

# **Action Plan and Issue Profiles**

**Addressing Environmental Health Issues of  
Land Use, Growth, and Development,  
Outdoor Air Quality, and  
Water Quality**

**Environmental Health Action Team  
Blount County, Tennessee**

**January 2007**

*The mission of the Environmental Health Action Team (EHAT) is to improve and sustain the health of the people of Blount County through addressing environmental health issues of concern.*

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## **Introduction.**

This action plan is the culmination of four years of work by the Blount County Environmental Health Action Team. The focus is on environmental issues of human health, and what may be done to address the issues. The remainder of this document presents a brief overview of the Environmental Health Action Team (EHAT) and how the issues were chosen. This is followed by background information on Blount County. A summary action plan is then presented, referenced to page numbers in the main report. Three issue profiles and detailed action plans are then presented. Finally, responsibility for action is discussed, followed by references for further information.

## **EHAT and the Issues.**

In response to community-identified priorities, the Blount County, Tennessee, Environmental Health Action Team (EHAT) was formed in 2002, as a part of the Blount County Community Health Initiative to address environmental issues of health. The term environmental health refers to the impact of the overall environment, both natural and built, on human health, and is therefore a public health focus and not a focus on the status of the natural environment itself.

The EHAT is a diverse group of individuals including citizens, community group representatives, health care sector representatives, and federal, state, county and city officials. EHAT activities are facilitated by professionals from the East Tennessee Regional Health Department and the Blount County Health Department. Team members volunteer their time well above their regular walks of life. The mission of the Environmental Health Action Team is to improve and sustain the health of the people of Blount County through addressing environmental health issues of concern.

The EHAT undertook a randomized survey of Blount County residents and stakeholders in October 2002, finding that the community identified three priority issues of concern: land use, air quality and water quality. These issues, supported by analysis of collated secondary data, became the focus of three sub-groups, who recruited additional people according to interest and expertise. Approximately 35 people were involved long term in the subgroups and team, and many more intermittently.

EHAT, through the Blount County Health Department, was awarded a National Demonstration Grant of \$20,000 from the National Association of County and City Health Officials (NACCHO) and the Centers for Disease Control and Prevention (CDC) to support activities following the *Protocol for Assessing Community Excellence in Environmental Health (PACE EH)*. Each sub-group developed a plan and timeline of activities, which included community education, data collection/analysis and facilitation services to use the money equally, with some funds reserved for general EHAT activities and reporting results to the community.

### **About Blount County.**

Blount County, in East Tennessee is bordered to the north by Knoxville and Knox County, and borders North Carolina to the south. County population in 2000 was 105,823, an increase of 23 percent over 1990 population. The population estimate as of July 1, 2005 was 115, 535 persons. Population is projected between 139,000 to 145,000 by 2020. Of the 2000 population, 66,916, or 63 percent, were classified as living in urbanized areas, with only 1 percent classified as living on rural farms. The population is 94.7 percent white, and about 20 percent of the population is age 60 years or older.

Land use analysis shows that only 9.5 percent of land area is developed in urban, suburban or rural residential use, and only 3.6 percent is developed in commercial, industrial and other non-residential urban and suburban related uses. Agricultural use accounts for 24 percent of land area, forest outside of national park accounts for 35 percent of land area, and the Great Smoky Mountains National Park (GSMNP) and other minor National Park Service land accounts for 26 percent of land area.

County growth dynamics are based in part on strong linkages to the larger Knoxville urban/economic region, and in part on its own internal characteristics such as easily developable lowlands, access to mountains and TVA lakes, tourist gateway to Cades Cove in the GSMNP, excellent school systems, excellent cooperation between county and city governments for industrial development and promotion, and small town and rural character. The County includes two larger cities of Maryville (population 24,110) and Alcoa (population 7,734), and four other smaller municipalities of Friendsville, Louisville, Rockford and Townsend.

**Summary Action Plan** - The following presents a summary in tabular form of action plan items by issue subgroups. The action plan items also will be presented in more detailed form in the separate issue profiles of the subgroups referenced below by page number(s).

*Land Use Growth and Development Issue Subgroup (pages 7 - 25)*

Health Related Issue	Recommended Actions
1. Growth and Sprawl (pages 8-14)	<ul style="list-style-type: none"> <li>• Review 1101 Growth Plan for appropriateness.</li> <li>• Encourage urban development concentration.</li> <li>• Discourage rural development dispersion.</li> <li>• Map and track development over time.</li> <li>• Cities and County work together to address growth and sprawl.</li> </ul>
2. Loss of Rural Land (pages 14-16)	<ul style="list-style-type: none"> <li>• Identify measures to directly preserve rural land.</li> <li>• Encourage and support public and private efforts to preserve rural land.</li> <li>• Increase awareness on programs and incentives to preserve rural land.</li> <li>• Map and track rural land conversions to development, and rural land preserved.</li> <li>• Consider also preservation of rural land as part of quality of life and environmental concerns.</li> </ul>
3. Roads and Traffic (pages 16-17)	<ul style="list-style-type: none"> <li>• Improve deficient roads.</li> <li>• Apply sound engineering standards for safe roads.</li> <li>• Address also pedestrian and bicycle safety.</li> </ul>
4. Air Quality (pages 17-19)	<ul style="list-style-type: none"> <li>• Support actions recommended by EHAT Air Quality Subgroup.</li> <li>• Assess development pattern to determine measures to decrease total vehicle miles traveled.</li> <li>• Encourage and support programs that will reduce vehicle miles traveled.</li> <li>• Include air quality considerations in land use plans.</li> </ul>

Health Related Issue	Recommended Actions (continued)
5. Water Quality (pages 19-20)	<ul style="list-style-type: none"> <li>• Support actions recommended by the EHAT Water Quality Subgroup.</li> <li>• Reduce pollution load in 303(d) listed impaired streams to remove them from the list.</li> <li>• Support activities of the Little River Watershed Restoration Initiative and other watershed improvement activities.</li> <li>• Continue implementation of the Stormwater Phase 2 program.</li> <li>• Review regulations and permit procedures to better address water quality issues.</li> </ul>
6. Commercial & Industrial Development. (pages 20-22)	<ul style="list-style-type: none"> <li>• Encourage urban development concentration and integration of commercial with residential development.</li> <li>• Review plans and regulations to provide pedestrian and bicycle linkage between residential and commercial areas.</li> <li>• Identify measures to reduce the impact of commercial and industrial development on residential areas.</li> </ul>
7. Development Design (pages 22-24)	<ul style="list-style-type: none"> <li>• Incorporate innovative development design and practice into regulations.</li> <li>• Integrate open space and pedestrian/bicycle improvements into new development.</li> <li>• Integrate a plan for community wide open space and recreation into existing plans.</li> </ul>
8. Preservation of Trees (pages 24-25)	<ul style="list-style-type: none"> <li>• Adopt Tree City USA programs for all jurisdictions.</li> <li>• Adopt regulations to preserve tree cover, and integrate landscape trees into commercial development.</li> <li>• Increase tree cover in built-up urban areas.</li> <li>• Encourage best management practice in tree harvesting.</li> </ul>

*Outdoor Air Quality Issue Subgroup (pages 26 – 39)*

Health Related Issue	Recommended Actions
<p>Ozone and Particulate Matter Pollution. (pages 37-39)</p>	<ul style="list-style-type: none"> <li>• Conduct co-relation study between pollution levels and emergency pulmonary health outcomes.</li> <li>• Identify what others are doing to address air pollution locally and support such actions.</li> <li>• Regularly exchange information and data with the Regional Clean Air Coalition (RCAC).</li> <li>• Educate at-risk populations, such as those with lung or heart disease, on personal behavior during air quality alert days.</li> <li>• Raise community awareness about air quality.</li> <li>• Continue support of Blount County’s Air Fest activities.</li> <li>• Support air quality recommendations of the EHAT Land Use Subgroup.</li> </ul>

*Water Quality Issue Subgroup (pages 40 – 49)*

Health Related Issue	Recommended Actions
<p>1. Failing Septic Systems. (page 47)</p>	<ul style="list-style-type: none"> <li>• Continue current protocol for failing septic systems.</li> <li>• Provide financial assistance to low-income families for septic system repair.</li> <li>• Follow current county standards for septic system lot size requirements.</li> <li>• Form a County Wastewater Board for oversight of sewer utilities outside municipal systems.</li> </ul>
<p>2. Pollution of Water Wells (pages 47-48)</p>	<ul style="list-style-type: none"> <li>• Provide educational materials on well maintenance and safety for those on well water.</li> <li>• Maintain well water database created by the EHAT/Water Quality Subgroup.</li> <li>• Publish information on well maintenance in Daily Times and county website.</li> </ul>

Health Related Issue	Recommended Actions (continued)
3. Sewer Overflows (page 48)	<ul style="list-style-type: none"> <li>• Continue sewer rehabilitation and maintenance program in Alcoa and Maryville.</li> <li>• Follow state-approved (TDEC) response plan for sanitary sewer overflow incidents.</li> <li>• Submit yearly overflow data to the county director of environmental health.</li> </ul>
4. Water Contact Advisories (page 48)	<ul style="list-style-type: none"> <li>• Continue advisories for water bodies where contact and/or consumption of fish would be unhealthy.</li> </ul>
5. Impaired Streams (page 48)	<ul style="list-style-type: none"> <li>• Add all stream miles in the county for testing under the 305 (b) report: The Status of Water Quality in Tennessee.</li> <li>• Fully implement Phase 2 of the county's Storm Water Program.</li> <li>• Encourage and provide incentives for adoption of best management practices for water quality in farming operations.</li> <li>• Provide homeowner education on water quality issues.</li> <li>• Target one stream in the county for an intensive mitigation program every three years.</li> </ul>
6. Bacteria at Intake of Utility Water (page 48)	<ul style="list-style-type: none"> <li>• Submit yearly E. coli results from water system intake tests to the county director of environmental health.</li> </ul>
7. General Water Quality (page 48-49)	<ul style="list-style-type: none"> <li>• Fully implement the Little River Watershed Restoration Initiative.</li> <li>• Create, update and distribute an Annual Water Quality Report for Blount County.</li> <li>• Support water quality recommendations of the EHAT Land Use Subgroup.</li> </ul>

## **Land Use, Growth and Development Action Plan and Issue Profile**

**Issue Name.** Land Use, Growth and Development

**Scope.** The scope of the issue may be broken down into several sub-issues as follows: growth and sprawl, loss of rural land, roads and traffic, air quality, water quality, commercial and industrial development, development design with preservation of green or open space, and preservation of trees.

**Background:** The impetus in forming an EHAT (Environmental Health Action Team) subgroup on this set of issues was results from the initial EHAT survey that included concern with loss of rural land, industrial development and urban growth in general. The subgroup found that these issues were value laden, with tenuous linkages to public health concerns.

The subgroup enlisted the services of the East Tennessee Community Design Center to conduct five facilitated community consultation meetings to further refine the issues with direct citizen input. The subgroup also enlisted the assistance of Trevor McMurray in the Blount County Assessors Office to produce a set of maps depicting residential growth by decade (using date of residential structure construction), to show the pattern of residential growth in the county over time. In addition, the subgroup drew upon the files of the Blount County Planning Department for population growth analysis and land use information.

The subgroup identified several avenues for addressing the links between public health on the one hand and land use or growth issues on the other. For this, the subgroup focused on collating research and literature on the issues. Findings ranged from conjectures, to suggestive correlations, to firm correlations and inferred causal links. The subgroup identified several promising actions that could be taken by public and private entities to address the issues identified.

For many issues, a direct causal relationship to a specific health outcome could not be confirmed in research. However, conditions fostered by a specific use of land or development situation may reasonably be argued to have impact on the public's health.

## **Growth and Sprawl**

Overall growth may be an issue to some, but the pattern of growth is a more definitive issue. Sprawl may refer to dispersed pattern of both residential and non-residential development. However, the word “sprawl” is not well defined and has gained much emotional and ideological baggage. In general, sprawl refers to development that occurs when there is still substantial intervening developable land between it and an urban center, where the development is generally of low suburban density, where different uses are separated by large distances, and where there is deficient or inefficient use of supporting infrastructure for the dispersed development.

