerson, 5).

The Income Approach is concerned with the present worth of the future benefits of the property. Again, four basic steps are required for a value indication. These are the estimation of economic rent, expenses, economic life of the improvements and the selection of an appropriate capitalization rate for processing the net income. In its application, the appraiser estimates a gross annual income which the property should produce to attract investors in the market. From the gross income, expenses are subtracted to obtain a new income before recapture projection. Expenses include taxes, insurance, operating costs and maintenance costs. An estimate of the economic life of the improvements requires a determination of the probable duration of the income stream. Rate selection

requires market scrutiny for an interest rate reflective of current conditions. An applicable capitalization technique is then asserted, and the net income estimate is processed by the proper rate for a present value estimate of the property. As Justice Oliver Wendell Holmes stated, "All values are anticipations of the future."

THE COST AND INCOME APPROACHES TO VALUE

The cost and income approaches to value were considered but were rejected as inappropriate for this appraisal research problem for the following reasons:

The reason that the cost approach is not applicable is because the properties under consideration were not available to us for measurement and interior examination, a requirement for cost estimating. It was necessary to rely on tax records, MLS data and street observations which are insufficient for accurate cost estimations.

The reason that the income approach is not applicable is because homes in the area are owner occupied. There are no comparable rentals.

THE COMPARATIVE MARKET ANALYSIS APPROACH TO VALUE

The potential AT subject properties in these subdivisions were primarily located in Indian Point and Saratoga Hills on the following streets:

1300 - 1315 Arrowhead Drive

1200 - 1301 Choctaw Trail

Flint Court

Saratoga Drive

Coxboro Drive

The AT subject properties were further limited to those properties that sold more than once so that we could accurately determine if a loss of value had occurred. If an AT had not sold more than once it was not suitable to be considered.

Furthermore, we discovered that up until 1989 values for all the properties increased annually whether or not they were AT or NAT. After 1989, values for AT decreased. NAT value appreciated after 1989. Since these are new subdivisions, many of the owners who first bought the AT properties have not sold so the number of subject properties in the study is only seven.

The power lines between Steeplechase Drive and Saratoga Drive are not easily seen from Steeplechase homes since there is a row of trees between the homes

and the lines. The homes are also set well away from the lines which are closer to the homes on Saratoga Drive. Homes on Steeplechase were excluded from being considered AT for this reason.

Comparables.

The tax records and sales records of both subject properties and comparable sales were retrieved from Tax Star and the Multiple Listing Service (MLS), a service of the Nashville Board of Realtors to its members. Tax Star is a direct computer access to the county tax records. It is one of the first such systems in the country. Tax Star is a reliable source of sale data. It is generally accepted by appraisers that measurements in both tax records and MLS records are frequently inaccurate. Sale dates and sale prices recorded in tax records are considered by appraisers to have a high degree of reliability.

The reason for using two sales was the fact that a hard dollar loss could be verified if it had occurred. Estimates of current value of subjects sold only once would be very difficult to verify without a site examination.

Choosing NAT Comparables.

Comparables were chosen on the basis of not adjoining the TVA right of way. In most cases excellent comparables were on streets far enough away from the transmission lines so there could be no doubt that the properties were unaffected by the EMF stigma.

The second criteria considered in choosing comparable sales was whenever possible they were properties that had sold more than once. This permitted measurement of NAT appreciation or depreciation that had occurred.

Sufficient NAT properties were sold more than once in the adjoining subdivisions that an annual market rate of appreciation was calculated. Then a value was estimated for each AT based on its pre-1989 sale price as to what it could have been expected to be worth were it in a NAT location and not suffer from EMF location stigma. This gave a value estimate to the real loss sustained by the owners of the AT subject properties.

Sales Comparison Grids

Comparison grids based on the available information from the tax records were compiled for each of the subject properties. NAT comparable solds were chosen that were closest in size (sf) to the AT subject.

Adjustments to Comparables.

A regression analysis of the comparables was done to discover the value of market adjustments. A swimming pool was discovered to have a value of \$15,000 by this approach after a paired study (Table 2) showed a market value of \$7500 for a pool. Where market data was lacking a conservative cost estimate was used based on Marshall and Swift, 1991 tables, adjusted for the Nashville, Tennessee area (Table 1). This was necessary because of the questionable reliability of some of the variables found in the tax records.

All homes in the study were two story (mostly brick), with two car garages, concrete driveways, central heat and air conditioning and fireplaces. The square foot adjustment used in the calculations was \$45.39.

Time Adjustments

Early in the study it was suspected that 1989 was a year that AT properties began depreciating. The market value for all properties in the subject area appreciated at a mean annual rate of +3.779% until 1989. (Table 3). The homes showed a consistent appreciation whether or not they were 3 or 6 years old.

The appreciation rate dropped in 1990 and 1991 but still remained above 2.74% per year (Table 4). The appreciation and depreciation rates were calculated by annual compounding for the term between the two sales.

UNDERSTANDING THE SALES COMPARISON GRIDS

Explanation by Grid Line Number

0. Subject and Comparable Identification Numbers.
1. Street Address. No picture indicates picture of that property is missing among photos for some reason.
2. Subdivision is name where property is located.
3. Price, Date Sold. Taken from county tax records. The date is day/month/year.
4. Year is year built.
5. Fixtures are plumbing fixtures.
6. Fin. Basement is finished basement.
7. Unfin. Basmt is unfinished basement.
8. Sq. Ft. Res. is square feet of finished living area.
9. Spec. Feature are special features and include swimming pools, extra story beyond two story level home and new condition where it was first occupancy and no other adjustment would suffice to bring comparable into a reasonable conformity.
10. Opn Porch is open porch square feet.
11. Deck is square feet of deck.
12. Patio is square feet of patio.
13. Dif.2 Sales is the difference between the last two sales of the property in line 3. Ap/Dep Rate is the appreciation or depreciation rate annualized for the difference in sales price.

14. Exp.Sub.Value 1989 is the expected value of the Subject Property in 1989 from the comparables after having made adjustments. This value in the Subject Column represents the value of the comparable on that line to the right thought to be most like the Subject. This was arrived at by dividing the price in 1989 or adjusted thereto on Line 3 by the square feet of residence in Line 8 and choosing the comparable that was most similar to the subject on this basis. This was believed to be the most reliable means of similarity available to the author. The value of the comparable sale that had the closest price per square foot to the Subject had its value on Line 14 transferred to the Subject column Line 14.
15. 1991 Exp Sub is the 1991 Expected Subject Value and is arrived at by appreciating the comparable sales by 2.74% and depreciating the subject sale by -2.79% per year for two years beginning with 1989 Expected Subject Value for the Comparables and the actual 1989 price of the Subject.
16. 1991 Est is the 1991 estimate of value. In the Subject column it represents the 1991 Expected Subject value of the Comparable on Line 15 that was chosen as being the most like the Subject. For the comparables it represents an appreciation of 2.74% of their 1989 price in Line 3.

17. 1991 Est/SF is the price per square foot resulting from dividing Line 16 by Line 8.
18. Est.Gain/Loss is the percent and actual amount of the expected gain or loss based on subtracting Line 15 from Line 16 for the actual amount and then dividing the result by line 16 to give the percentage of gain or loss.

TABLE 1

COST/SF ADJUSTMENT FIGURES*		
	U.S. basic cost	Adjusted for region and Nashville x.88
Est. Life=50yrs Straight line Annual factor	.020000	
**Pool	45.00	39.60
Fin. Basemt	19.00	16.72
Unf. Basemt	8.50	7.48
Sq.Ft. Res.	51.58	45.39
Garage	14.75	12.98
Opn Porch Fin	8.98	7.90
Stoop	8.13	7.15
Fixtures	200 each	.
Deck	8.05	7.08
Patio	2.10	1.84

Sources: *Marshall & Swift, 1991 and **Ed Reid, Brentwood Pools, Brentwood, May 20, 1991.

All homes in study had 2 stories, brick exterior, concrete driveway, central heat and air conditioning. No adjustments were made for these characteristics. Age adjustments were based on straight line depreciation at 2% per year. Site Value was judged to be assessed value in consideration for time and lack of access to review all the sites. Similarity of subject and comparables was based solely on the tax records and exterior appearances.

