# Alleghany Highlands Cluster / Target Industry Analysis

**Prepared** for

# Alleghany Highlands Economic Development Corporation

This Report was funded in part by

The US Department of Commerce Economic Development Administration, The Alleghany Foundation, Alleghany Highlands Economic Development Corporation









Written and Compiled by

Roanoke Valley— Alleghany Regional Commission & Virginia Polytechnic Institute and State University, Office of Economic Development





# **Acknowledgements**



# This project was supported by a grant from the U.S. Economic Development Administration

This report was prepared by the Roanoke Valley – Alleghany Regional Commission under award 01-69-08531 from the Economic Development Administration, US Department of Commerce. The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of the Economic Development Administration, US Department of Commerce.

## Additional financial support was provided through

### The Alleghany Foundation

### The Alleghany Highlands Economic Development Corporation

Research was conducted by the

### Roanoke Valley – Alleghany Regional Commission

Virginia Tech Office of Economic Development

# **Executive Summary**

A number of economic development initiatives, studies, and plans have recently been written for the Alleghany Highlands region of Virginia, a region consisting of the County of Alleghany, the City of Covington, and the Towns of Clifton Forge, and Iron Gate. Recently, the region embarked on a strategic economic development planning initiative, the Alleghany Highlands Comprehensive Economic Development Strategy. This strategy recommended among other projects, the completion of an industry cluster analysis and some labor force analysis work.

An industry cluster analysis it was determined both by local stakeholders and a number of grant funding sources would assist in prioritizing the region's many planned economic development investments. The regional Comprehensive Economic Development Strategy Committee made pursuit of this analysis one of its annual priorities in FY 2007. The region sought project funding from the Alleghany Foundation and the US Economic Development Administration and both organizations graciously granted the region funding.

Following this executive summary, the report is presented in three sections. The first section of the Alleghany Highlands Target Cluster/Industry Analysis is a detailed analysis of industry clusters in the Alleghany Highlands and surrounding counties. The second section of the report is a detailed analysis of firm interactions, labor force concerns, and recommendations relevant to three specific clusters (Forest and Wood Products, Chemicals and Chemical-Based Products, and Apparel and Textiles) identified in the first section of this report as the most significant industry clusters present in the Alleghany Highlands economy presently and coincidentally the three clusters that have traditionally been at the core of economic activity for the region. Section I also presents data that suggests these clusters are all in decline either locally or nationally and are under threat of off-shoring. The third section is an Action Agenda listing a series of recommendations necessary to implement the findings of this report.

Section II of this study effort examines these three industry groupings in greater detail, documenting the characteristics and conditions of existing firms in the clusters, occupational structures and skills training characteristics, relevant educational and training facilities, and labor market intermediaries. From the research potential new value-added niches can be seen emerging in these sectors. Skillsets are also examined across the occupations in the three clusters. Advanced manufacturing training is identified as a key to unlocking potential in all three industry groupings.

The following are the recommendations of the report as set out in the Action Agenda in Section III.

## **Short-Term Recommendations**

Recommendations to Pursue within 1-2 Years

- Encourage regional investment in the Virginia's Western Highlands regional tourism initiative. The initial planning work behind the Virginia's Western Highlands brand and marketing plan are now concluding and a working group is now looking at local funding options to implement the regional tourism initiative. This regional tourism initiative should serve as a springboard for promotion of regional cottage industries in woods products, textiles, and other craft industries in addition to the outdoor recreational opportunities which will serve as the backbone of the brand.
- Develop artisan listings and networks through the Virginia's Western Highlands initiative and promote through a variety of media but with a priority on internet promotion.
- The Alleghany Highlands Economic Development Corporation should use specific data points in this report to build specific marketing materials relevant to the target clusters including cluster specific web pages. These specific and practical marketing materials will assist in marketing to key target industries.
- Convene a local working group through the auspices of the Alleghany Highlands Economic Development Corporation to help market and promote existing training programs in advanced manufacturing, entrepreneurial and business skills, and other relevant topics available in the region to area residents. This group should include representation from Dabney S. Lancaster Community College (DSLCC), the Jackson River Technical Center, and the region's school districts and should also assist these training institutions in securing state and local funds for additional training programs in advanced manufacturing and other relevant training opportunities. This group should consider application of the Wood LINKS program.
- Make application to the US Economic Development Administration Public Works and Economic Development program for the construction of infrastructure necessary to provide natural gas to the Alleghany Regional Commerce Center. The availability of natural gas is often crucial to the development of plastics industries as a chief industry target in the chemicals and chemical-based cluster.
- Continue planning activities and support related to the Regional Business Resource Center concept currently being studied. Entrepreneurial growth in value-added niches can unlock tremendous growth potential in the three primary industry clusters.

 Market the available labor force possessing qualifications relevant to employment in the professional and production sectors of the plastics industries in the chemical and chemical-based products cluster through regional economic development web sites and other regional marketing tools for economic development.

# Long-Term Recommendations

Recommendations that should be pursued in 3-5 years.

The following are longer term recommendations that should be pursued. Some of these activities require additional planning (both financial and physical). Relevant planning activities could be pursued in the shorter term.