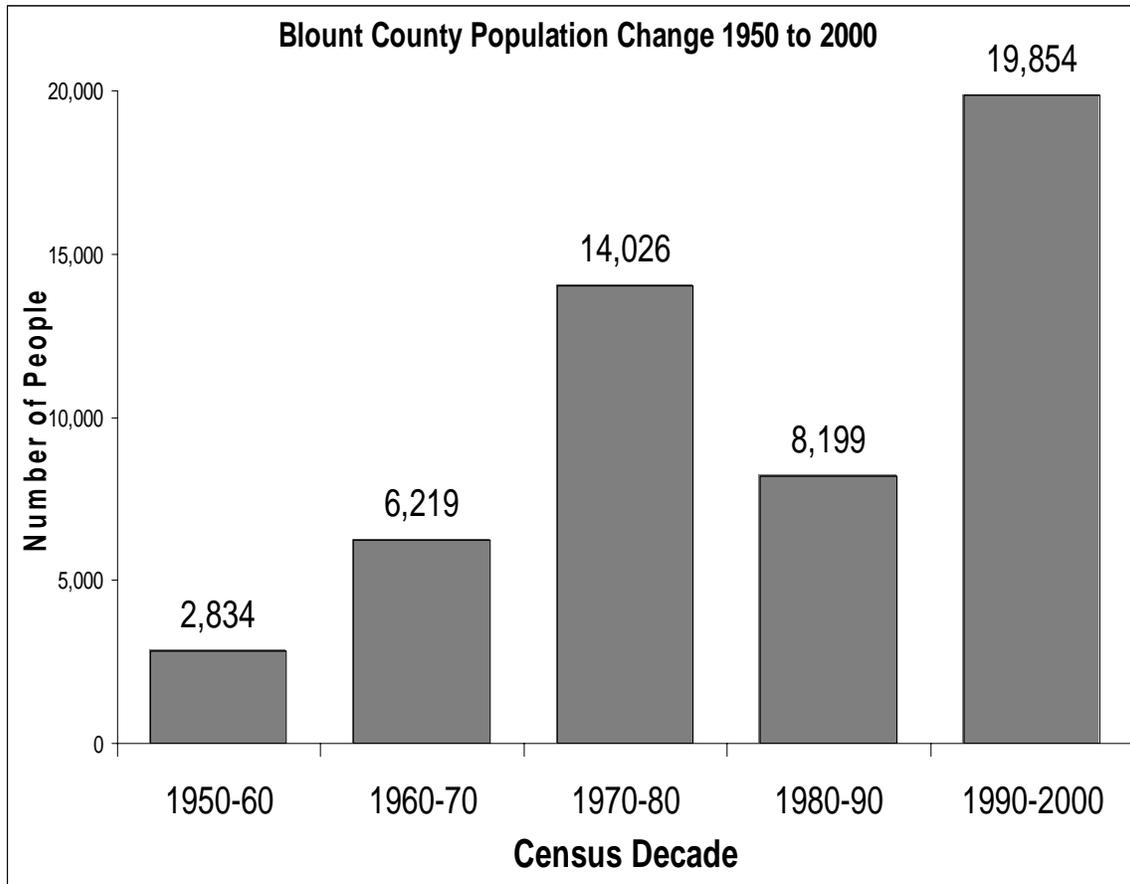
The land use subgroup referenced a growing body of research linking sprawl to problems of lack of exercise and consequent weight gain. Separation of uses by large distances, such as separation of residential use from school, work or shopping, is not conducive to walking or biking which would provide exercise activity. Lack of exercise leads to lower burning of calories, which may lead to weight gain. At some point, weight gain can affect health, leading to heart disease, diabetes and even cancer. Thus the land use pattern of sprawl can lead to adverse health outcomes.

The argument linking sprawl to health outcomes is plausible and supported by some research showing suggestive correlations. Other factors such as nutrition and a more sedentary life style in general can be intervening and dominant factors for the same health outcomes. Research links between weight gain (obesity) and health outcomes is much more definitive.

Growth and Sprawl Indicators. Overall growth in the County can be quantified from population trends. However, sprawl was not directly quantified. Objective measures of sprawl for the county did not exist. The Land Use Subgroup worked with Trevor McMurray in the Blount County Assessors Office to produce a set of maps showing residential development patterns and growth by decade from 1950 to 2000, corresponding to existing decennial Census population figures, as a visual indicator of development pattern.

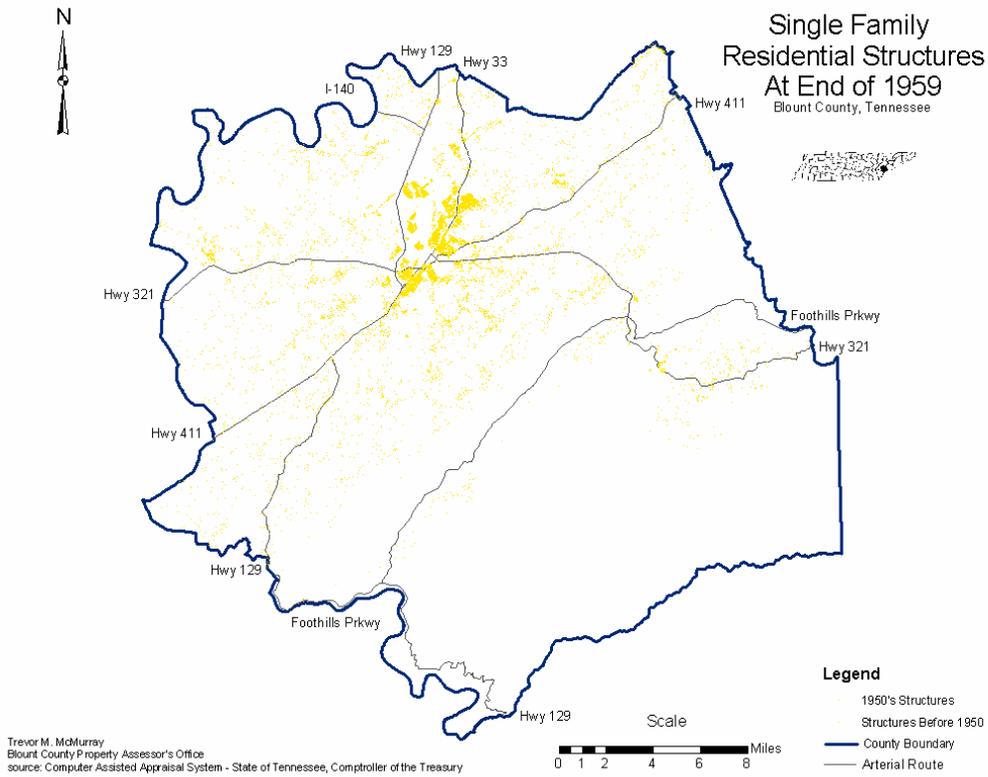
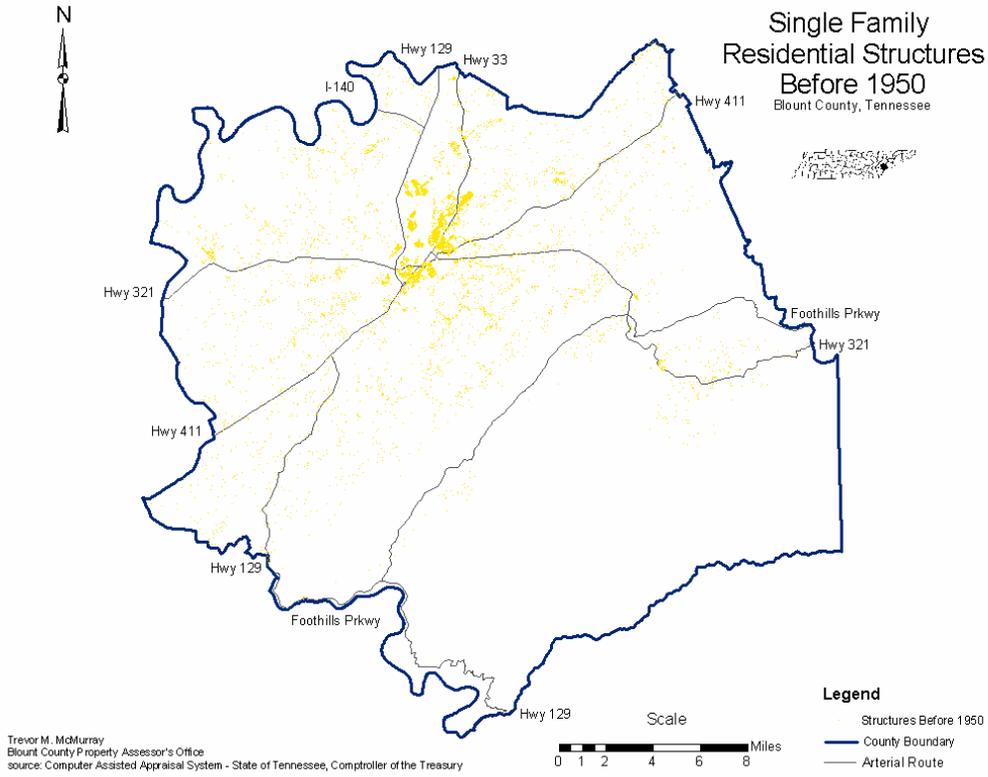
Growth in population over the past five decades shows a pattern of weak growth in the 1950's, acceleration of growth in the 1960's to first peak in the 1970's, followed by slowing of growth in the 1980's, and a peak of highest growth in the history of the county in the 1990's. The chart below shows

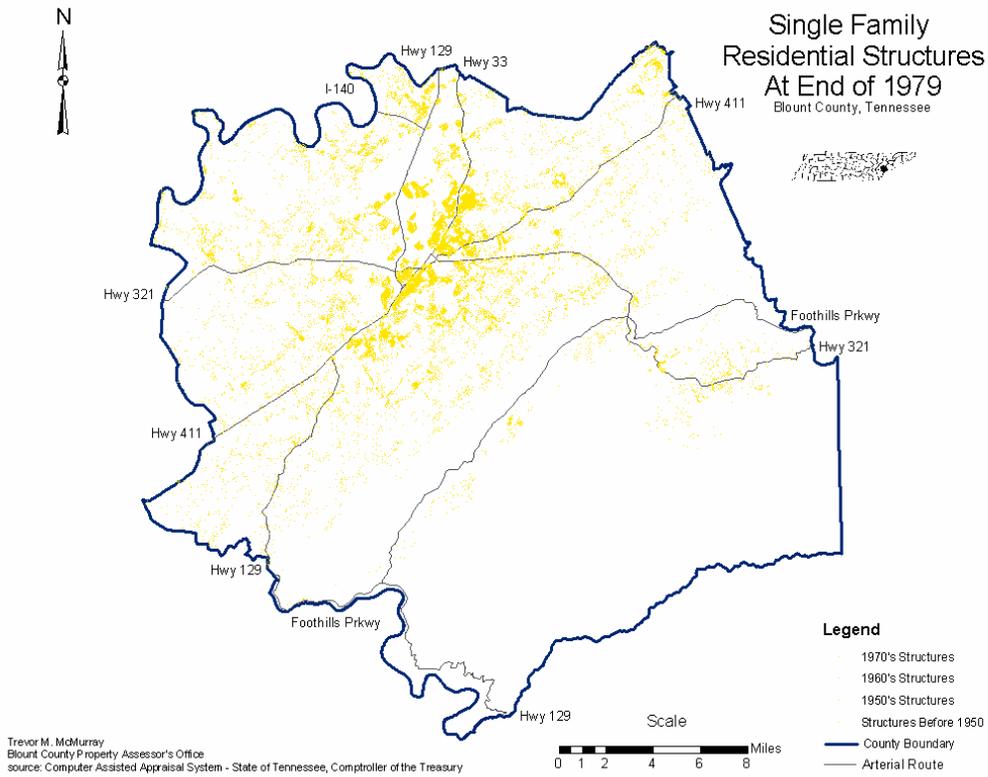
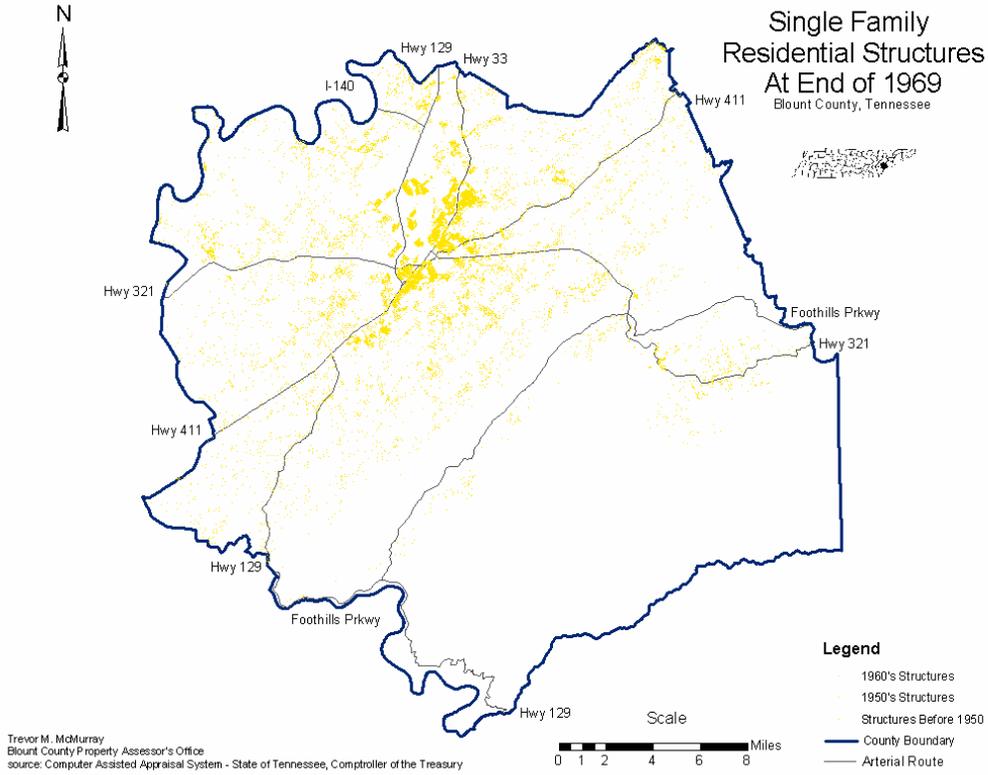
this graphically. The population of the county in 2000 was 105,823. Estimated population in July of 2005 was 115,535. Growth over the past several years has been at about the same pace as the 1990's.