TABLE 2

MARKET VALUE OF POOL BY PAIRED STUDY

	SUBJECT	COMP.
Address	9312 Crockett Dr.	1307 Glenview Dr.
Sold New	16/AU/89	01/SE/89
PRICE	242,400	253,500
Year built	1989	1989
Exterior Wall	Brick	Brick
Fixtures	13	14
Finished Basemt	0	0
Unfin. Basemt	3068sf	2076sf
Sq.Ft. Res.	3070sf	3172sf <102sf> -4600
Garage	0	0
Open Porch Fin	125sf	0 +1000
Stoop	24sf	40sf
Pool	29x17	0
Deck	308sf	280sf
Patio	0	0
Adjusted Price	242,400	249,870
Estimated Value of Pool:		7,500

Market Value of a Pool in regression analysis (Appendices) was found to be \$15,000.

TABLE 3

1989 ANNUAL NAT APPRECIATION RATE

No.	1989 Price	Prev. Price	Term/Yrs.	Rate
1.1	224,000	149,500	5	.084230
1.2	192,950	176,000	4	.023253
1.3	230,000	225,000	2	.010501
1.4	234,000	231,000	1	.019870
1.5	245,000	173,900	4	.089473
1.6	213,900	176,300	4	.049517
2.1	204,000	139,000	6	.066029
2.2	176,500	164,000	5	.014799
2.3	190,000	177,500	4	.017159
2.7	240,000	219,900	2	.047034
5.2	273,000	269,000	2	.007407
5.6	234,000	217,797	3	.024208

Mean (Average) 1989 NAT Price: 221,446

Mean (Average) NAT Annual Appreciation Rate: .037790

ANNUAL AT DEPRECIATION RATE

No.	1989 Price	Prev. Price	Term/Yrs	Rate
3.0	245,000	260,000	2	-.029274
4.0	173,820	205,740	1	-.155188
5.0	260,000	265,280	3	-.006679
6.0	237,500	243,000	2	-.011382

Note: Figures based on homes in study that sold more than once since construction.

TABLE 4

1990-1991
ANNUAL APPRECIATION RATE FOR COMPARABLE PROPERTIES

ADDRESS	Square Feet	PRICE 1990	PRICE Previous	TERM	RATE Annual
Closed in 1990					
1213 Arrowhead Dr.	3678	241,000	221,087	4.5 yrs	.019339
1416 Arrowhead Dr.	3833	227,500	221,050	2 yrs	.014485
1206 Brookview	3570	250,000	246,000	2 yrs	.008097
1207 Chickasaw	3088	220,000	178,070	4 yrs	.077611
1202 Choctaw Tr	3871	325,000	282,000	2 yrs	.073537
9235 Greensboro Ct.	3401	193,000	135,900	7 yrs	.051387
9317 Lake Shore Dr.	4092	295,000	292,500	1 yr	.008547
1113 Navaho Dr.	3138	220,000	214,000	2.5 yrs	.011158
9210 Apache Tr.	4262	240,000	231,000	4 yrs	.009601
9209 Shawnee Tr.	3108	205,000	156,250	6.5 yrs	.042627
9210 Shawnee Tr.	3127	202,000	192,000	4 yrs	.012774
9216 Shawnee Tr.	3186	171,000	168,900	5.5 yrs	.000024
Averages	3530	232,458		5.62 yrs	.027432
Closed in 1991					
1423 Arrowhead Dr.	SF 3848	1991 Pr. 241,000	Previous Pr. 228,000	TERM 3 yrs	RATE .018656
9412 Lake Shore Dr.	4087	280,000	new		
1205 Navaho Dr.	3796	290,000	new		
1302 Navaho Dr.	3657	258,000	new		
Averages	3.847	267,250			

Insufficient sales to suggest a 1991 market rate of appreciation .

Average Cost per square foot (includes lot): \$65.85 in 1990.

Average Cost per square foot (includes lot) \$69.47 in 1991

This list of properties was composed from the MLS and TAX records for Williamson County on May 22, 1991. Any MLS sales were confirmed by phone. 17 other sales were made but not included here because they were single sales of new homes or we could not confirm an earlier sale from the tax record.

REVIEW OF INDIVIDUAL AT SUBJECTS

Subject #1.0

This property is located at 1306 Arrowhead Drive and was last sold in 1986 for \$198,000. The previous sale was for \$191,500 in 1985, a year before (Table 5). It showed an appreciation rate of 3.39% for the period. It has not sold since 1986. Based on the other sales in the AT area it would be expected to sell in 1991 for less than it sold for in 1986. With an increase in value expected up till 1989 of 3.779% and for 1990 of 2.74% the author expects that it's value if not adjoining the TVA lines would be \$225,800 but that it would sell for something less than \$198,000 because of its location, say 191,500.

From the comparable sales the author estimated that its value in 1989 was \$205,100 because from the records, the comparable most like the subject needing the smallest number of adjustments was Comparable 1.6.

The author believes this house has lost about \$34,300 (or about 15.19%) in value due to the EMF issue.

TABLE 5

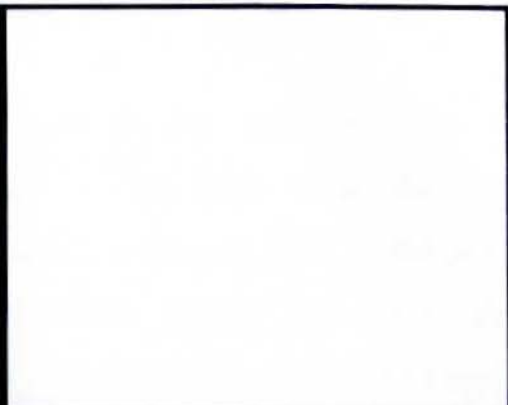
Sales Data Comparison in Brentwood, Tennessee - 1991

0. Line	Subject 1.0	Comparable 1.1	Comparable 1.2	Comparable 1.3	Comparable 1.4	Comparable 1.5	Comparable 1.6
1. Address	1306 Arrowhead Dr.	820 Georgeboro Ct.	9215 Brushboro Dr.	809 Foxboro Ct.	9228 Huntersboro Dr.	9215 Apache Tr.	1210 Chickasaw Dr.
2. Subdivision	Indian Point	Foxboro Estates	Foxboro Estates	Foxboro Estates	Foxboro Estates	Indian Point	Indian Point
3. Price	198,000	224,000	192,950	230,000	234,000	245,000	213,900
Date Sold	26/SE/86	24/AP/89	28/FE/89	29/AU/89	30/JN/89	03/JL/89	24 AU/89
	191,500	149,500	176,000	225,000	231,000	173,900	176,300
	01/JN/85	01/JA/84	01/JA/85	19/MY/87	09/JN/88	01/JA/85	01/JN/85
4. Year	1985	1983	1985	1986	1987	1984	1985
5. Fixtures	10 -0-	10 -0-	9 +200	12 -400	15 -1000	10 -0-	- -
6. Fin. Basement	0	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-
7. Unfin. Basmt	0	1943sf -14500	676sf -5000	198sf -15000	0 -0-	1484sf -11100	0 -0-
8. Sq.Ft. Res.	3200sf	3161sf -0-	3222sf -0-	3324sf -5650	3346sf -6650	3372sf -7800	3377sf -8000
9. Spec. Feature	0 -0-	Pool -15000	0 -0-	0 -0-	0 -0-	Hot tub -5000	0 -0-
10. Opn Porch	0 -0-	334sf -2700	272sf -2150	0 -0-	0 -0-	50sf -400	99sf -800
11. Deck	0 -0-	0 -0-	16x12 -1350	0 -0-	20x12 -1700	14x16 -1600	0 -0-
12. Patio	196sf	0 +360	0 +360	0 +360	0 +360	0 +360	200sf -0-
13. Dif. 2 Sales Ap/Dep Rate	.033943	.084230	.023253	.010501	.019870	.089473	.049517
14. Exp.Sub. Value 1989	205,100	192,160	185,010	209,310	234,010	219,460	205,100
15. 1991 Exp Sub	191,500	202,847	195,300	220,951	247,025	231,666	216,506
16. 1991 Est	225,800	236,458	203,681	242,792	247,014	258,626	225,796
17. 1991 Est/SP	59.84	74.80	63.22	73.04	73.82	76.70	66.86
18. Est.Gain/Loss	-1519 -34,300						

Source: Williamson County Tax Records, Tennessee. Information deemed reliable but not guaranteed.



(1.0) 1306 Arrowhead



(1.1) 820 Georgeboro Ct.



(1.2) 9215 Brushboro Dr.



(1.3) 809 Foxboro Ct.



(1.4) 9228 Hunterboro Dr.



(1.5) 9215 Apache Tr.



(1.6) 1210 Chickasaw

Subject #2.0

Subject 2.0 is in Saratoga Hills subdivision at 1011 Saratoga Drive (Table 6). The last time that the property sold was in 1988 when it sold for \$259,000. The previous sale was in 1986 when it sold for \$245,000. Over a period of two years, it appreciated \$14,000 in value for an appreciation rate of 2.82% per year. Once again notice that the last sale occurred in 1988. This AT appreciated during that two year period even though it was adjoining the power lines.

However, the author expects that if this property sold today it would sell for less than it did in 1988 based on the data from the remaining subject properties.

From the market comparables, the author estimated that if it was located somewhere else in the subdivision that it would be worth about \$295,400 and judged that the Comparable 2.4 was the most like the subject.

From extrapolations of its last sale in 1988 at 3.779% for 1989 and 2.74% for 1990 the author expects that this property could be worth \$295,400 were it not for its location. If it sold today it would sell for about \$238,300, a loss of about \$57,000 (about -19.3%).

TABLE 6

Sales Data Comparison in Brentwood, Tennessee - 1991

0. Line	Subject 2.0	Comparable 2.1	Comparable 2.2	Comparable 2.3	Comparable 2.4	Comparable 2.5	Comparable 2.6	Comparable 2.7
1. Address	1011 Saratoga Dr.	9223 Fox Run Dr.	813 Steeplechase Dr.	9229 Brushboro Dr.	9314 Navaho Dr.	9316 Navaho Dr.	9325 Navaho Dr.	9217 Fox Run Dr.
2. Subdivision	Saratoga Hills	Foxboro Estates	Foxboro Estates	Foxboro Estates	Liberty Downs	Liberty Downs	Liberty Downs	Foxboro Estates
3. Price Date Sold	259,000 31/AU/88	204,000 09/JN/89	176,500 01/AU/89	190,000 01/JN/89	282,500 06/AP/89	288,000 14/JL/89	275,000 10/MR/89	240,000 01/AU/89
	245,000 02/MY/86	139,000 01/JA/83 01	164,000 02/JA/84	177,500 02/JA/85				219,900 11/MY/87
4. Year	1986	1983	1984	1985	1988	1989	1988	1983
5. Fixtures	13	9 +800	10 +600	10 +600	10 +600	13 -0-	10 +600	11 +400
6. Fin. Basement	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-
7. Unfin. Basmt	2293sf	625sf +12500	0 +17150	0 +17150	2536sf -1800	2508sf -1600	1134sf +8700	1060sf +9200
8. Sq.Ft. Res.	3605sf	3450sf +7050	3513sf +4200	3450sf +7050	3680sf -3400	3508sf +4400	3459sf +6650	3480sf +5650
9. Spec. Feature	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	Pool -15000	0 -0-
10. Opn Porch	22sf	0 +150	0 +150	0 +150	36sf -0-	32sf -0-	0 +150	24sf -0-
11. Deck	266sf	0 +1900	0 +1900	0 +1900	0 +1900	466sf -1400	0 +1900	200sf -450
12. Patio	0	0 -0-	285sf -500	272sf -500	0 -0-	112sf -200	0 -0-	240sf +450
13. Dif. % Sales Ap/Dep Rate	.028175	.066029	.014799	.017159				.047034
14. Exp.Sub. Value 1989	279,800	226,400	200,000	216,350	279,800	289,200	278,000	254,350
15. 1991 Exp Sub	238,265	238,992	211,123	228,383	295,361	305,284	293,461	268,496
16. 1991 Est Comp	295,400	215,346	186,316	200,567	298,212	304,018	290,295	253,348
17. 1991 Est/SF	66.09	62.42	53.04	58.14	81.04	86.66	83.92	72.80
18. Exp.Gain/Loss	-1934 -57,000							

Source: Williamson County Tax Records, Tennessee. Information deemed reliable but not guaranteed.



(2.0) 1011 Saratoga Dr.



(2.1) 9223 Fox Run Dr.



(2.2) 813 Steeplechase Dr.



(2.3) 9229 Brushboro Dr.



(2.4) 9314 Navaho Dr.



(2.5) 9316 Navaho Dr.



(2.6) 9325 Navaho Dr.



(2.7) 9217 Fox Run Dr.

Subject #3.0

The first AT property sold for a loss in 1989 is Subject 3.0. The loss was \$15,000 (Table 7). It is located at 1217 Choctaw Trail in the Indian Point subdivision. From the market comparables it is expected that in 1989 it could have been worth \$278,300 or Comparable 3.4 and in 1991 terms were it not for its AT location it should be worth \$294,000.

If sold in 1991, the author expects it to sell for as little as \$231,000 or a loss in value of about 63,000 or 21.43% less than what could otherwise have been expected were it not for a AT location.

TABLE 7

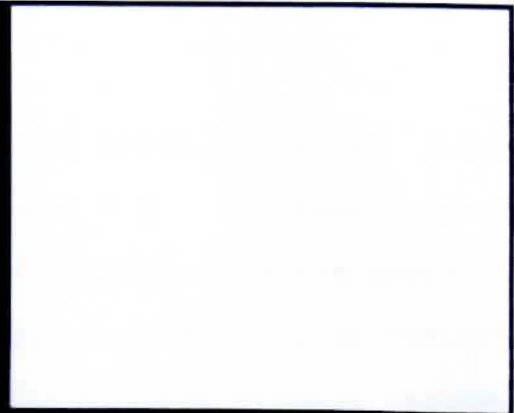
Sales Data Comparison in Brentwood, Tennessee - 1991

0. Line	Subject 3.0	Comparable 3.1	Comparable 3.2	Comparable 3.3	Comparable 3.4	Comparable 3.5
1. Address	1217 Choctaw Tr.	9307 Foxboro Dr.	9317 Navaho Dr.	9327 Lakeshore Dr.	9317 Lakeshore Dr.	805 Steeplechase Dr.
2. Subdivision	Indian Point	Foxboro Estates	Liberty Downs	Liberty Downs	Liberty Downs	Foxboro Estates
3. Price Date Sold	245,000 27/AP/89 260,000 20/FE/87	236,000 21/AU/89	269,000 12/MY/89	261,500 19/MY/89	292,500 12/AP/89	252,048 31/JL/89
4. Year	1986	1989	1988	1989	1988	1989
5. Fixtures	14	11 +800	10 +1000	19 -800	12 +600	15 -0-
6. Fin. Basement	0	650sf -10900	0 -0-	0 -0-	0 -0-	650sf -10900
7. Unfin. Basmt	0	0 -0-	2648sf -19800	1878sf -14050	1012sf -7600	0 -0-
8. Sq.Ft. Res.	4481sf	4022sf +20850	4032sf +20400	4082sf +20600	4092sf +17650	4197sf +12900
9. Spec. Feature	0	0 -0-	0 -0-	0 -0-	New cond -25000	0 -0-
10. Opn Porch	0	0 -0-	224sf -1800	0 -0-	32sf -250	0 -0-
11. Deck	140sf	350sf -1500	0 +990	264sf -900	0 +990	280sf -1000
12. Patio	0	0 -0-	0 -0-	0 -0-	336sf -600	0 -0-
13. Dif. 2 Sales Ap/Dep Rate	-.029375					
14. Exp.Sub. Value 1989	278,300	245,250	269,790	266,350	278,290	253,048
15. 1991 Exp Sub	231,000	258,890	284,795	281,163	293,768	267,122
16. 1991 Est	294,000	249,125	283,961	276,044	308,768	266,066
17. 1991 Est/SP	51.77	61.94	70.43	67.62	75.46	63.39
18. Est.Gain/Loss	-21.43% -63,000					

Source: Williamson County Tax Records, Tennessee. Information deemed reliable but not guaranteed.



(3.0) 1217 Choctaw Tr.



(3.1) 9307 Foxboro Dr.



(3.2) 9317 Navaho Dr.



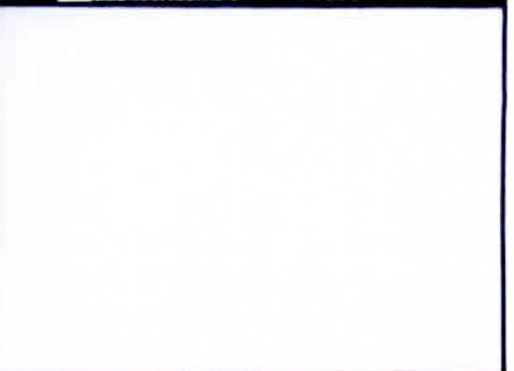
(3.3) 9327 Lakeshore Dr.



(3.4) 9317 Lakeshore Dr.



(3.5) 805 Steeplechase Dr.



Subject #4.0

Located at 9307 Seminole Drive in Indian Point subdivision (Table 8) is Subject 4.0. It last sold in 1989 for \$173,820, a loss of \$31,930 from its previous sale in 1988. This was a depreciation rate of -15.52% per year for the period. This was the highest annual depreciation rate reviewed in the AT subjects. The author acribes 10% of the loss to Seller motivation and the remainder to the AT location. The Seller was Equitable Relocation Management which typically discounts properties about 10% for quick sale.