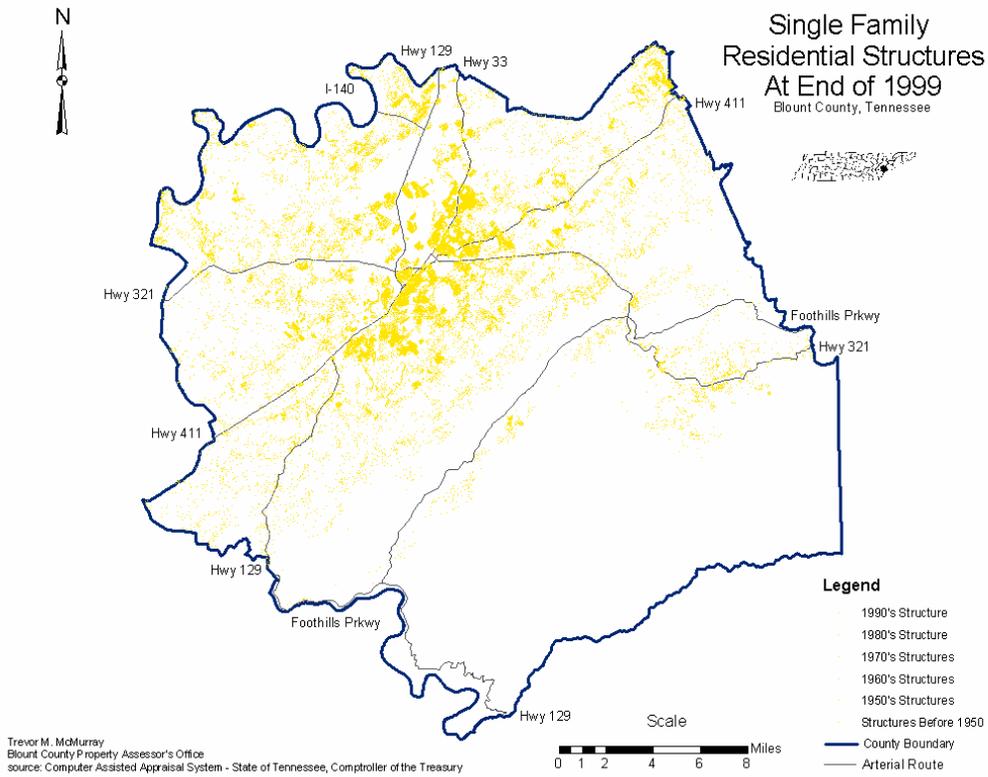
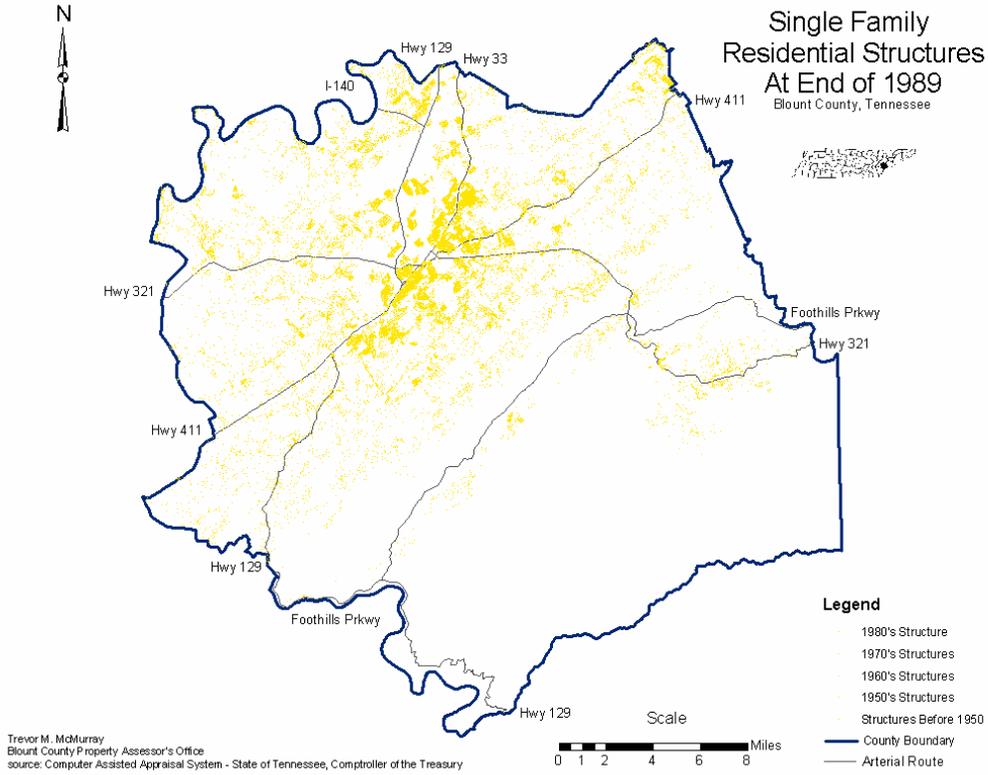


Residential growth showed acceleration similar to the trend of population growth, but also showed a distinct geographical pattern. The maps of residential development patterns are reproduced on the following pages.

The 1950's started with a relatively compact residential development pattern, clustered in and around the cities of Maryville and Alcoa. There was a distinct urban core and an extensive rural hinterland. The maps from end of 1969 to end of 1999 indicate a pattern of sprawling or scattered residential development into the rural areas around the older urban core. The decades of highest incremental sprawl were the 1970's and 1990's. Those were also the decades of fastest population growth in the county, especially the 1990's.







Growth and Sprawl Standards. In general, less sprawl is better than more sprawl. The county now has a pattern of sprawled development of undetermined objective magnitude. For the future, this would indicate that a greater proportion of county development should be in and immediately around the existing urban core of Maryville and Alcoa, and served by adequate urban services. This standard could be measured by tracking subdivision approvals and/or building permits from the various jurisdictions in the county, and by reference also to the urban growth boundaries of the two larger cities.

### **Growth and Sprawl - Recommended Actions**

Review the 1101 Growth Plan for appropriateness in defining Urban Growth Boundaries, Planned Growth Area and Rural Area that best discourages sprawl.

Review recommendations of the Maryville Urban Growth Strategy and other plans, reports and regulations for the various Cities in the County regarding sufficiency of measures that could encourage concentration of development in and immediately around the Cities, and whether such measures are sufficient to address issues of growth and sprawl. Based on review, any deficiencies in plans and regulations should be remedied.

Review recommendations of the Blount County Growth Strategy (Hunter Interests study) and other County plans, reports and regulations regarding sufficiency of measures that could discourage sprawl into rural areas of the County, and whether such measures are sufficient to address issues of growth and sprawl. Based on review, any deficiencies in plans and regulations should be remedied.

Track development on a yearly basis by mapping new subdivisions and building permits, particularly in relation to the Urban Growth Boundaries of the Cities.

General statement – the subgroup recommends that the Cities and the County work together cooperatively to address growth and sprawl since the issues cross over jurisdictional boundaries. It will be incumbent upon the cities with municipal sewer to consider sewer

extension as a tool for encouraging densification in selected areas within the city urban growth boundaries so that any measures to discourage sprawl in the County outside of Urban Growth Boundaries could become effective.

### **Loss of Rural Land**

Some would attribute a direct health effect to distress caused by loss of rural land. These linkages are tenuous, and rely on psychological effects as the basis of arguing a health outcome. Some may be distressed by the loss of a nearby farm to suburban residential subdivision, and this distress may lead to marginal effects on health and well being. However, those who live in the subdivision probably do not feel the same effects, and in fact may thrive in the suburban setting. In addition, some would contend that loss of rural land affects the general wellbeing of a community by taking away a mode of stress relief or psychological regeneration through enjoyment of the rural landscape. The subgroup did not come to clear consensus on this issue. Implied health linkages were based more on personal values and preferences than on objective health outcomes.

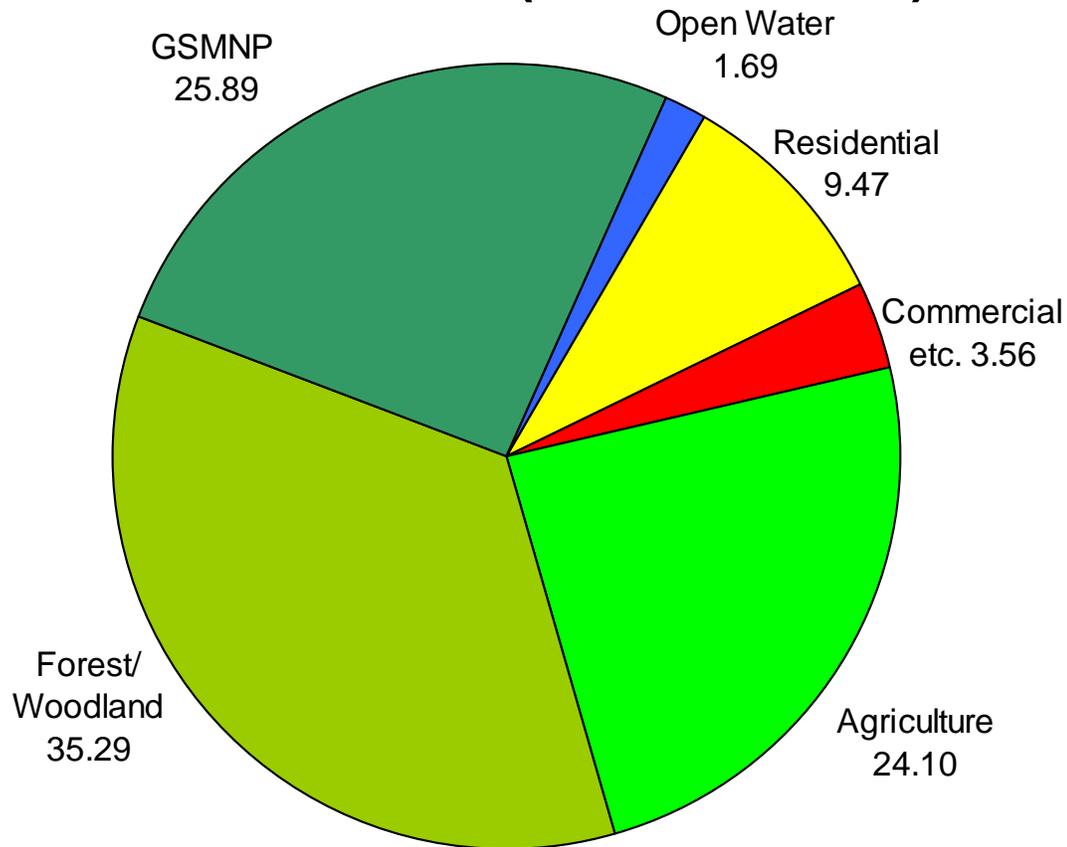
Loss of Rural Land Indicators. Agriculture and forest predominate the land use of the county. The pie chart on the next page shows that only about 13 percent of the land area of the county is developed into commercial and residential use (about 18 percent not counting the National Park), with the remainder classifiable as rural, including the Great Smoky Mountains National Park that permanently preserves a quarter of the county.

It would seem then that loss of rural land to development, while obvious in the pattern of residential development, has not progressed to the point that urban and suburban development is dominant. However, many see the scattering of suburban residential development as destructive of the rural character of the county.

Loss of Rural Land Standards. In general, less sprawl would lead to reduced loss of rural land. The standard is closely related to the issue of growth and sprawl above. If more development is directed to the urban growth boundaries of Maryville and Alcoa, where high density development is expected, and away from rural areas, then the result should be a reduction in the loss of rural land. This could be measured in similar manner with sprawl

by tracking subdivision approvals. A more direct standard could be programs for preservation of rural land, and measure could be number of acres preserved.

## Blount County Land Use Percent of Area (IPSI Data 2000)



### Loss of Rural Land – Recommended Actions

Review plans, reports and regulations of the Cities and County to identify measures that could directly preserve rural land.

Encourage and support public and private sector programs that directly preserve priority rural land in the County.

Increase awareness among the public and officials of existing programs and incentives that can help preserve rural land, such as conservation easements, and efforts of the Foothills Land Conservancy.

Track rural land conversions to development and actual rural land preserved on a yearly basis by maintaining a map data base (possible GIS layer).

General statement – beyond direct public health concerns, the subgroup recommends that preservation of rural land be considered also from the standpoint of quality of life and preservation of wildlife habitat and the environment, and that priority rural land for preservation be identified in plans and plan maps.

### **Roads and Traffic**

There is abundant research showing the relationship between roads and traffic and health and safety. An inadequate or unsafe road with growing traffic can lead to both automobile and pedestrian accidents resulting in bodily injury and death – a clear link to health. Much growth in the county spreads onto rural roads that are inadequate for suburban development.

Roads and Traffic Indicators. The scattering of suburban development into rural areas increases traffic on rural roads of limited capacity, and channels increased traffic onto long stretches of major roads which eventually need improvement. The Blount County Roadway Needs Study, both the original 2000 report and the updated 2005 report, provides a list of deficient major roads under County maintenance.

The Highway Department official roads list can be used to indicate deficient minor roads. The Blount County Planning Commission set a standard of minimum safe road to be 18 feet of pavement with two foot shoulders. This comes from widely accepted standards contained in A Policy on Geometric Design of Highways and Streets by the American Association of State Highway and Transportation Officials (AASHTO). The AASHTO report also provides extensive documentation of safety issues of road design and relation to accident potential, a direct link to public health goals of preventing injury. Using this standard, about 345 miles of roads or 42

percent of total roads under County maintenance are deficient in pavement width only, with probably about 50 percent of roads not meeting the standard of 18 feet of pavement with two foot shoulders. Comparable information on city maintained roads was not collated.