The seven NAT comparables on the grid established in the opinion of the author that the comparable most like the subject was Comparable 4.5 for an expected value of \$232,000 if it were in a NAT location but would be expected to sell for about \$164,400 in 1991.

This would be a loss of about \$67,600 or -41.12% less than what it could be expected to sell for in a NAT location.

TABLE 8

Sales Data Comparison in Brentwood, Tennessee - 1991

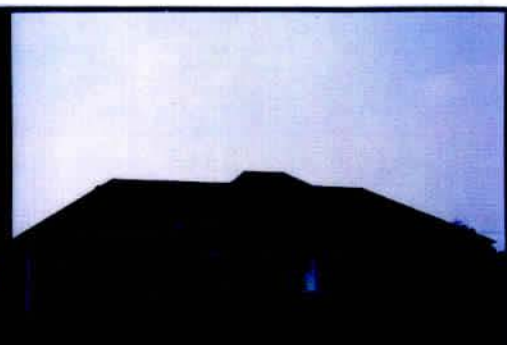
0. Line	Subject 4.0	Comparable 4.1	Comparable 4.2	Comparable 4.3	Comparable 4.4	Comparable 4.5	Comparable 4.6	Comparable 4.7
1. Address	9307 Seminole Dr.	9312 Crockett Dr.	9424 Chesapeake Dr.	1307 Glen View Dr.	9248 Brushboro Dr.	9251 Foxboro Dr.	9327 Navaho Dr.	902 Steeplechase Dr.
2. Subdivision	Indian Point	Indian Point	Chenoweth	Liberty Downs	Foxboro Estates	Foxboro Estates	Liberty Downs	Foxboro Estates
3. Price Date Sold	173,820 10/JL/89 295,750 23/JA/88 186,750 28/AU/86	242,400 16/AU/89	1989 adj 264,636 255,000 31/OC/88	253,500 01/SE/89	1989 adj 239,742 239,742 22/MY/87	225,000 28/JN/89	274,000 01/MR/89	274,000 24/AU/89
4. Year	1984	1989	1988	1989	1987	1987	1988	1989
5. Pictures	9	13 -800	15 -1200	14 -1000	11 400	10 -200	12 -600	12 -600
6. Fin. Basement	0	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-
7. Unfin. Basmt	0	3068sf -22950	0 -0-	2076sf -15550	2003sf +5000	0 -0-	456sf -3450	650sf -4900
8. Sq.Ft. Res.	3095sf	3070sf +1150	3131sf -1650	3172sf -3500	3179sf -3800	3230sf -6150	3301sf -9350	3313sf -9900
9. Spec. Feature	0	Pool -15000	Unf.upstrs -30000	0 -0-	0 -0-	0 -0-	New cond -25000	New cond -25000
10. Opn Porch	240sf	12sf +1650	27sf +1500	0 +1700	0 +1700	128sf +800	128sf +800	0 +1700
11. Deck	492sf	308sf +1300	0 +3500	280sf +1500	240sf +1800	- -0-	- -0-	374sf +850
12. Patio	0	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-
13. Dif. 2 Sales Ap/Dep Rate	-155188							
14. Exp.Sub. Value 1989	219,500	207,750	236,786	236,650	234,842	219,450	236,400	236,150
15. 1991 Exp Sub	164,400	219,300	250,000	250,000	248,000	232,000	250,000	250,000
16. 1991 Est	232,000	256,000	279,000	268,000	253,000	238,000	289,000	289,000
17. 1991 Est/SP	83.12	83.35	89.22	84.36	79.61	73.53	87.62	87.30
18. Ext.Gain/Loss	-4112 -67,600							

Less 10% -3112 -46,850 Adjusted for Seller discounting price (Equitable Relocation Mgmt).

Source: Williamson County Tax Records, Tennessee. Information deemed reliable but not guaranteed.



(4.0) 9307 Seminole



(4.1) 9312 Crockett



(4.2) 9424 Chesapeake Dr.



(4.3) 1307 Glenview Dr.



(4.4) 9248 Brushboro Dr.



(4.5) 9251 Foxboro Dr.



(4.6) 9327 Navaho Dr.



(4.7) 902 Steeplechase Dr.

Subject #5.0

This house is located at 1015 Saratoga Drive in Saratoga Hills (Table 9). It was compared to seven other NAT houses that were similar in size. The author thought it was most similar to Comparable 5.2 and its estimated value was expected to be \$288,000.

It sold in 1986 for \$265,280 and in 1989 for \$260,000 or a loss of \$5,280 in three years. This was a depreciation rate of less than one per cent per year.

If this had been a NAT property it might be expected to be worth \$296,500 in 1989 and \$304,000 in 1991.

Due to its AT location it would be expected today to sell for \$242,800, a loss of \$61,200 or - 20.13%.

TABLE 9

Sales Data Comparison in Brentwood, Tennessee - 1991

0. Line	Subject 5.0	Comparable 5.1	Comparable 5.2	Comparable 5.3	Comparable 5.4	Comparable 5.5	Comparable 5.6	Comparable 5.7
1. Address	1015 Saratoga Dr.	9303 Foxboro Dr.	1211 Navaho Dr.	9326 Lake Shore Dr.	9318 Navaho Dr.	9218 Huntersboro Dr.	9210 Brushboro Dr.	1209 Navaho Dr.
2. Subdivision	Saratoga Hills	Foxboro Estates	Liberty Downs	Liberty Downs	Liberty Downs	Foxboro Estates	Foxboro Estates	Liberty Downs
3. Price	260,000	232,500	273,000	287,000	280,000	245,000	234,000	295,000
Date Sold	18/OC/89 265,280 05/JN/86	06/JN/89	15/JA/89 269,000 23/JN/87	10/OC/89	28/JL/89	17/MR/89	17/MR/89 217,797 09/JN/86	01/SE/89
4. Year	1986	1989	1987	1989	1989	1985	1986	1989
5. Fixtures	11	11 -0-	11 -0-	14 -600	14 -600	11 -0-	11 -0-	14 -800
6. Fin. Basement	0	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-
7. Unfin. Basmt	2272sf	650sf +12150	2369sf -0-	2550sf -2000	1067sf +9000	624sf +12300	925sf +10100	2245sf -0-
8. Sq.Ft. Res.	3704 sf	3684sf -0-	2369sf -0-	2550sf -2000	1067sf +9000	624sf +12300	925sf 10100	2245sf -0-
9. Spec. Feature	384sf upper story	+30000	Pool -15000 +30000	New Cond -25000 +30000	New cond -25000 +30000	+30000	+30000	Pool -15000 +30000 New Cond -25000
10. Opn Porch	0	0 -0-	0 -0-	0 -0-	0 -0-	26sf -200	220sf screened -1750	134sf screened -1050
11. Deck	yes	yes	yes	yes	yes	-	-	yes
12. Patio	0	0 -0-	0 -0-	0 -0-	0 -0-	640sf -1200	308sf -550	0 -0-
13. Dif. 2 Sales Ap/Dep Rate	-.006679		.007407				.024208	
14. Exp.Sub. Value 1989	288,000	275,000	288,000	289,000	293,000	281,000	266,000	277,000
15. 1991 Exp Sub	242,800	290,000	304,000	305,000	310,000	297,000	281,000	292,000
16. 1991 Est	304,000	245,000	288,000	303,000	296,000	259,000	247,000	311,000
17. 1991 Est/SP	65.55	66.62	78.16	81.53	79.35	67.92	64.56	80.95
18. Est.Gain/Loss	-.2013 -61,200							

Source: Williamson County Tax Records, Tennessee. Information deemed reliable but not guaranteed.



(5.0) 1015 Saratoga Dr.



(5.1) 9303 Foxboro Dr.



(5.2) 1211 Navaho Dr.



(5.3) 9326 Lake Shore Dr.



(5.4) 9318 Navaho Dr.



(5.5) 9218 Hunterboro Dr.



(5.6) 9210 Brushboro Dr.



(5.7) 1209 Navaho Dr.

Subject 6.0

Located in Saratoga Hills subdivision at 1005 Saratoga Drive (Table 10) is Subject 6.0. It was compared to seven NAT properties and was judged by the author to be most like Comparable 6.5.

It sold in 1987 for \$243,000 and then again in 1989 for \$237,500 for a loss in value of \$5,500 and an annual depreciation rate of -1.14%.