Roads and Traffic Standards. Engineering standards for roads incorporate health and safety concerns. These standards are found in the widely recognized publication A Policy on Geometric Design of Highways and Streets by the American Association of State Highway and Transportation Officials (AASHTO). Within the County jurisdiction, a minimum standard for safe road for new major developments has been set at 18 feet of pavement with 2 foot shoulders, and may be greater for major roads in proportion to traffic as identified in the Blount County Roadway Needs Study (2000 and 2005).

### **Roads and Traffic – Recommended Actions**

Take steps to improve existing deficient roads in the county, based on priorities set in the Blount County Roadway Needs Study, and institute a comprehensive infrastructure management system along with capital improvement budgeting.

Apply sound engineering standards for safe roadway design based on A Policy on Geometric Design of Highways and Streets by the American Association of State Highway and Transportation Officials (AASHTO). Apply both within new developments and external to new developments as part of plat and permit approvals.

General statement – although the original EHAT issue profile did not address pedestrian and bicycle traffic, the subgroup recommends that standards contained in AASHTO guidebooks for safe pedestrian and bicycle development design be incorporated in design review of road improvements, new roads and new developments, and that training for design professionals be provided.

### **Air Quality**

Air quality is linked to use of automobiles, and other vehicles and machinery, and such use is linked to growth and sprawl. Sprawling

development requires use of automobiles, and often requires longer drives for everyday activities. Greater use of automobiles is linked to air pollution, for example ground level ozone, carbon monoxide, and particulate matter. Air quality is linked to public health concerns such as respiratory and other illness, including chronic obstructive pulmonary disease, asthma, and heart disease. Thus growth and development pattern are linked to possible public health outcomes via air quality concerns. The EHAT Air Quality Subgroup explored this issue in more detail (see pages 26-39).

Air Quality Indicators. Blount County, as well as many adjacent counties, has been classified in non-attainment for air quality standards for ozone and PM 2.5 (very small particulate matter). These measures are documented by the Environmental Protection Agency. The EHAT Air Quality Subgroup has undertaken passive ozone sampling in seven sites throughout the county, with results showing that higher elevations are exposed to more ozone than lower elevations on average. The Air Quality Subgroup will provide more information on indicators (see page 36).

Air Quality Standards. Research and regulations set by the U.S. Environmental Protection Agency form a sound basis for air quality standards. The standard for improvement should be conformity with ozone and particulate matter standards. The EHAT Air Quality Subgroup will address standards for this issue in more detail (see pages 36-37).

### **Air Quality – Recommended Actions**

Support action recommendations of the EHAT Air Quality Subgroup. (see pages 37-39)

Take steps to attain minimum health standards for ozone and particulate matter as set by the EPA. Such steps should include those required by any air quality mitigation plans to address non-attainment for ozone and particulate matter.

Assess development pattern to determine measures that may be taken to limit increases in total vehicle miles traveled (see also discussion under Growth and Sprawl above).

Encourage and support programs that will reduce total vehicle miles traveled, such as Smart Trips Program, transit planning, carpooling, bicycle commuting, and trip combining.

Consistent with the spirit of Tennessee Code Annotated 13-7-118, Cities and the County should include consideration of air quality issues in their respective land use plans.

### **Water Quality**

Water quality is linked to activities on the land, or land use. Most residential developments in the county outside the cities of Maryville and Alcoa are on private septic tank and leach field systems. Operating properly, such systems take care of household waste effectively. However, if the system is not installed correctly, not placed in proper soils, not used properly, or is not well maintained, the residential land use can lead to pollution of both ground and surface water by disease causing pathogens. Thus land use is linked to possible public health outcomes via water quality concerns. The EHAT Water Quality Subgroup explored this issue in more detail (see pages 40-49).

Water Quality Indicators. The county is covered in part by municipal sewer from treatment plants in Maryville and Alcoa. The maps of sewer coverage show a tight service area in and around the two main cities in the county, associated also with higher density of development in and around the two cities. Land parcels not within the service area of municipal sewer are served almost exclusively by individual septic tanks and drain fields. The County Environmental Department estimates that approximately 10,000 out of 45,000 households in the county, or 22 percent, are served by municipal sewer. That means that about 35,000 households, or 78 percent, are served by private septic tank and drain field. The Environmental Health Department also reports that about 250 private septic systems fail and are repaired each year.

The Tennessee Department of Environment and Conservation 303(d) list indicates that several streams in the county are impacted by bacteria pollution. However, the origin of such pollution is not known, and could be from human or animal waste. The Water Quality Subgroup has undertaken the mapping of well tests in the county with no clear clustering of results

associated with development patterns. That subgroup will provide more information on water quality indicators (see pages 42-45).

Water Quality Standards. The standards set by the Tennessee Department of Environment and Conservation (TDEC) form a basis for identifying impaired waterways in the 303(d) list. The standard for improvement should be deletion of waterways from the 303(d) list of impaired waterways. For ground water issues related to septic fields, the standard should be to insure proper septic field function. The EHAT Water Quality Subgroup will address standards for this issue in more detail (see pages 45-46).

### **Water Quality – Recommended Actions**

Support action recommendations of the EHAT Water Quality Subgroup (see pages 47-49).

Take steps to reduce pollution load in 303(d) designated impaired streams, sufficient to remove such streams from the impaired list.

Support watershed activities of the Little River Watershed Restoration Initiative through the Little River Water Quality Forum and the Soil Conservation District, and other water quality improvement activities in the County.

Continue implementation of the Stormwater Phase 2 program.

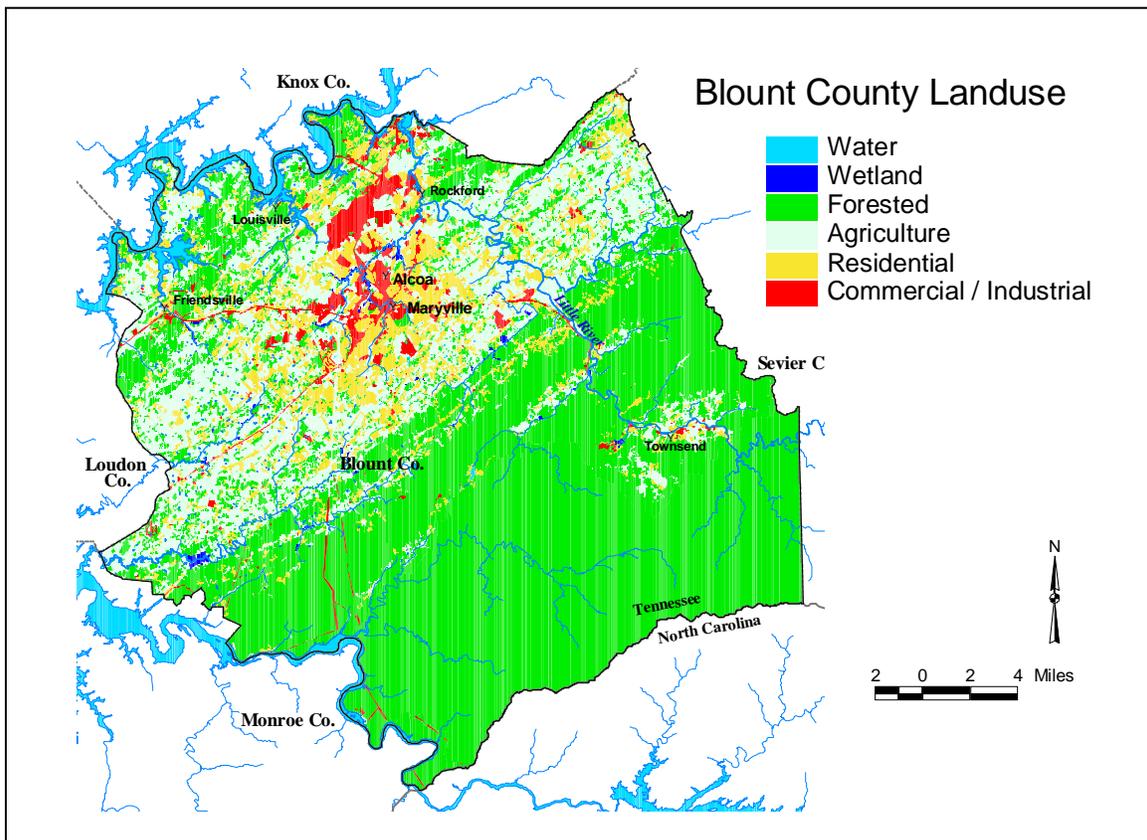
Review regulations and permit procedures to better address long term septic capability and erosion control for new development.

### **Commercial and Industrial Development**

Beside the sprawl effects of separating residential and commercial uses, commercial and industrial developments are intensive land use activities that can have internal and external effects on health and wellbeing. Commercial activity is often seen as conflicting with enjoyment of residential use. There is implied in this a continuing stress factor for those living near to substantial commercial uses. Some of the external effects are traffic, lighting, noise, storm water, smoke, fumes, dust and debris. Industrial activity is also seen as conflicting with enjoyment of residential use. In addition to the implied

stress factors listed for commercial use, industrial uses may present exposure hazards to chemicals used in processing or as by-products of processing. Such exposure hazards may be on the job, or off-site through transmission in air and water.

Commercial and Industrial Use Indicators. Commercial and industrial land uses are concentrated in the two main cities of Maryville and Alcoa, but also stretch out along the major highways in the county. The map below shows the pattern of commercial and industrial use in the county along with residential and other uses.



The pattern indicates that sprawl in the county has separated the two main development use categories. Shopping and employment are generally in the cities, and the bulk of residential use is scattered throughout the county. In addition, much of the commercial use is concentrated along main arterial roads in the urban areas, in big box stores, strip commercial developments and an enclosed mall. Very little commercial use is conveniently accessible to pedestrians or bicyclists who might originate in the residential areas.

Commercial and Industrial Development Standards. In relation to sprawl, an appropriate standard would be clustering of commercial and industrial use in the cities where urban services are present. In relation to community design, an appropriate standard would be greater pedestrian and bicycle access to neighborhood commercial uses, implying a greater integration of commercial and residential uses on a neighborhood basis. In relation to external impacts, an appropriate standard would be measures, such as buffering, to reduce the impact of commercial and industrial uses on surrounding residential neighborhoods.

### **Commercial and Industrial Development – Recommended Actions**

Review plans, reports and regulations of the Cities and County to identify measures that could enable and encourage clustering of commercial development and provide appropriate integration with residential development.

Review plans, reports and regulations of the Cities and County to identify measures that could provide greater pedestrian and bicycle linkages between residential and commercial uses.

Review plans, reports and regulations of the Cities and County to identify measures that could reduce the impact of commercial and industrial uses on surrounding residential neighborhoods, such as requirements for shielding of lights, sound buffering, and visual buffering.

### **Development Design**

Participants in community consultations linked the internal design of residential development to health and wellbeing. In particular, community consultations revealed a preference for cluster development with integrated green or open space. Added to this was a desire for more opportunities for walking and biking, such as provision of sidewalks and trails integrated with open space. Better design of residential developments can at least provide the opportunity for a more active and healthy lifestyle, and can provide opportunities for relieving the stress of urban and suburban living. This could extend also to design of commercial developments and linking residential and commercial uses.

Development Design Indicators. Review of development regulations and standards of the various jurisdictions shows that pedestrian and bicycle friendly development design can be accommodated, but is not encouraged. This is born out by casual observation of recent and new developments which generally do not provide for walking or bicycling. Maryville and Alcoa require provision of pedestrian sidewalks in many new developments, but such improvements are not necessarily linked across developments in a functional manner.

Provision for green or open space can be accommodated under present regulations and standards, but is generally not encouraged. The City of Alcoa requires set aside of open space, but often the space is not improved and is of limited function in smaller developments.

Maryville and Alcoa, in partnership with Blount County, provide a well established green-way linking the two cities, and also a well established recreation park system. Neither the green belt nor the park system extends substantially outside the city limits. Information and evaluation of the park system is contained in a recently released Comprehensive Parks and Recreation Master Plan (2005).

Development Design Standards. Standards for design are often dependent on specific community values. However, there is a growing body of guidelines and models that can form the basis for good development design, particularly Traditional Neighborhood Development and New Urbanism. Specific standards could also include direct requirement of open space set asides and pedestrian/bicycle improvements in new developments, and integration with a plan for community wide open space and recreation.

### **Development Design – Recommended Actions**

Review plans, reports and regulations of the Cities and County to identify measures that could incorporate innovative development design and practice such as Traditional Neighborhood Development and New Urbanism, and Form Based Zoning into subdivision regulations and zoning regulations.

Require integration of open space and pedestrian and bicycle improvements in new developments, and retrofitting into presently developed areas.

Integrate a plan for community wide open space and recreation into existing plans of the Cities and County, especially the Comprehensive Parks and Recreation Master Plan.

### **Preservation of Trees**

Apart from the possible health benefits of green space in community design, preservation of trees and other vegetation that can sequester carbon may be a long term and global health issue. Research indicates that increased carbon dioxide in the atmosphere can lead to global warming. Such global warming can lead to health effects such as increased heat stress, spread of climates conducive to tropical diseases, and promotion of ground level ozone formation. To date, the literature is projective and speculative.