Were it not for its location, this house could be expected to sell for \$273,000 in 1991 if it were a NAT. Its AT location stigma would limit it to about \$221,800 if it was sold today.

This would be a \$51,200 loss or -18.75%.

TABLE 10

Sales Data Comparison in Brentwood, Tennessee - 1991

0. Line	Subject 6.0	Comparable 6.1	Comparable 6.2	Comparable 6.3	Comparable 6.4	Comparable 6.5	Comparable 6.6	Comparable 6.7
1. Address	1005 Saratoga Dr.	9244 Brushboro Dr.	9305 Foxboro Dr.	9221 Huntersboro Dr.	804 Steeplechase Dr.	813 Foxboro Ct.	9319 Lake Shore Dr.	187 Steeplechase Dr.
2. Subdivision	Saratoga Hills	Foxboro Estates	Foxboro Estates	Foxboro Estates	Foxboro Estates	Foxboro Estates	Liberty Downs	Foxboro Estates
3. Price Date Sold	237,500 18/SE/89 243,000 09/JA/87	230,000 26/MY/89	233,000 28/AP/89	1989 adj 222,871 199,400 28/MR/86	230,000 28/FE/89	242,000 01/SE/89	1989 adj 284,354 274,000 21/OC/88	242,000 19/MY/89
4. Year	1986	1988	1988	1985	1988	1989	1988	1988
5. Fixtures	12	10 +400	11 +200	12 -0-	11 +200	10 +400	12 -0-	11 +200
6. Fin. Basement	0	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-
7. Unfin. Basmt	600sf	1209sf -4500	650sf -0-	650sf -0-	650sf -0-	0 +4900	2313sf -12,800	2103sf -11250
8. Sq.Ft. Res.	3697sf	3576sf +5500	3536sf +7300	3565sf +6000	3570sf +5800	3486sf +9600	3485sf +9600	3449sf +11250
9. Spec. Feature	0	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-	New cond. -10000	0 -0-
10. Opn Porch	210sf	0 +1700	0 +1700	0 +1700	0 +1700	0 +1700	0 +1700	0 +1700
11. Deck	yes	yes 0	yes 0	yes 0	yes 0	yes 0	yes 0	yes 0
12. Patio	0	0 -0-	0 -0-	240sf -450	0 -0-	0 -0-	0 -0-	0 -0-
13. Dif. 2 Sales Ap/Dep Rate	-.011382							
14. Exp.Sub. Value 1989	258,600	233,100	242,200	230,000	238,000	258,600	272,900	243,900
15. 1991 Exp Sub	221,800	246,000	256,000	243,000	251,000	273,000	288,000	257,500
16. 1991 Est	273,000	242,800	246,000	235,000	243,000	255,500	300,000	255,500
17. 1991 Est/SF	59.99	67.89	69.56	65.99	68.01	73.28	86.13	74.07
18. Ext.Gain/Loss	-.1875 -51,200							

Source: Williamson County Tax Records, Tennessee. Information deemed reliable but not guaranteed.



(6.0) 1005 Saratoga Dr.



(6.1) 9244 Brushboro Dr.



(6.2) 9305 Foxboro Dr.



(6.3) 9221 Hunterboro Dr.



(6.4) 804 Steeplechase Dr.



(6.5) 813 Foxboro Ct.



(6.6) 9319 Lakeshore Dr.



(6.7) 187 Steeplechase Dr.

Subject 7.0

The last AT Subject is located at 1209 Arrowhead Drive and is outside of the AT parameters since it does not adjoin the TVA right of way (Table 11).

Why is this house included with the RAT locations? Location stigma may not be limited to the parameters set by the author, namely, the property adjoins the TVA right of way. The author believes that this is the case with this property which is close to the right of way and within visual sighting of the lines and on the same street as many other RAT properties.

It sold at a loss of \$31,000 in February of 1991 over its previous sale price of \$186,000 in 1986. Either it is a AT which the author believes to be the case or it is an exceptional NAT. We have observed that NATs in the subdivision annually appreciate in value.

Since it is the only property in the study that sold in 1991, we may be observing a trend of the RAT location stigma moving away from properties adjoining to other properties that are close to or within visual sighting of the power lines.

Whatever the reason, it had an annual depreciation rate of -4.46%. It should be expected to be worth \$194,000 if it was in a NAT location and considered by market comps to be most like Comp. 7.3.

In terms of its real loss at its 1991 sale, the author believes that it was \$39,000 or -20.1% of what it could have been expected to bring at sale if it were in a location free of AT influence.

TABLE 11

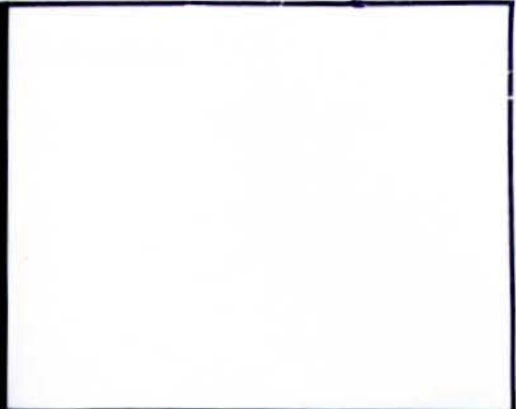
Sales Data Comparison in Brentwood, Tennessee - 1991

0. Line	Subject 7.0	Comparable 7.1	Comparable 7.2	Comparable 7.3	Comparable 7.4	Comparable 7.5
1. Address	1209 Arrowhead Dr.	9209 Shawnee Tr.	9210 Shawnee Tr.	1113 Navaho	1114 Navaho	9216 Shawnee Tr.
2. Subdivision	Indian Point	Indian Point	Indian Point	Liberty Downs	Liberty Downs	Indian Point
3. Price Date Sold	155,000 26/FE/91 186,000 07/NO/86 129,900 01/JA/83	205,000 11/JA/91 156,250 01/JA/84	202,200 02/DE/90 192,000 22/AU/86 152,000 01/JA/84	220,000 21/AP/90 214,000 13/NO/87	213,000 04/OC/90	171,000 31/JL/90 168,900 01/JA/85 144,000 01/JA/84
4. Year	1983	1984	1983	1987	1987	1983
5. Fixtures	10	10 -0-	8 +400	14 -800	10 -0-	9 +200
6. Fin. Basement	0	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-
7. Unfin. Basmt	0	0 -0-	0 -0-	1954sf -14600	1746sf -13000	0 -0-
8. Sq.Ft. Res.	2784sf	3108sf -14700	3127sf -15500	3138sf -16600	3157sf -17000	3186sf -18250
9. Spec. Feature	0	0 -0-	0 -0-	0 -0-	0 -0-	0 -0-
10. Opn Porch	105sf	224 -0-	0 +800	0 +800	0 +800	0 +800
11. Deck	308sf					
12. Patio	0	308sf -500	324sf -500	0 -0-	0 -0-	0 -0-
13. Dif. 2 Sales Ap/Dep Rate	-.087129	.055812	.013025	.009259		.002474
14. Exp.Sub. Value 1989	188,800	199,000	189,600	188,800	183,800	153,750
15. 1991 Exp Sub	155,000	204,500	194,800	194,000	188,800	158,000
16. 1991 Est	194,000	210,600	208,000	226,000	219,000	175,000
17. 1991 Est/SF	55.68	67.77	66.44	72.03	69.32	55.14
18. Est. Gain/Loss	-.201 -39,000					

Source: Williamson County Tax Records, Tennessee. Information deemed reliable but not guaranteed.



(7.0) 1209 Arrowhead



(7.1) 9209 Shawnee Tr.



(7.2) 9210 Shawnee Tr.



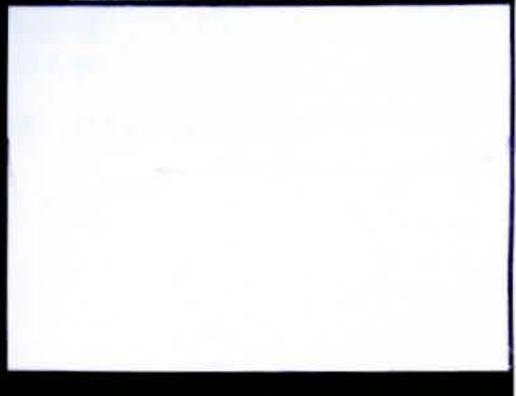
(7.3) 1113 Navaho Dr.



(7.4) 1114 Navaho Dr.



(7.5) 9316 Shawnee Tr.