However, one direct benefit of tree preservation is the cooling effect of shade, especially in urban areas with large amounts of impervious surface. This can reduce the heat island effect of developed areas, and can mitigate ground level ozone formation. Both heat stress and ozone related respiratory health effects thus can be linked to lack of tree preservation.

Preservation of Trees Indicators. As noted in the pie chart on land use above, defined areas of forest and woodland account for about 35 percent of total land area of the county. If you include the area of the Great Smoky Mountains national Park, forest would account for almost 60 percent of land area. The land use information does not account for areas of agricultural land with scattered trees, and does not account for residential land with landscaped trees and vegetation. Information on the loss of trees to development or harvesting was not available to the Land Use Subgroup for consideration.

Preservation of Trees Standards. A direct standard of no net loss of trees in conversion of land to urban and suburban development would be appropriate. In urban areas, the standard could be more aggressive, to add more tree cover in areas of impervious surface. Harvesting of trees for

lumber is an agricultural use, and best management practice would indicate a standard of reforestation after harvesting.

The cities of Alcoa and Maryville are participants in the Tree City USA program. The program promotes urban forestry and is sponsored by the National Arbor Day Foundation, in cooperation with the National Association of State Foresters, USDA Forest Service, US Conference of Mayors and National League of Cities. Participants adhere to four standards for maintaining a successful program. These standards are:

1. A Tree Board or Department
2. A Tree Care Ordinance
3. A Community Forestry Program
4. An Arbor Day Observance and Proclamation

The City of Alcoa landscaping ordinance provides standards for tree replacement or enhancement. Any tree removed measuring six (6) inches or greater in caliper, at a point six (6) inches above the ground, must be replaced by a tree with minimum caliper of two (2) inches, at a point six (6) inches above the ground. In addition, for every four thousand (4,000) square feet of paved area in a commercial development, at least two (2), two (2) inch caliper trees must be planted. Alcoa parking regulations require parking islands that can be part of overall landscaping and tree planting areas for commercial developments.

### **Preservation of Trees – Recommended Actions**

Adopt a County program, and City programs in smaller Cities, similar to the Tree City USA program of Alcoa and Maryville.

Adopt regulations requiring no net loss of trees in conversion of land to urban and suburban development, and provision of landscaped tree integration into commercial development design.

Institute a program to increase the tree cover in built-up urban areas, particularly densely paved areas.

Encourage best management practices such as reforestation for commercial tree harvesting operations.

## Outdoor Air Quality Action Plan and Issue Profile

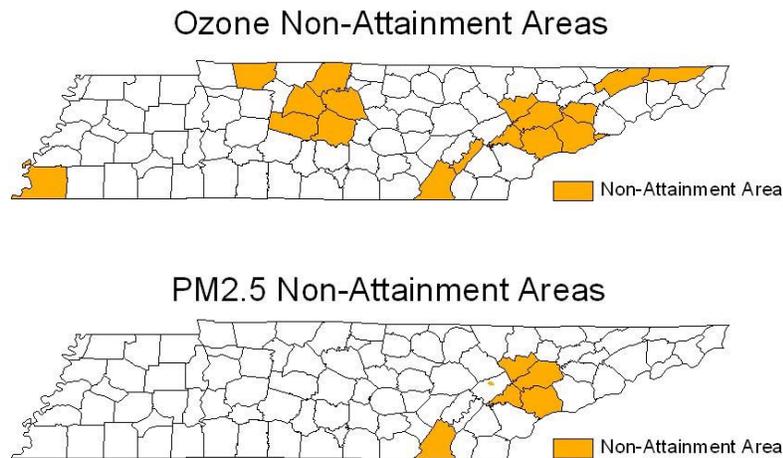
**Issue Name:** Outdoor Air Quality

**Scope:** The outdoor air quality issue may be broken down into two sub-issues as follows: ground-level ozone (O<sub>3</sub>), and particulate matter less than 2.5 microns in diameter (PM 2.5).

**Background:** During the initial EHAT survey, conducted in September 2002, outdoor air quality was identified as the number one environmental health issue of concern to residents of Blount County.

In addition, Blount County and other adjacent counties have been designated by the U.S. Environmental Protection Agency (EPA) to be in non-attainment of national ambient air quality standards (NAAQS) for ozone and particulate matter. See Figure 1.

**Figure 1. Ozone and PM<sub>2.5</sub> Non-Attainment Counties in Tennessee.**

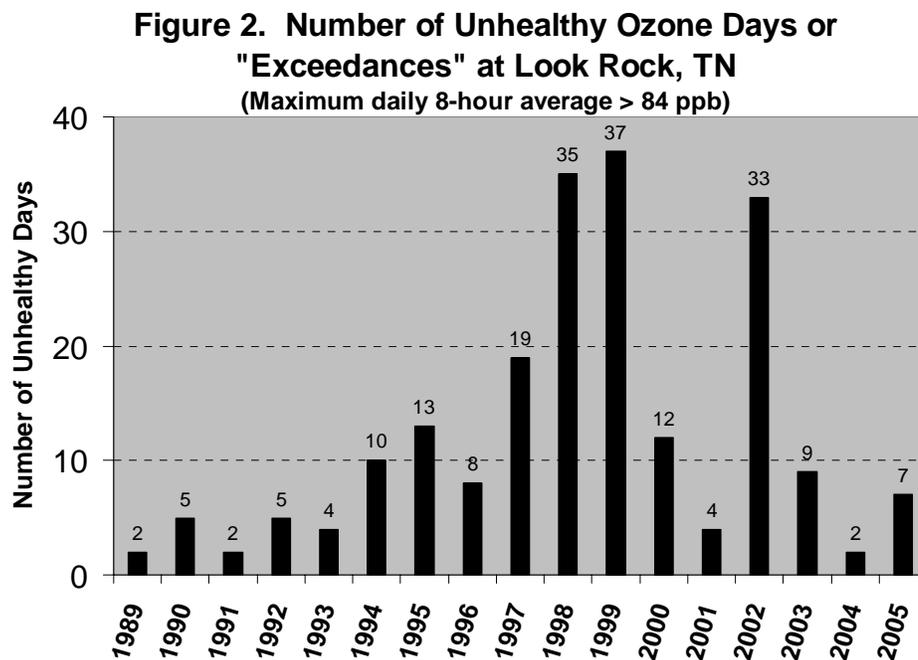


According to the EPA, the average adult breathes over 3,000 gallons of air every day. Children breathe even more air per pound of body weight and are more susceptible to air pollution. Many air pollutants, such as those that

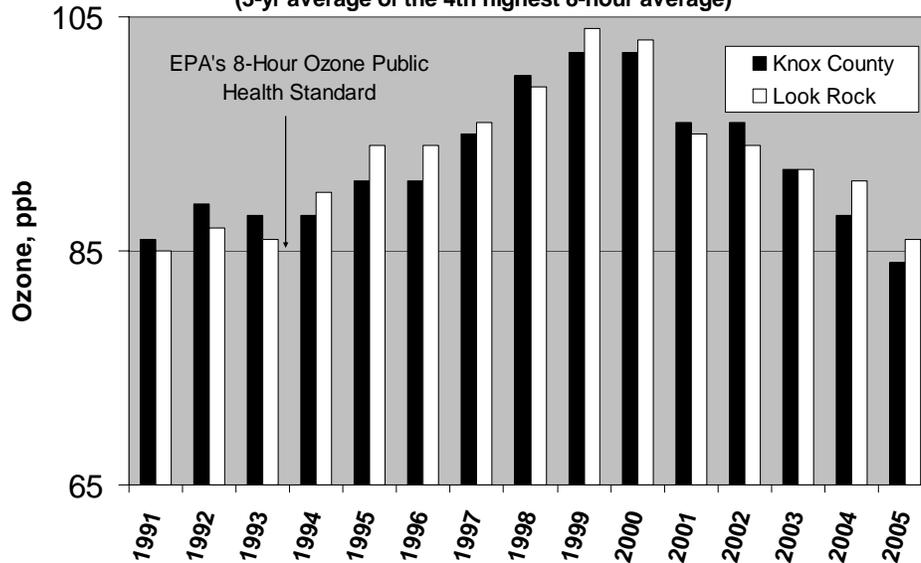
form urban smog and toxic compounds, remain in the environment for long periods of time and are carried by the winds hundreds of miles from their origin. Millions of people live in areas where urban smog, very small particles, and toxic pollutants pose serious health concerns. People exposed to high enough levels of certain air pollutants may experience burning in their eyes, an irritated throat, or breathing difficulties. Long-term exposure to air pollution can cause cancer and long-term damage to the immune, neurological, reproductive, coronary, and respiratory systems. In extreme cases, it can even cause death.

Ground-level Ozone. In the Earth's lower atmosphere, near ground level, ozone (also known as “smog”) is formed when pollutants (e.g. nitrogen oxides and volatile organic compounds) emitted by cars, trucks, power plants, industrial boilers, refineries, chemical plants, and other sources react chemically in the presence of sunlight. Ozone pollution is a concern during the warmer summer months when the weather conditions needed to form ground-level ozone (lots of sun, hot temperatures and light winds) normally occur.

Figure 2, below, shows the number of exceedances of the NAAQS for ozone at Look Rock, Blount County. Figure 3 on the following page shows the national standard and average ozone concentration at Knox County and Look Rock.



**Figure 3. Measured 8-Hour Average Ozone Design at Look Rock and Knox County, TN**  
(3-yr average of the 4th highest 8-hour average)



Health effects of Ozone. According to the EPA, *ozone can irritate the respiratory system*, causing a person to start coughing, feel an irritation in the throat and/or experience an uncomfortable sensation in the chest.

*Ozone can reduce lung function* and make it more difficult for a person to breathe as deeply and vigorously as one would normally.

*Ozone can aggravate asthma.* When ozone levels are high, more people with asthma have attacks that require a doctor's attention or the use of additional medication. One reason this happens is that ozone makes people more sensitive to allergens, which are the most common triggers for asthma attacks. Also, asthmatics are more severely affected by the reduced lung function and irritation that ozone causes in the respiratory system.

*Ozone may aggravate chronic lung diseases* such as emphysema and bronchitis and reduce the immune system's ability to fight off bacterial infections in the respiratory system.

*Ozone may cause permanent lung damage.* Repeated short-term ozone damage to children's developing lungs may lead to reduced lung function in adulthood. In adults, ozone exposure may accelerate the natural decline in lung function that occurs as part of the normal aging process.

Particulate Matter, 2.5 Microns (PM 2.5). Particle pollution is a mixture of microscopic solids and liquid droplets suspended in air. This pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, soil or dust particles, and allergens (such as fragments of pollen or mold spores).

The size of particles is directly linked to their potential for causing health problems. Small particles less than 10 micrometers in diameter pose the greatest problems, because they can get deep into lungs, and some may even get into the bloodstream. Exposure to such particles can affect a person's lungs and heart. Larger particles are of less concern, although they can irritate the eyes, nose, and throat.

Small particles of concern include "fine particles" (such as those found in smoke and haze), which are 2.5 micrometers in diameter or less; and "coarse particles" (such as those found in wind-blown dust), which have diameters between 2.5 and 10 micrometers.

Figure 4 shows the number of days that the daily average PM<sub>2.5</sub> concentration was above the unhealthy level for sensitive groups of people. Figure 5 on the next page shows the measured 3-year annual average PM<sub>2.5</sub> concentration at Knox County, Maryville and Look Rock and the related public health standard.

**Figure 4. Number of Days the Average Daily PM<sub>2.5</sub> is > 40 ug/m<sup>3</sup> at Look Rock, TN**

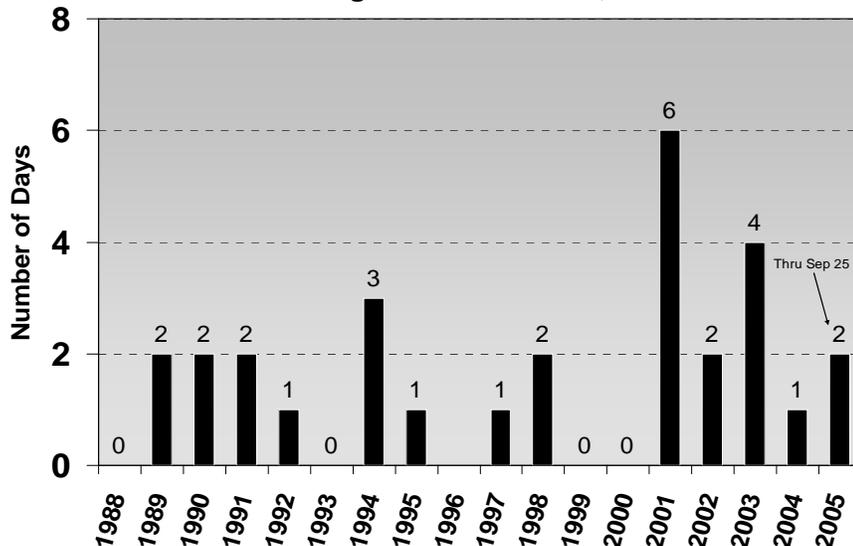
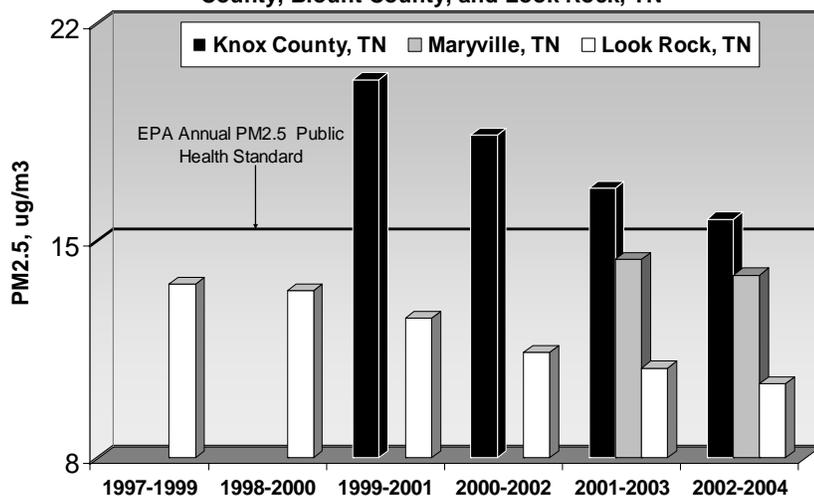


Figure 5. Measured 3-Year Annual Average PM2.5 at Knox County, Blount County, and Look Rock, TN



Health effects of Particulate Matter. According to the EPA, particle exposure can lead to a variety of health effects. For example, numerous studies link particle levels to increased hospital admissions and emergency room visits—and even to death from heart or lung diseases. Both long- and short-term particle exposures have been linked to health problems.