STATISTICAL ANALYSIS

Number in Study
 Comparable Sales: 44
 Subjects: 7

1. Comparable Sales (Price/sf)

1991 Estimated

Mean: \$72.18
 Median: \$72.56
 Standard Deviation: \$8.76
 Observation Range: \$53.09 to \$87.70
 Z value: .11
 60% Z range: -.11 to +.11
 2 Standard Deviations
 includes 95.44% of
 normal distribution: \$54.66 to \$89.70

2. Subjects (Price/sf)

1991 Estimated

Mean: \$58.86
 Median: \$59.84
 Observation Range: \$51.77 to \$66.09

Frequency Distribution:

Subject 3.0	\$51.77
Subject 4.0	\$53.12
Subject 7.0	\$55.68
Subject 1.0	\$59.84
Subject 6.0	\$59.99
Subject 2.0	\$66.09
Subject 5.0	\$65.55

3. Difference Between Comparable and Subject Means

Comparable Mean	\$72.18
Subject Mean	\$58.86
Estimated Subject mean loss	\$13.32

Subject mean % loss: $13.32/72.18 = .184499$ or 18.45%

SUBJECT LOSS TALLY

<u>Actual</u>				<u>Estimated Loss in 1989-91</u>	
Sub. # /	Year /	Amount /	%	Amount	%
3.0	1989	-15,000	-2.94	-63,000	-21.43
4.0	1989	-31,930	-15.52		
Adjust for Seller motivation 10%					
		-11,355	-5.52	-46,850	-31.12
5.0	1989	-5,280	-0.0	-61,200	-20.13
6.0	1989	-5,500	-1.14	-51,200	-18.75
7.0	1991	-31,000	-8.71	-31,000	-8.71
1.0				-34,300	-15.19
2.0				-57,000	-19.34
Total		-68,135		-352,550	
Mean		-8,517	-3.80	-50,364	-20.87

SUMMARY ANALYSIS

In review, the author compared seven (7) AT and 44 NAT residential properties in the subject neighborhood Indian Point and Saratoga Hills subdivisions in Brentwood, Tennessee. The basis of comparison was factual data, sales prices and dates, from the Williamson County tax records. Each AT was compared to 5-7 NAT properties closest in square footage.

We found the following:

1. Before awareness of negative EMF health effects in 1989, all properties in the study appreciated in value at resale. After 1989, all ATs lost value and this was attributed by the author to probable locational stigma near power lines. One AT property (7.0) did not meet the AT criteria of adjoining the TVA right of way but was included because the author believed that it had suffered locational stigma by being within visual sight of the lines and by being just down the street from AT stigmatized properties.

2. The AT properties that sold prior to 1989 also increased in value. In 1989 and thereafter, four AT properties lost value on resale. Their losses are tabulated in the Subject Loss Tally.

3. The comparable sales were an adequate sample of convenience to study. During the period of a year the area experienced 90 sales so 44 represented nearly half of the sold population. The adjustment of value to a price per square foot was chosen as a way of concentrating data for comparability.

The probability of the price/square foot values being a normal frequency distribution for NATs is seen from the fact that the mean of the Z values is so low, only .11. The Z value is the percentage of one standard deviation a given observation stands from the mean and a mean of the Z values shows that the average Z value is very close to the mean.

By count, 60% of the Z values for 44 NAT comparables are either plus or minus 11% of one standard deviation from the mean. This indicates a concentration of values in mid-range.

It is probable that an observation sales price per square foot less than \$54.66/sf is not in the normal price/sf frequency distribution expected of a NAT in this neighborhood. The only known common cause of AT losses known to the author is location.

4. The difference between the mean price per square foot values for the Comparable Sales and the Subjects is 18.45%. This is close to the mean estimated expected loss in 1989-91 for the Subjects of 20.87% (See Subject Loss Tally).

5. If the difference between the two sales is the measurement of actual loss suffered by RAT owners, the mean RAT loss is \$8,517 per property. This actually only accounts for part of the loss. The balance of the real loss is the difference between what the property should have appreciated to in a NAT location.

6. If loss estimates are adjusted for time, the mean (average) estimated loss per AT location is calculated to be rounded to \$50,000 to the present time. The total loss of value for 21 AT properties (15 have only sold once to date) is estimated to be \$1,050,000 (rounded to \$1,000,000) one million dollars.

7. The largest AT loss experienced to date is for the property that sold most recently in 1991. This could mean that the stigma impact is only beginning to be felt on property value for AT properties in these Brentwood subdivisions.

RECONCILIATION OF VALUE INDICATORS FOR PROPERTIES
ADJOINING ELECTRIC POWER LINES

The value indicators for AT properties established by this study are simply the difference between sale price before 1989 and the sale price after 1989. Only properties sold at least twice were selected for AT subjects because of the potential error in making adjustments to comparables when physical examination and property measurements were not possible.

The other measure of estimating value was using the mean annual appreciation for NAT properties to establish an expected value for the AT subject were it located in a NAT location. This value had to be adjusted for time and the principle of conformability suggests that once properties drop in value for stigma that this affects all stigmatized properties to more or less the same extent. Since loss of value was not observed before 1989, all properties received the same average adjustment for time as 3.779%/year appreciation. After 1989, AT properties were depreciated and NAT properties appreciated by annual rates.

The Appraiser expects that AT properties that have not yet sold in this subject neighborhood will

bring between 18-20% less than what was expected of a NAT if sold during 1991.

Factors that could worsen this measurement could be a devastating EPA review panel report on EMF that would be well reported in the Nashville media coupled with a worsening of relations of the City of Brentwood with TVA that would keep this issue in the public consciousness.

Factors that could lessen this measurement might be an EPA review panel report discounting the health hazards and an improving relationship of city and TVA.

SUMMARY AND CONCLUSION OF STUDY

The Cost and Income Approaches to Value were inappropriate for this study. The Comparative Market Sales Data Approach was used to analyse the values of seven (7) properties that were in close proximity to TVA transmission lines. Six of these properties adjoined the TVA right of way while the seventh was on an affected street.

Seven AT homes believed to be affected by EMF stigma were compared to 44 NAT properties that were near by but unaffected by the stigma of EMF health hazards. Thirteen of these NAT properties sold at least twice since construction. They averaged 3.779% appreciation rate over the period between their last two sales. None of the NAT properties lost value between the two sales except one that was used as a subject (Subject #7) because it was close but not adjoining to the TVA lines.

The mean of the Z values for 44 NATs price/sf frequency distribution was .11, indicating a concentration of NAT values typical of a normal distribution. (A Z value is the percentage of a standard deviation that a given observation stands on one side or the other of the distribution mean). By actual count, 60% of the 44 NAT comparables were within + or - .11 standard deviation of the NAT price/sf

frequency distribution mean. The mean (average) loss of the Subjects in 1991 was estimated to be \$50,000 or 20.8% less than what could have been expected in a NAT location. The median loss was \$51,200 or 19.34%.

A comparison of the means of the AT homes and the NAT comparables showed a negative difference of -18.45% for the ATs. The percentage loss to the AT homes is estimated to be rounded to 18.5-21.0% to date.

PRIMARY HYPOTHESIS: That home buyers who have bought a home adjoining an electric power transmission line right of way before January 1, 1989 and sold it since that date have experienced a loss in value is probably true but not proven due to the small NAT sample size.

SECONDARY HYPOTHESIS: That since January 1, 1989, home buyers are paying less for a residence adjoining transmission (AT) right of way than they are paying for a similar residence nearby not adjoining the transmission line right of way (NAT). This hypothesis is also not proven due to small AT sample size.

NULL HYPOTHESIS: The Null Hypothesis, that there are no demonstrable effects on sale prices, was disproven due to small sample size.

WORKS CITED

- Ackerson, C. B. Capitalization Theory and Techniques, American Institute of Real Estate Appraisers, Revised ed. 1984.
- Appraisal Institute. The Appraisal of Real Estate, American Institute of Real Estate Appraisers, 8th ed., 1983.
- Boyce, S., Kinnard, W. Appraising Real Property, Society of Real Estate Appraisers, Lexington Books. 1984.
- Carnahan, C. R., Cerone, A. M., Haber, J. R. Principles of Residential Real Estate Appraising, National Association of Independent Fee Appraisers, 1984.

RECOMMENDATIONS FOR FURTHER STUDY

1. This study could be replicated in other places in the U.S. where there has been a public outcry against EMF health hazard.
2. This study can be improved upon by doing random sampling of RAT properties sold in last year and using the the street number (higher or lower) that is across the street as a paired study.
3. This study could be continued and expanded by offering an incentive such as an ELF (Electrical Low Frequency) survey of the interior of the RAT properties in exchange for permission to measure the property thus permitting the use of the Cost Approach to Value and better Market Analysis.

APPENDICES

Regression Analysis Continued

RESULTS:

Regression Solutions	Multiple			Residualized		
	\$ val	+ (SEC)	#	\$ val	+ (SEC)	#
Square ft.	54.61	16.04		39.61	11.98	
Basement fin sq. ft.	-9.43	32.98		4.70	23.09	
Basement unfin sq. ft.	18.17	5.12		19.01	3.74	
Fixtures	0	0	0	0	0	0
Special Features	0	0	0	0	0	0
Open Porch Fin. S.F.	14171	11033	12	27567	9064	9
Swimming Pool	14675	14938	4	15312	13780	2
Deck S.F.	7718	10860	25	20061	8547	20
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
Degrees Of Freedom		34			26	
Constant	201775	11282		194536	8335	
+ (Std error of Y est)		25686.8			17582.3	
Accuracy (R^2)		0.5583			0.7700	

***** MATCHED SALES *****

Diff:	Address.....	Price:	Address.....	Price:	Assume
-14500.00:	813 Steeplechas	186500:	9229 Brushboro	201000:	perfect
-14500.00:	9221 Hunterboro	228500:	804 Steeplechas	243000:	perfect

***** PAIRED SALES *****

Square ft.	Value:	Diff:	Address with.....	Price:	Address w/out.....	Price:	Assume
	445.31:	160:	9228 Hunterboro	247000:	9216 Shawnee	175750:	perfect
	-81.63:	147:	1210 Chickasaw	226000:	9251 Foxboro	238000:	perfect
	57.62:	269:	1210 Chickasaw	226000:	9209 Shawnee	210500:	perfect
	-55.70:	386:	813 Steeplechas	186500:	9210 Shawnee	208000:	perfect
	-21.67:	323:	9229 Brushboro	201000:	9210 Shawnee	208000:	perfect
	97.14:	175:	807 Steeplechas	266000:	9307 Foxboro	249000:	perfect
	670.73:	41:	9248 Brushboro	253500:	1113 Navaho	226000:	perfect
	225.41:	122:	9251 Foxboro	238000:	9209 Shawnee	210500:	perfect
	-118.60:	371:	9303 Foxboro	245500:	802 Steeplechas	289500:	perfect
	-3.38:	148:	9303 Foxboro	245500:	9305 Foxboro	246000:	perfect
	142.86:	119:	9303 Foxboro	245500:	9221 Hunterboro	228500:	perfect
	21.93:	114:	9303 Foxboro	245500:	804 Steeplechas	243000:	perfect
	-195.07:	223:	9305 Foxboro	246000:	802 Steeplechas	289500:	perfect
	-242.06:	252:	9221 Hunterboro	228500:	802 Steeplechas	289500:	perfect
	-603.45:	29:	9221 Hunterboro	228500:	9305 Foxboro	246000:	perfect
	-180.93:	257:	804 Steeplechas	243000:	802 Steeplechas	289500:	perfect
	-88.24:	34:	804 Steeplechas	243000:	9305 Foxboro	246000:	perfect
	60.71:	140:	813 Foxboro	255500:	9228 Hunterboro	247000:	perfect
	265.83:	300:	813 Foxboro	255500:	9216 Shawnee	175750:	perfect
	-45.13:	277:	187 Steeplechas	255500:	1307 Glen View	268000:	perfect

BOB CLEMENT
8TH DISTRICT, TENNESSEE

COMMITTEE ON
PUBLIC WORKS AND TRANSPORTATION

COMMITTEE ON
MERCHANT MARINE AND FISHERIES

CONGRESSIONAL TRAVEL AND
TOURISM CAUCUS
STEERING COMMITTEE

DEMOCRATIC STEERING AND
POLICY COMMITTEE



Congress of the United States
House of Representatives
Washington, DC 20515-1205
January 11, 1991

DISTRICT OFFICES
552 U.S. COURTHOUSE
NASHVILLE TN 37203
615-238-6266

310 MAIN STREET
SPRINGFIELD TN 37172
615-384-6800

2701 JEFFERSON STREET
SUITE 109
NASHVILLE TN 37208
615-320-1383

WASHINGTON OFFICE
ROOM 228
CANNON HOUSE OFFICE BUILDING
202-225-4311

Mr. Marvin Runyon
Chairman, Board of Directors
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

Dear Chairman Runyon:

I respectfully request your assistance in responding to the concerns of one of my constituents over whose property the TVA plans to construct a 161,000 volt power line.

As you can see from the enclosed correspondence, Dr. James E. Rogers is concerned by the health consequences posed by the high voltage passing through the line. In particular, he points to the conclusions of a report of the Environmental Protection Agency, which links the electromagnetic radiation emitted by high voltage power lines with several types of cancers, especially in children. Inasmuch as Dr. Rogers' children would be living in a house within 80 feet of the power line, he is rightly concerned about their long-term health. In fact, Dr. Rogers has told me that he and his family will not live in their house if the power line is built along the proposed path.

Consequently, Dr. Rogers and I would like the TVA to consider several alternatives which we believe will help address these health concerns:

1) halt the planned construction of the 161,000 volt power line and re-route it away from any and all residential areas. I understand that there is plentiful unoccupied land on which to re-route the power line.

2) re-routes the power line so that it is farther away from the Rogers' house, essentially by placing it equidistant between the Rogers and McLemore or Alexander houses.

3) agree to purchase the Rogers' property at its fair market or appraised value.

4) agree to reimburse the Rogers for the difference between the fair market or appraised value of their house and the price at which the house is auctioned or sold to a third party.

Mr. Marvin Runyon
Page 2
January 11, 1991

Dr. Rogers' letter effectively argues many of the reasons for these alternatives and I ask that you carefully review them. I know that Dr. Rogers will carefully consider any alternatives which you may propose insofar as they ensure the health and safety of his children and protect the value of his property.

I am anxious that this matter be resolved to the satisfaction of Dr. Rogers and I request that you keep me informed of the disposition of this case. And, if I can provide any information or answer any questions you or your staff may have, I hope you will not hesitate to call me or David Flanders of my Washington staff.

Thank you for reviewing this matter.

Sincerely,

Bob Clement
Member of Congress

BC/df

Enclosure

BRIAN J. SWEENEY
MAYOR
DR. JACK FLETCHER
VICE MAYOR
MICHAEL W. WALKER
CITY MANAGER



City of Brentwood

COMMISSIONERS
BRIAN J. SWEENEY
DR. JACK FLETCHER II
ALBA DURR
G. ALEX FERRE, JR.
DELLY BEAGAN

January 16, 1991

Mr. Sidney D. Hemsley
Senior Legal Consultant
Municipal Technical Advisory Service
600 Henley Street, Suite 120
Knoxville, Tennessee 37996-4105

SENT VIA FACSIMILE
(615) 974-0423
HARD COPY TO FOLLOW

Dear Sid:

As we discussed over the telephone, I am sending a draft of an ordinance proposed by Vice Mayor Jack Fletcher which would establish requirements for design specifications for electrical power lines in the City of Brentwood. These specifications would prevent the spillage of electromagnetic fields outside of public utility right-of-way boundaries. This ordinance was proposed in response to local citizens' concerns over TVA's plans to erect a 161 KV transmission line through Brentwood, in light of unknown but potentially serious health effects of electromagnetic fields which could be produced by this line.

We appreciate your interest in this situation and look forward to your opinion as to the legality of the proposed ordinance, as well as any additional recommendations you can offer. As we plan to include first reading of the ordinance on our January 28 Commission meeting agenda, it will be especially helpful if we receive your advice before that time. Thank you for your assistance.

Sincerely,

Roger A. Horner
City Recorder/Finance Director

c: Mayor and City Commission
Michael W. Walker, City Manager
Robert H. Jennings, Jr., City Attorney

January 30, 1991

Mr. E.S. Christenbury
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, Tennessee 37902

Dear Mr. Christenbury:

My name is Joseph Cashia. I reside at 8313 Bridle Place, Carriage Hills Subdivision, Brentwood Tennessee, 37027, (615) 370-9430.

I attended the January 14, 1991 Brentwood City Commissioners meeting where Mr. Glen Burgess of TVA described and showed pictures of electrical poles that would be used along a thirty six (36) mile corridor from Columbia to Brentwood, Tennessee to run two (2) 161 KV high transmission lines.

Mr. Burgess pictures revealed a pole with three (3) "arms". He stated the only change would be one (1) arm would be inverted to aid in the "Delta Configuration" to reduce the electro magnetic fields (EMF's). Today, behind my home TVA is erecting poles with five (5) arms. When I inquired as to why with the work crew I was told this was to "accommodate Middle Tennessee Electric" to run additional lines. Did Mr. Burgess forget this small detail when he vehemently denied any additional lines or was he misinformed?