*Short-term exposures* to particles (hours or days) can aggravate lung disease, causing asthma attacks and acute bronchitis, and may also increase susceptibility to respiratory infections. In people with heart disease, short-term exposures have been linked to heart attacks and arrhythmias. Healthy children and adults have not been reported to suffer serious effects from short-term exposures, although they may experience temporary minor irritation when particle levels are elevated.

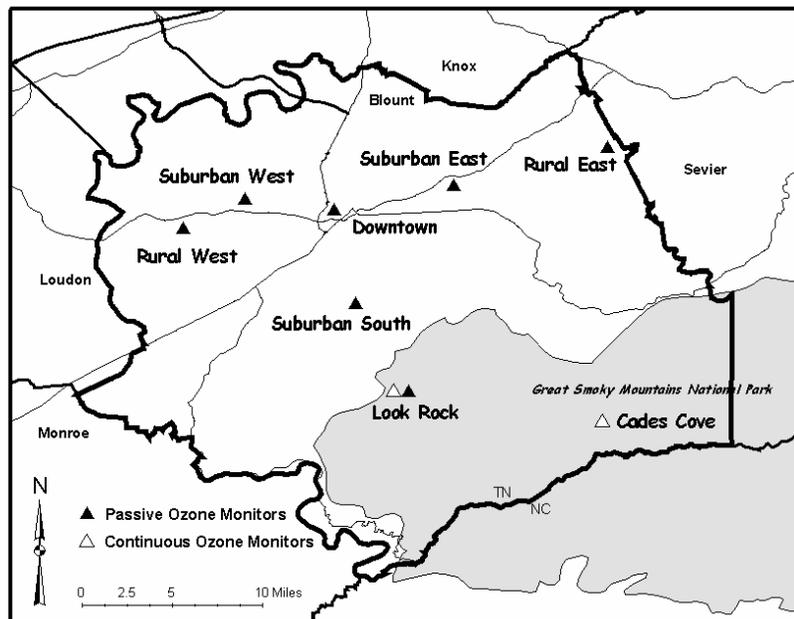
*Long-term exposures*, such as those experienced by people living for many years in areas with high particle levels, have been associated with problems such as reduced lung function and the development of chronic bronchitis and even premature death.

**Air Quality Subgroup Research:** The initial work of the EHAT’s Air Quality Subgroup involved review and assessment of data already collected on ozone and particulate matter. The subgroup focused on monitoring data from continuous analyzers at Look Rock and Cades Cove, sites maintained by Great Smoky Mountains National Park.

The number of days when ozone levels were above national standards ranged from 2-37 annually, for the period from 1995-2005 at Look Rock (see Figure 2 above). The information above is derived from data gathered by continuous analyzers located at Look Rock, which is at an elevation of approximately 2,700 feet. Since it was recognized that ozone levels can differ markedly by elevation and topographic position, the subgroup asked the question: *What does ozone exposure look like in other areas of Blount County, where most people live, work, and play?*

The idea emerged to employ passive ozone monitors to measure ozone concentration at 6 sites throughout the county (downtown, suburban [east, west, south], and rural [east, west]). See Figure 6 below. An additional passive monitor was placed next to the continuous analyzer at Look Rock to establish a relationship between the two. The monitoring project utilized Ogawa Ozone Passive Samplers as its method of collection. See Figure 7 on next page. These have been used in the past by the National Park Service in larger scale studies, with positive and valid results. Hardware (poles and shelters) was provided in-kind by Great Smoky Mountains National Park.

Figure 6. Location of Ozone Monitors, Blount Co



Source: EHAT Air Quality Subgroup

**Figure 7. Assembly for Passive Ozone Monitoring and Passive Ozone Sampler**



Measurements were collected for nine, two-week intervals, from May 11-September 14, 2004. Samplers were shipped to the Research Triangle Institute (RTI) in North Carolina, contracted by the subgroup for analysis. Trained community volunteers were responsible for setting up, collecting, storing and shipping of the passive ozone samplers.

The project was funded by a utilizing part of the grant from the Centers for Disease Control and Prevention (CDC) and the National Association of County and City Health Officials (NACCHO). A replication of the project was completed for the 2005 ozone season. Funding for this second year was provided solely by local organizations, including Blount Memorial Hospital, the Industrial Development Board, ALCOA Inc., DENSO Inc., and local government. Results of second year monitoring were similar to the first.

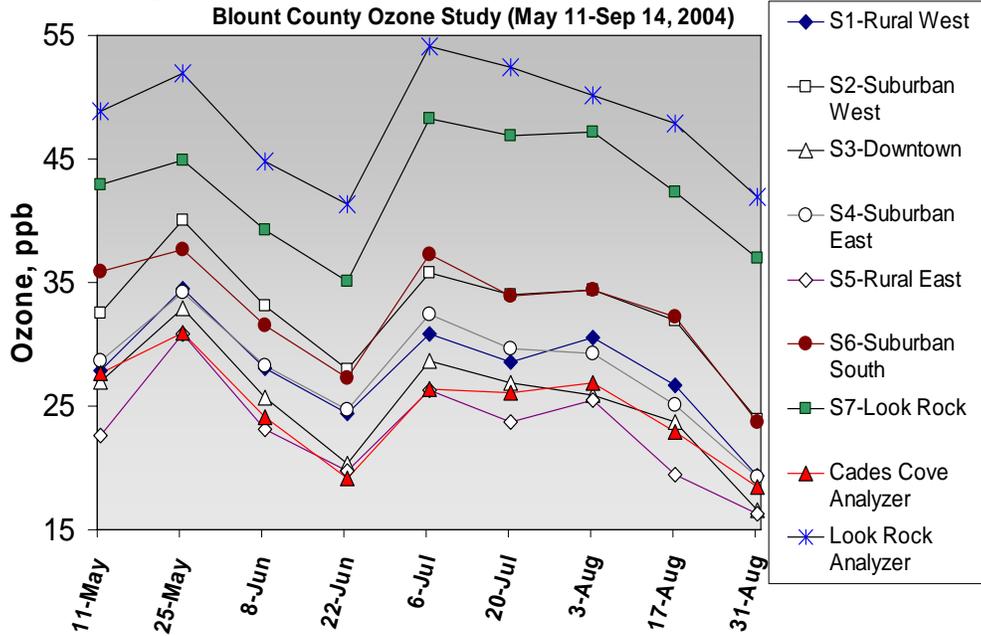
### Passive Ozone Monitoring Results

Figure 8, on following page, shows the pattern of bi-weekly average concentrations recorded by these passive ozone monitors and the two continuous analyzers at Look Rock and Cades Cove.

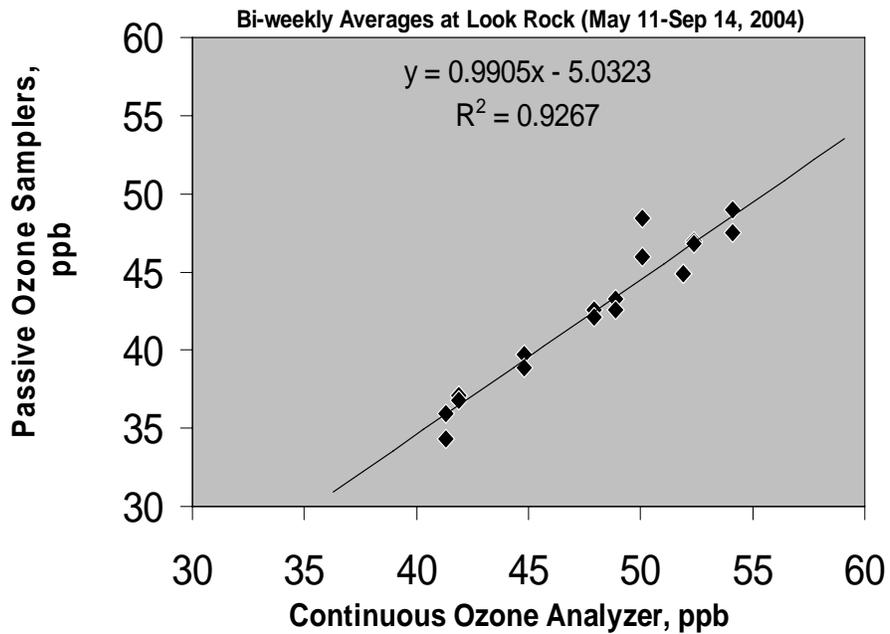
Figure 9, also on following page, shows a strong relationship between the measurements of the passive monitor and the continuous analyzer place at Look Rock, adding strong correlation and validity to the study.

Figure 10, on subsequent page, shows average ozone concentrations at passive monitoring sites as a percentage of the concentration recorded at the continuous monitoring site at Look Rock.

**Figure 8. Bi-Weekly Passive Ozone Concentrations**



**Figure 9. Continuous Ozone Measurements vs Passive Ozone Measurements Scatter Plot**



**Figure 10. Passive Ozone Percentages of Look Rock Ozone Measurements**

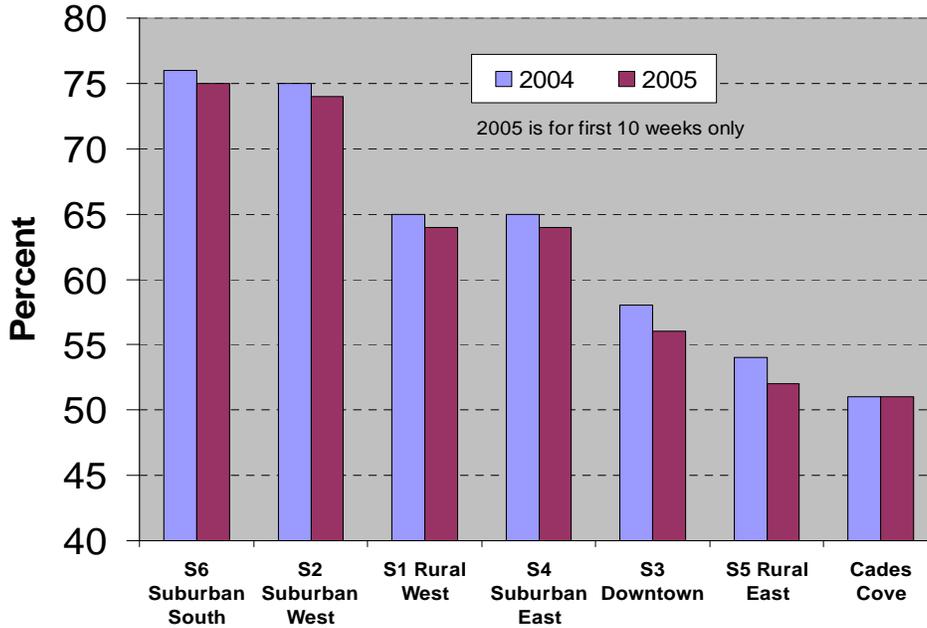


Figure 11 shows the average bi-weekly ozone concentration at each of the sites with passive ozone samplers, as well as that of continuous analyzers in Blount County at the Great Smoky Mountains National Park, and five nearby continuous ozone monitors in the Knoxville area.

**Figure 11. Average Ozone Concentrations  
Blount County, TN (May 11 - Sep 14, 2004)**

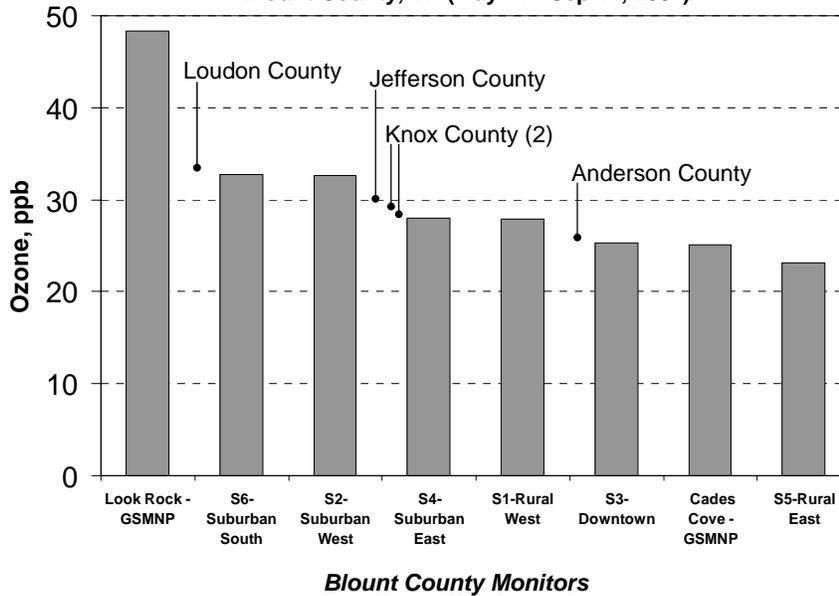
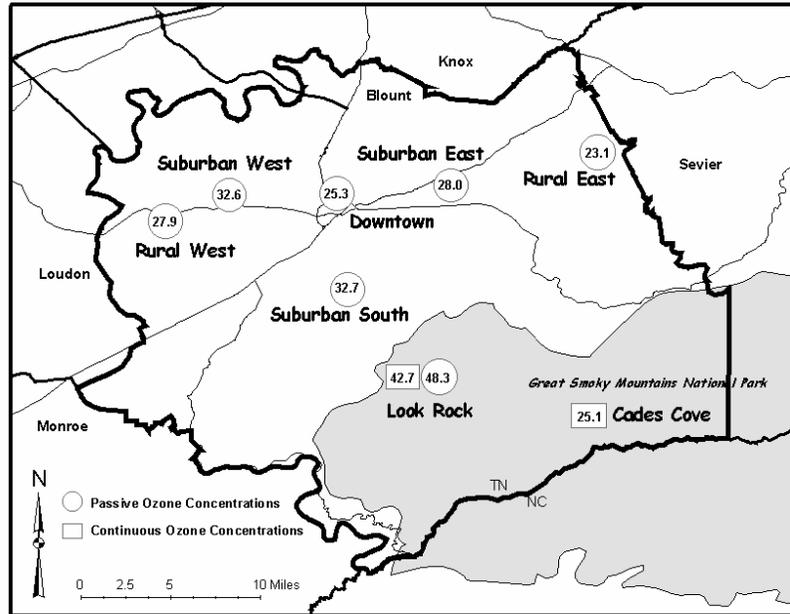


Figure 12 shows the location and average ozone concentration by passive monitors in Blount County, and that of the continuous monitors at Cades Cove and Look Rock.

Figure 12. Average Ozone Concentrations, Blount Co.



Source: EHAT Air Quality Subgroup

What do these data tell us? It is important to point out that the passive ozone monitors and the continuous analyzers, such as the one at Look Rock, measure ozone differently. The passive monitors provide an average ozone level over a two week period, while the continuous analyzer can provide hourly levels, including peak levels. While the passive monitors do not provide the same level of detail as the continuous analyzers, the information they yield is still of value. The results of the passive ozone monitoring projects tell us the following:

First, the ozone levels from passive monitoring parallel the rise and fall of 2-week average ozone levels from the Look Rock analyzer. See Figures 7-9. This suggests the data are reliable.

Second, the ozone levels in other areas of Blount County, while less than the levels recorded by the continuous analyzer at Look Rock, nevertheless are important to note. The ozone levels as measured by the passive monitors do not indicate average levels that exceed the NAAQS for ozone; however, it is

clear that residents of Blount County are still breathing air that has similar average ozone levels as other counties in the Knoxville non-attainment area. See Figures 10 and 11 above.

### Air Quality Indicators:

The following set of Air Quality Indicators was developed by members of the EHAT Air Quality Subgroup, as a way to describe and monitor the county's status regarding air quality. Indicators are tools for quantifying, through direct or indirect measures, a significant aspect of an environmental health issue.

1. a) Number of unhealthy days (exceedances) in Blount County for ground-level ozone as measured by the continuous monitors at Look Rock.  
  
b) Measured 8-hour average ozone levels (design value) at Look Rock and Knoxville.
2. a) Measured 3-year annual average PM<sub>2.5</sub> levels (design value) at Look Rock, Maryville and Knoxville.  
  
b) Number of days with a 24-hour PM<sub>2.5</sub> average concentration equal to or above 40µg/m<sup>3</sup>.
3. Number of emergency room (ER) visits for asthma and chronic obstructive pulmonary disease (COPD), as well as the percentage of all ER visits due to these conditions.
4. Number of hospital discharges for asthma and COPD, as well as the percentage of all hospital discharges due to these conditions.

### Air Quality Standards:

The purpose of standards is to provide a benchmark or point of comparison for assessing where the community's status lies in relation to the identified health standards, and to guide decisions on addressing the issues.

The EPA Office of Air Quality Planning and Standards (OAQPS) has set National Ambient Air Quality Standards for ozone, particulate matter and

four other principal pollutants, which are called "criteria" pollutants. Units of measure for the standards are parts per million (ppm) by volume and micrograms per cubic meter of air ( $\mu\text{g}/\text{m}^3$ ).

**Ozone and PM<sub>2.5</sub> National Ambient Air Quality Standards (NAAQS). Source: EPA.**

<b>Pollutant</b>	<b>Standard</b>	<b>Averaging Times</b>
Ozone	0.08 ppm	8-hour <sup>1</sup>
Particulate Matter 2.5 (PM 2.5)	65 $\mu\text{g}/\text{m}^3$	24-hour <sup>2</sup>
	15 $\mu\text{g}/\text{m}^3$	Annual <sup>3</sup>

- Notes: 1. To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm.  
 2. To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 65  $\mu\text{g}/\text{m}^3$ .  
 3. To attain this standard, the annual average of the PM<sub>2.5</sub> concentrations measured at each monitor must not exceed 15  $\mu\text{g}/\text{m}^3$

EPA is reviewing the national standard for particulate matter 2.5, and may make recommendations in to lower it further. This potential change would have a significant impact on Blount County attainment status potential.

**Air Quality - Recommended Actions:**

**DATA USE AND COLLECTION**

1. Obtain data on emergency room (ER) visits and hospital discharges, as they relate to asthma and chronic obstructive pulmonary disease (COPD), in order to conduct co-relational study with ozone levels. The Tennessee Hospital Association is a possible source for this data.
2. Conduct an environmental scan of Blount County –what people are already doing to maintain and/or improve air quality and how it can be supported
  - Create plan to tap into Metropolitan Planning Organization (MPO) / Congestion Mitigation Air Quality (CMAQ) regional funding for projects (which may require matching funds)

3. Regularly exchange information and data with the Regional Clean Air Coalition (RCAC), specific to continuous ozone and particulate matter monitors in the area

## COMMUNITY AWARENESS AND EDUCATION

4. Educate at-risk populations, such as those with lung or heart disease, on personal behavior during air quality alert days (e.g., on an “unhealthy” ozone day, active children and adults, and people with lung disease, such as asthma, should avoid prolonged or heavy exertion outdoors. Everyone else, especially children, should reduce prolonged or heavy exertion outdoors).
5. Raise community awareness about air quality, e.g. use flags to reflect colors of the air quality index at prominent locations throughout the county (businesses on 129, Townsend Visitors Center, etc.); distribute literature on the benefits of clean air; behaviors for long-term impact (e.g., carpooling, the smart trips program, bicycle clubs, etc.); use decals
  - Compile and publish information on burning regulations and best management practices, e.g., open burning, construction sites, leaf burning, etc.
  - Partner with other local agencies and venues to promote awareness, e.g., Little River Watershed Association, Keep Blount Beautiful (kiosk), landfill, library, Trout Fest
  - Encourage voluntary implementation of anti-idling policies (e.g., for school buses)
6. Continue support of Blount County’s Air Fest activities (scheduled 1<sup>st</sup> Saturday in April 2007)
  - Establish an Environmental Award for Air Quality to recognize the efforts and accomplishment of local businesses and residents

## GENERAL

7. Support recommendations for air quality from the Environmental Health Action Team (EHAT) / Land Use Subgroup. These are listed below.
  - Take steps to attain minimum health standards for ozone and particulate matter as set by the EPA. Such steps should include those required by Blount County's air quality mitigation plan to address non-attainment for ozone and particulate matter.
  - Assess development pattern to determine measures that may be taken to limit increases in total vehicle miles traveled.
  - Encourage and support programs that will reduce total vehicle miles traveled, such as Smart Trips Program, transit planning, carpooling, bicycle commuting, and trip combining.
  - Cities and the County should include consideration of air quality issues in their respective land use plans (consistent with the spirit of Tennessee Code Annotated 13-7-118).

## **Water Quality Action Plan and Issue Profile**

**Issue Name:** Water Quality

**Scope:** The scope of the issue may be broken down into three sub-components as follows: safe drinking water, surface water quality, and ground water quality.

**Background:** During the initial EHAT survey, conducted in September 2002, safe drinking water, surface water quality and ground water quality were identified as the second, third and fifth environmental health issues of concern to residents of Blount County, respectively. A “Water Quality” subgroup was formed to address the three issues.

The subgroup reviewed local drinking water quality reports, finding that the cities of Alcoa and Maryville meet state and federal requirements for drinking water. The subgroup reviewed Tennessee Department of Environment and Conservation 303(d) list and related studies and found that the health impacts were secondary to the environmental impacts in most stream miles. Following further discussion and collation of data, the immediate focus of subgroup activities became ground water quality, upon finding that little information was available on this issue. The lack of information available on the topic, and the large number of Blount County residents who use wells as their source for drinking water were key factors considered.

The EHAT Water Quality Subgroup contracted to create a database of all private wells tested by the County’s Department of Environmental Health. This department supplied the data, which was entered into a database developed by the contractor using GIS (Geographic Information Systems) technology for possible mapping applications. The department has committed to maintain the database, entering data for any tested wells. The information could be used in the future to selectively test wells, according to further data analysis.

Safe drinking water. According to the U.S. Environmental Protection Agency (EPA), actual events of public drinking water contamination are rare, and typically do not occur at levels likely to pose health concerns. Likewise, drinking water that is not properly treated or disinfected or that travels

through an improperly maintained distribution system, may also pose a health risk. Contaminants can enter water supplies either as a result of human and animal activities, or because they occur naturally in the environment. Some typical examples of drinking water threats are microbial contamination, chemical contamination from fertilizers, and lead contamination. Possible health effects include cancer and birth defects from exposure to disinfected by-products (DBPs) and gastrointestinal illness from microbial ingestion.

As mentioned above, reports provided by the cities of Alcoa and Maryville show that the drinking water provided by their water treatment facilities meets state and federal requirements. At the time the subgroup gathered and reviewed information, data from the South Blount water treatment facility was not available. More information regarding Blount County's community water systems can be accessed at EPA's website ([www.epa.gov](http://www.epa.gov)).

Surface water quality. The interest on surface water quality arose from its role as a source of the drinking water supply, as well as its role as a recreational outlet. Human health concerns include neurological and skin effects from mercury accumulation in fish, cancer from Polychlorinated Biphenyls (PCBs), and unhealthy microbial exposure during recreational activities such as swimming and fishing.

The city of Alcoa conducts a water intake test for E. coli coliforms at the point of collection prior to treatment. Results from this test can be used as a gauge of surface water quality at the intake point. However, the extent to which this indicator reflects conditions in the rest of the Little River and its tributaries is uncertain.

Ground water quality. The National Ground Water Association has determined that 47% of the U.S. population depends on ground water for its drinking water supply, and there are 15.4 million individual households served by private wells ([www.wellowner.org](http://www.wellowner.org)).

The General Accounting Office (GAO) reported in 1997 that up to 42% of private wells were contaminated with coliform bacteria at levels in excess of the federal maximum contaminant level (MCL), and indicated that excessive concentrations of coliform bacteria may indicate the presence of other disease-causing bacteria, such as E.coli. During 1999-2000, 41% of all

reported outbreaks associated with drinking water were from private wells (EPA, <http://www.epa.gov/indicators/roe/html/roeWaterDr.htm>).

Additionally, there are concerns with the mineral hardness of water leading to kidney stones, cancer from radon, and gastrointestinal problems from bacteria and other microorganisms. Thus, the subgroup's effort focused on domestic wells used to supply drinking water in Blount County.

The primary source of data identified for local domestic wells was that found in files stored at the County's Department of Environmental Health, regarding wells that had been tested for the presence of Coliform bacteria from the 1970's onwards. With money received from the Demonstration Site grant from the Centers for Disease Control and Prevention (CDC) and the National Association of County and City Health Officials (NACCHO), the subgroup contracted for the development of an electronic database, including mapping of the wells using GIS software.

**Indicators:** The following set of Water Quality Indicators was developed by members of the EHAT Water Quality Subgroup, as a way to describe and monitor the county's status regarding water quality.

1. *Annual number and percentage of failing septic systems.*

The County Department of Environmental Health estimates that 250-260 septic systems, or less than 1% of all septic systems, have a reported evidence of surface failure each year.

2. *Annual number and location of tested private wells that are contaminated.*

A total of 625 tested wells were compiled into the database; 256 had tested positive for the presence of Coliform bacteria, and 369 tested negative. Thus, of all tested wells, approximately 41% tested positive. It must be noted that this is the compilation of almost four decades of testing, so that changes in technology must be accounted for. See the breakdown by decade in Table 1 on the next page.

**Table 1. Summary of Results for Tested Wells in Database by Time Period.**

Time Period	Number of wells tested positive	Number wells tested negative	Percent wells tested positive
1970s	2	-	-
1980s	6	17	26.1
1990s	177	273	39.3
2000-04	71	79	47.3

The reasons for the seemingly increasing trend in the percentage of wells testing positive in more recent decades have not been investigated. Also, it must be noted that there were an additional ninety-seven (97) wells tested not included in the database, due to insufficient location information in the file. Of these, thirty-six (36) had tested positive and sixty-one (61) negative.