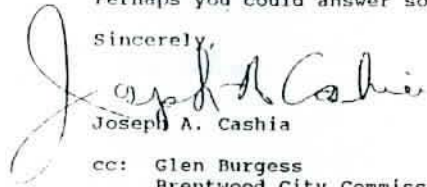
I am also concerned since my land title stipulates "one line and one pole to be used by the United States of America and/or its agents". How can Middle Tennessee Electric, a for profit Corporation, could be defined as an agent of the United States and how they could run an additional line seems to be in question.

We have also been unsuccessful in obtaining copies of minutes from a public hearing in 1987 in which Mr. Burgess purportedly stated the existing towers were to be removed.

Mr. Christenbury
Page 2

Since the inception of my involvement in this issue I have grown more and more pessimistic about the validity of the details of this project that have been released by TVA. Perhaps you could answer some of my concerns and questions.

Sincerely,



Joseph A. Cashia

cc: Glen Burgess
Brentwood City Commissioners



Tennessee Valley Authority, 400 West Summit Hill Road, Knoxville, Tennessee 37902

FEB 15 1991

M. Ivan Hayslett
Chairman, Board of Directors

The Honorable Brian J. Sweeney
Mayor
City of Brentwood
P.O. Box 788
Brentwood, Tennessee 37024-0788

Dear Mayor Sweeney:

John Waters and I appreciate your concern for the health and well-being of the citizens of Brentwood. Let me assure you that we too care about your citizens. We believe though that our new powerline is important to their well-being. Let me explain why I say that.

During the cold weather in the winter of 1989, the power supply to the Nashville area, including Brentwood, was barely adequate. Since that time, you have experienced considerable growth. Developments like Maryland Farms, new schools, homes, and businesses have increased the electric demand.

Today reliable electricity is not simply a convenience; it is a necessity. Adequate electricity is essential to power hospitals and other medical services, water and wastewater treatment facilities, as well as businesses and industry. In fact, electricity powers our economy providing the standard of living we enjoy and the jobs that pay for it.

Stopping or even delaying our transmission line could jeopardize your power supply. We believe the risks posed by an inadequate supply of electricity far outweigh any potential risk posed by electric or magnetic fields.

2

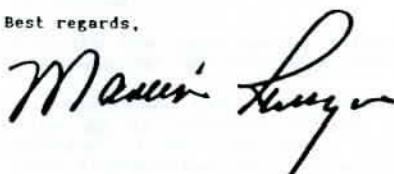
The Honorable Brian J. Sweeney

FEB 15 1991

Since we received your letter, the Brentwood Board of Commissioners has proposed an ordinance that would require zero EMF at the edge of our transmission line right of way. That level is impossible to achieve not only at the edge of the right of way, but even in your own living room. Home appliances, TV sets, and even water pipes expose all of us to EMF.

We really want to find a way to satisfy your concerns and still provide you with adequate, reliable electricity. My staff will continue to work with you and the council, and I hope we can find a mutually agreeable solution.

Best regards,

A handwritten signature in black ink, appearing to read "Mauri Luyck". The signature is written in a cursive, flowing style with a long, sweeping tail on the final letter.

BRIAN J. SWEENEY
MAYOR
DR. JACK FLETCHER
VICE MAYOR
MICHAEL W. WALKER
CITY MANAGER



City of Brentwood

COMMISSIONERS
BRIAN J. SWEENEY
DR. JACK FLETCHER
AIME DARR
G. ALEX NOBLE, JR.
BETTY REAGAN

March 14, 1991

Mr Marvin Runyon, Chairman
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville, TN 37902

Dear Mr Runyon:

I appreciate the opportunity afforded Brentwood by your staff to hear and consider our concerns and opinions.

I have researched the controversial and factual aspects of EMF radiation as it relates to the necessity of electrical power transmission. I am completely aware of the associated relative risk that accompanies such transmission.

I am conscious of the on-going debate not only in our community, but across the state, your service area, our nation, and several other countries. Indeed, the public, political, practical, and pragmatic threads of this issue are woven into a complicated concern. As a health care professional, an elected official, and a consumer, I have tried to understand these different concerns.

I have reached a conclusion. When we ask people to assume a risk for the welfare of others in general, it is our obligation to minimize that risk. The risk may turn out to be harmless. The risk may turn out to be significant. If we have done all we can do people will understand and appreciate our efforts.

In this case we have requested a design for a transmission line presented by your staff which is another way to provide the "necessity" of power but at its lowest possible "risk" related to EMF radiation and exposure. It is called the "II" configured single structure. Through Senator Gore's office, E.P.A. has been given that design for consideration and assessment. They approve of its capabilities. Respectfully I ask you to consider the possibilities for our Brentwood area and give us the opportunity to work with you.

Mr Marvin Runyon
March 14, 1991
Page two

The ordinance we have proposed has only a third reading before passage. I have asked that we defer that reading until communication between the two of us has been exhausted. I don't think it is in the best interest of TVA, Brentwood, or the State of Tennessee to have this ordinance be a court case or a precedent.

Your leadership and experience are needed and would be very much appreciated. If I can be of help to you I will make myself available.

Respectfully yours,

Dr. Jack Fletcher
Vice Mayor

c: The Honorable Albert Gore, Jr
The Honorable Jim Sasser
The Honorable Bob Clement
The Honorable Bart Gordon

ns *JA*

BIBLIOGRAPHY

- Ackerson, C. B. Capitalization Theory and Techniques, American Institute of Real Estate Appraisers, Revised ed. 1984.
- Appraisal Institute, The Appraisal of Real Estate, American Institute of Real Estate Appraisers, 8th ed., 1983.
- Boyce, S., Kinnard, W. Appraising Real Property, Lexington Books, Society of Real Estate Appraisers, 10th printing, 1984.
- Brodeur, P. "Danger in the Schoolyard," Family Circle, Sept. 25, 1990.
- Carnahan, C. R., Cerone, A. M., Haber, J. R. Principles of Residential Real Estate Appraising, 1989.
- Colwell, P. F., Foley, K. W. "Electric Transmission Lines and the Selling Price of Residential Property," The Appraisal Journal, April, 1967.
- Correspondence from Government Officials and Others included in Appendix and used by permission as original documents dealing with EMF hazards at TVA right of way in Brentwood, TN, dated between Dec. 1, 1989 and May 1, 1991.
- Kinnard, W. N. Jr. "Tower Lines and Residential Property Values," The Appraisal Journal, April, 1967.
- Kirkpatrick, D. "Can Power Lines Give You Cancer?," Fortune, Dec. 31, 1990.

Moore, T. "Pursuing the Science of EMF," EPRI Journal,
Jan.-Feb. 1990.

Nair, I., Morgan, G., Floriz, H. K. Biological Effects
of Power Frequency, Electric and Magnetic Fields,
Department of Engineering and Public Policy,
Carnegie Mellon University, Pittsburg, PA 15213.
A background paper performed for the U. S. Office
of Technology Assessment. OTA-BP-E-53 U. S.
Government Printing Office, May 1989.

Nashville Banner, "EPA cancer panel snubs White House,"
Jan. 14, 1991.

Parsch, L. D., Norman, M. D. "Impact of Powerlines on
Cost of Production," Right of Way, International
Right of Way Association, April 1988.

Pool, R. "Is There an EMF-Cancer Connection?,"
Science, vol. 249, Sept. 7, 1990.

Reese, L. "The Puzzle of the Power Line," The
Appraisal Journal, Oct., 1967.

Review Appeal, Franklin, Tennessee. 1990, 1991.

Rickert, R. "Effects of Market Perceptions of ELF/ETL
Impacts on Property Values," Demba-Bank
Associates, St. Louis, MO 63104. Paper written
April 9, 1991.

"60 Minutes," transcript of TV Show of April 7, 1991.

Slocum, C. L. "Transmission Line Easement Effect on
Rural Land in Northwest Wisconsin," Right of Way,
International Right of Way Association, 1984.

- Sykes, T., Li, P. "Possible Health Effects of Electric and Magnetic Fields from Electric Power Lines: A Summary of Scientific Studies." Washington State Institute for Public Policy. Jan. 1990.
- Thompson, R. R., Phillips, W. E. "Agricultural Land Value Changes from Electric Transmission Lines: Implications for Compensation," Right of Way, International Right of Way Association, Dec. 1985.
- Time, "Hidden Hazards of the Airwaves," July 30, 1990.
- Wertheimer, N., Leeper, E. "Electrical Wiring Configurations and Childhood Cancer," American Journal of Epidemiology, Vol 109, No. 3, 1979.