The use of private wells is not regulated by any level of government, so that water quality testing is not required nor provided on a regular basis. However, concerned residents may request that their wells be tested for the presence of bacteria, and they are, at this point, provided with limited educational materials on well maintenance and disinfection. The Water Quality Subgroup is not aware of any county-wide efforts to educate private well owners.

3. *Annual number of reported spill and discharge incidents.*

The subgroup gathered information on the occurrence of sanitary sewer overflows under the scope of this indicator. See Table 2 below for data on the cities of Alcoa and Maryville.

**Table 2. Number of Overflow Days per 100 miles of Sewer by Year and Location.**

Year	Number of days with overflow(s) per 100 miles of sewer*	
	Alcoa	Maryville
2000	22	12.5
2001	11	11.5
2002	24	11.5
2003	19	7.5
2004	13	10

\*Note: The City of Alcoa has approximately 100 miles of sewer, while the City of Maryville has approximately 200 miles.

The Tennessee Department of Environment and Conservation (TDEC) is the state agency with the authority to require corrective action when hazardous materials are spilled. The agency also monitors and permits hazardous materials. The state has no set standard for reporting, cleaning or testing for hazardous spills in or that enter into a water body. The EPA is required to respond if the quantity of the spill is 3,000 gallons or more. The state must be notified if there is a fish/aquatic life kill. Basically, the state would prefer a notification (phone call) of any amount of a hazardous spill into a water body, primarily in case it escalates into something larger, and also if citizens start complaining they will know what to expect. The responsible party (individual/company that released the material) has to make sure the area is properly contained, remediated, etc.

In the Phase II stormwater program, local governments require any person or company that spills/releases hazardous material into a water body or stormwater conveyance to provide a letter stating the location, cause, and responsive action for cleaning the site. This has been a rare occurrence so far in the short history of the local stormwater program.

The subgroup reviewed all of TDEC's hazardous spill files for Blount County from 2001-2005 and pulled the cases that required corrective action be taken. There were 28 cases in total. All actions taken were followed up and cases were closed. Additional data provided the by Blount County Fire Department, regarding spill incidents, showed these to be minimal in recent years. No particularly major incident was reported. To report an emergency spill or other environmental release, anyone may call the Tennessee Emergency Management Agency (TEMA) at 1-800-262-3300.

4. *Current number and location of advisories for (a) fish consumption and (b) bodily contact.*

No water bodies (rivers, lakes, streams) in Blount County have posted advisories for bodily contact, while two have posted advisories for consumption of certain species of fish due to PCBs. These are the Little River (below Rockford) and the Fort Loudon Reservoir.

5. *Current stream miles, location and type of impairment of impaired streams, as indicated by TDEC's 303(d) List.*

According to the 2004 303(d) List, there are over 25 different impacted water bodies (rivers, lakes, streams) in Blount County, totaling over 250 impaired stream miles. All of these streams are listed as Category 5 in the 303(d) List, indicating that one or more uses are not being met, and that Total Maximum Daily Loads (TMDL) are needed for the listed pollutants.

6. *Number of months in a year that E. coli levels exceed State recreational water quality criteria for E. coli at the Alcoa City water systems intake.*

**Table 3. Number of Months Exceeding State Recreational Water Quality Criteria at City of Alcoa's Water Intake by Year.**

<b>Year</b>	<b>Geometric mean greater than 126 cfu/100 ml</b>	<b>Daily maximum greater than 487 cfu/100 ml</b>
2003	0	7
2004	0	8
2005*	0*	5*

\* Data reflects the January-July 2005 period only.

The daily levels of E. coli coliform bacteria measured at the Alcoa City water system intake were obtained starting with 2003, and analyzed on a monthly basis with respect to State water quality criteria for recreational use (Rule 1200-4-3-.03). Table 3 above summarizes these criteria and associated results. Note that CFU stands for colony forming units. The monthly geometric means did not exceed state guidelines for the years reviewed. However, most months in a year had at least one day that exceeded the State daily maximum guideline.

**Standards:** The subgroup also developed standards related to each of the selected indicators. The purpose of these standards is to provide a benchmark for assessing where the community stands in relation to the issues identified, and to guide decisions on directions to take to address the issues. Table 4 on the next page specifies the standard for each of the indicators previously discussed.

**Table 4. Water Quality Standards by Related Indicator Subject.**

<b>Indicator Category</b>	<b>Related Standards</b>
1. Failing Septic Systems	a. All reported failing septic systems are fixed or abandoned b. Less than 1% of residential and commercial septic systems fail annually <sup>1</sup>
2. Tested Water Wells	a. Educational materials on well maintenance and safety distributed to 100% of drinking well owners (those not on utility water)
3. Spills/Overflows	a. No more than 10 overflow day per year per 100 miles of sewer <sup>2</sup>
4. # & location of advisories	a. No increase in number of advisories
5. Impaired streams	a. All stream miles tested b. No negative change in status of tested streams c. 100% new constructions follow best management practices for erosion control <sup>3</sup> d. 80% farmers follow best management practices for erosion control e. Removal of 1 stream from the impaired streams category on the 303(d) list every 3 years
6. Bacteria – Alcoa intake tests	a. Monthly geometric mean for E. coli: should never exceed State recreational water quality criteria (126 cfu/100 ml) b. Monthly maximum for E. coli: should not exceed State recreational water quality criteria (487 cfu/100 ml) for more than 3 months/yr

Notes:

1. Percent of septic systems failing calculated as follows: # of failed systems reported / total # of structures on septic.
2. The estimates for miles of sewer are 100 and 200 for Alcoa and Maryville, respectively.
3. Blount County regulates new constructions with an area of disturbance equal to or greater than 1/10 of an acre (~4,356 square feet); however, any new constructions should follow best management practices for erosion control.

**Summary Findings.** Safe drinking water in Blount County is provided by the City of Alcoa and the City of Maryville water treatment plants. Questions remain regarding the quality of surface water. A large number of streams within the county are impacted, raising human health concerns. Well water data suggests the need to educate private well owners on monitoring their water and taking appropriate action to remediate any problems found.

Early in its process, the Water Quality Subgroup selected ground water quality as its primary issue of concern. The decision was based on the relative abundance of quality data on drinking water and surface water in comparison with data on ground water quality. Additionally, a significant

portion of the county's population uses private wells as its source for drinking water. This primary focus led to the development of a well test database, containing information on wells that have been tested by the county's Department of Environmental Health.

The Subgroup also developed a set of water quality indicators and selected related standards, in order to describe the status of water quality in Blount County. Pertinent data was gathered, when available, and the most relevant findings are presented in this document under each indicator. Selected standards provide a benchmark to compare current status against, but also reflect realistic expectations for the future.

### **Water Quality – Recommended Actions**

#### 1. Failing Septic Systems

- Continue current Environmental Health Department protocol for repairing or closing failing septic systems.
- Provide financial assistance to low-income families for septic system repair.
- Follow current county standards for septic system lot size requirements in subdivision regulations.
- Form a County Wastewater Board for sewer utilities outside municipal systems, with monitoring and permitting responsibilities for on-site systems, e.g., Williamson County, TN.

#### 2. Pollution of Water Wells

- Identify residents who are not receiving utility water and provide them with educational materials on well maintenance and safety. Provide same information to those who apply for building permits for lots that will not be on utility water (include question in application). Five year cycle for distributing materials to all households with wells.
- Maintain well water database created by the EHAT/Water Quality Subgroup. Environmental Health Department to enter new test data periodically.

- Publish information on well maintenance in Daily Times and county website.
3. Sewer Overflows
- Continue sewer rehabilitation and maintenance program in Alcoa and Maryville, in accordance with state and EPA standards.
  - Follow state-approved (TDEC) response plan for sanitary sewer overflow incidents.
  - Submit yearly overflow data to the county director of environmental health (Gary Ferguson).
4. Water Contact Advisories
- Continue advisories for water bodies where contact and/or consumption of fish would be unhealthy.
5. Impaired Streams
- Add all stream miles in the county for testing under the 305 (b) report: The Status of Water Quality in Tennessee.
  - Fully implement Phase 2 of the county's Storm Water Program.
  - Encourage and provide incentives for adoption of best management practices for water quality in farming operations.
  - Provide homeowner education on water quality issues, e.g., Little River Watershed.
  - Target one stream in the county for an intensive mitigation program every three years.
6. Bacteria at Intake of Utility Water
- Submit yearly E. coli results from water system intake tests to the county director of environmental health.
7. General Water Quality
- Fully implement the Little River Watershed Restoration Initiative (The document can be accessed at <http://www.epa.gov/owow/watershed/initiative/2005proposals/05little.pdf> )

- Create, update and distribute an Annual Water Quality Report for Blount County, highlighting the status of water quality indicators developed by the EHAT
- The Water Quality Subgroup supports the recommendations of the Air Quality and Land Use Subgroup of the Environmental Health Action Team (EHAT), as they relate to the maintenance and improvement of water quality in Blount County.

## **RESPONSIBILITY FOR ACTION:**

The Environmental Health Action Team (EHAT) is a voluntary community effort. The EHAT does not have independent authority over adoption or implementation of the recommended actions listed in this report.

Responsibility for encouraging and facilitating continued community dialogue on the issues identified in this report will remain part of the EHAT voluntary responsibility. The EHAT may also continue as an active participant in championing certain issues and actions, but effective action of the magnitude indicated in the recommendations will require a much broader community effort.

Ultimate responsibility for many of the recommended actions that reference Cities and the County will lie with the Cities of Alcoa, Friendsville, Louisville, Maryville, Rockford and Townsend, and Blount County. However, not all actions necessarily indicate or require government response.

Responsibility for action to improve environmental health may spring from individuals in their day-to-day activities and lifestyle choices. Groups of interested people may form to champion certain issues and actions. Established civic groups may carry the message of environmental health to their members, and support community wide efforts. Business and industries may encourage employees to greater environmental health awareness, and may provide encouragement and financial support for their own and other's activities within the larger community. All of these non-governmental responses are already present in the community and should be continued and strengthened.

## **For Further Information.**

### *Land Use, Growth and Development*

The EHAT subgroup on land use, growth and development reviewed a new and growing body of research and literature on the linkages between growth or sprawl and public health. The following are selected references for those interested in further reading.

Visit the web site of the National Association of County and City Health Officials at <http://www.naccho.org/> and specifically to see information on the following:

Dialogue – a process used to facilitate EHAT activities – on the web at <http://www.naccho.org/topics/infrastructure/dialogue.cfm> .

Community design and land use – a good general resource – on the web at [http://www.naccho.org/topics/hpdp/land\\_use\\_planning/LUP\\_Toolbox.cfm](http://www.naccho.org/topics/hpdp/land_use_planning/LUP_Toolbox.cfm) .

Visit on the web a site that provides information on the Protocol for Assessing Community Excellence in Environmental Health (PACE EH) used by the EHAT, and download the PACE EH manual at <http://www.cdc.gov/nceh/ehs/PIB/PACE.htm> .

Find on the web a comprehensive report on “Understanding the Relationship Between Public Health and the Built Environment” by Dr. Reid Ewing and Dr. Richard Kreutzer, May 2006 for the LEED-ND Core Committee at <https://www.usgbc.org/ShowFile.aspx?DocumentID=1480> (note this is a large pdf file).

Urban Sprawl and Public Health – Designing, Planning, and Building for Healthy Communities, by Howard Frumkin, Lawrence Frank and Richard Jackson, published by Island Press, 2004. This is a good state of the art review of the field. Also search the web by author for much of the content.

On the web, do a search combining terms sprawl health to access a large and growing body of research and literature on some of the issues addressed by the Environmental Health Action Team.

## *Air Quality*

National Park Service/Great Smoky Mountains National Park  
[www2.nature.nps.gov/air/webcams/parks/grsmcam/grsmcam.cfm](http://www2.nature.nps.gov/air/webcams/parks/grsmcam/grsmcam.cfm)

East Tennessee Regional Clean Air Coalition (RCAC)  
[www.etnrcac.org](http://www.etnrcac.org)

Tennessee Department of Environment and Conservation (TDEC)  
[www.state.tn.us/environment/air.php](http://www.state.tn.us/environment/air.php)

Tennessee Valley Authority (TVA)  
[www.tva.gov/environment/air/index.htm](http://www.tva.gov/environment/air/index.htm)

US Environmental Protection Agency (EPA)  
[www.epa.gov/ebtpages/air.html](http://www.epa.gov/ebtpages/air.html)

## *Water Quality*

For general information on water quality see the EPA website at <http://www.epa.gov/ebtpages/water.html> and the State TDEC website at <http://www.state.tn.us/environment/water.shtml>

For information on the Little River and water quality programs see <http://www.epa.gov/owow/watershed/initiative/2005proposals/05little.pdf> the Little River Watershed Association website at <http://www.littleriverwatershed.org/website/> and watershed data at <http://www.blounttn.org/planning/1%20-%20IPSI%20report.pdf>

For information on water quality of the rivers and streams in Blount County and Tennessee see the State of Tennessee 303(d) and 305(b) reports at <http://www.state.tn.us/environment/wpc/publications/303d2006.pdf> and <http://www.state.tn.us/environment/wpc/publications/2006305b.pdf>

For bacteriological and fishing advisories for water bodies see <http://www.state.tn.us/environment/wpc/publications/advisories.pdf>