- Consider establishment of a local campaign similar to 'Return to Roots' whereby qualified individuals seeking to return or to move to the Alleghany Highlands are identified as are relevant local employment opportunities. Highly qualified individuals who wish to return to the region or otherwise wish to move to the region are matched with relevant employment opportunities. Such a program will help reverse population decline, help to maintain the viability of local industry, and may also help to recruit firms to the region.
- Develop appropriate quality of life infrastructure possibly in conjunction with the Virginia's Western Highlands regional tourism initiative. Such infrastructure is both appealing to tourists and to potential residents. Such infrastructure is a necessity to attract recent graduates and professionals interested in technical and management positions available in the region.

v

# **Table of Contents**

Section I – Quantitative Cluster Analysis and Data

Background	I - 1
Regional Background Data	I - 2
The Industry Cluster Concept	I - 2
Methodology	
Regional Cluster Data	I-10
Target Cluster Typology	I-21
Appendix I-A	I-23

Section II – Targeting the Next Link in the "Value-Added" Chain: Industry Cluster and Labor Market Analysis for the Alleghany Highlands Region.

xecutive Summary II-iii
ist of Figures and TablesII-vii
orewordIl-xi
ntroductionII - 1
ndustry OverviewII - 6
Occupational Structure II-13
abor Market Intermediaries II-34
abor Market Analysis II-55
Yey Findings and Implications II-73
Appendices II-79
Section III – Action Agenda
Action Agenda III-1

# Background

The Alleghany Highlands is a region consisting of the County of Alleghany, the City of Covington, and the Towns of Clifton Forge and Iron Gate. In 2006, this region demonstrated a commitment to regional cooperation with the development and adoption of the Alleghany Highlands Comprehensive Economic Development Strategy, a five-year strategy recommending a number of projects to enhance the region's capacity for community and economic development.

The Alleghany Highlands region determined, through the Alleghany Highlands Comprehensive Economic Development Strategy process, that pursuit of the development of a Cluster/Target Industry Analysis should be one of its key priorities. Having identified the need for a strategic analysis of industry in the Highlands region, the region sought project funding from the Alleghany Foundation and the US Economic Development Administration and both organizations graciously granted the region funding.

The development of the strategy was lead by the Roanoke Valley – Alleghany Regional Commission, the organization which also facilitated development of the Alleghany Highlands Comprehensive Economic Development Strategy. The RVARC contracted with Virginia Tech to examine labor force and workforce issues and training needs of a select group of clusters identified as important and/or at-risk

The analysis is separated into the following parts:

Regional Background Data Discussion of the Theory and Literature related to Industry Clusters Methodology Utilized in Studying Industry Clusters in the Alleghany Highlands Presentation of Quantified Cluster Data

The second section of this report was produced by the Virginia Tech Office of Economic Development with input from the Roanoke Valley – Alleghany Regional Commission and from the Alleghany Highlands Economic Development Corporation and focuses on the clusters of Forest and Wood Products, Apparel and Textiles, and Chemicals and Chemical-Based Products and on regional labor force considerations applicable to each of the three clusters.

It is the intention that information in this report will inform future strategic economic development planning efforts both in the Alleghany Highlands but also in the larger Roanoke Valley – Alleghany Region.

# **Regional Background Data**

In conducting the Alleghany Highlands Cluster Target Industry Analysis, RVARC compiled a fair amount of demographic and economic data on the Alleghany Highlands area. The table below is a summary of the key economic and demographic data points for the immediate Alleghany Highlands region and for the larger study area region.

	Alleghany County	Bath County	Botetourt County	Craig County	Greenbrier County, WV
Population	12,926	5,048	30,496	5,091	34,453
Households	5,149	2,053	11,700	2,060	14,571
Median Household Income	38,545.00	35,013.00	48,731.00	37,314.00	26,927.00
Percent High School Diploma or Higher	77.53%	73.95%	81.42%	76.58%	73.43%
Percent Bachelor's Degree or Higher	13.57%	11.12%	19.62%	10.81%	13.64%
Median Age	41.1	41.8	40.7	39.6	41.6
Percent Unemployment	5.3*	4.5*	3.3*	4.6*	8.8*

	Highland County	Monroe County WV	Rockbridge County	City of Covington
Population	2,536	14,583	20,808	6,303
Households	1,131	5,447	8,486	2,835
Median Household Income	29,732.00	27,575.00	36,035.00	30,325.00
Percent High School Diploma or Higher	72.84%	73.7%	71.0%	71.4%
Percent Bachelor's Degree or Higher	13.22%	8.2%	18.7%	6.4%
Median Age	46.0	39.7	40.4	40.5
Percent Unemployment	5.8*	6.3*	4.3*	7.7*

Source: US Census Bureau Census 2000 except where marked by \*. \* Data Source US Department of Labor, January 2008.

# **The Industry Cluster Concept**

Industry Clusters are defined as geographic concentrations of competing, complementary, or interdependent firms and industries that transact business with each other and/or have similar requirements for talent, technology, and infrastructure. Firms within a cluster may either compete or cooperate with each other and may purchase goods and/or services from other members of the industry cluster. Clusters are usually formed around the presence of a large competitive firm, the presence of a large and influential research university, or around special resources or infrastructure availability that is unique to a certain geographic region.

Clusters are typically composed of a central industry or industries and any specialized support industries and/or institutions. An industry cluster may include certain regional institutions such as government, nonprofit organizations, and institutions of higher education (community colleges and four - year institutions of learning) where such institutions significantly impact the productivity or otherwise enable the operations of a given industry cluster.

It is important to note that clusters are dynamic entities that change as surrounding conditions or industries themselves adapt and change. Clusters can grow and contract. Most importantly, clusters are developed and clusters are maintained within regions.

Today, the economic developer is increasingly tasked with facilitating the process of growth for the clusters that are responsible for increasing the region's wealth by serving as exporting industries and by offering higher wages to its workforce.

Michael Porter of Harvard Business School has devoted much of his scholarly work to the concept of industry clusters. Porter argues that a region's competitive advantage is based on the ability of firms within that region to continually innovate, and that economic strength is directly related to the competitiveness of local industrial firms. According to Porter's Diamond Model of Competitive Advantage, innovation is driven by:

Factor Conditions - include specialized labor pools, infrastructure, and capital.

Demand Conditions – if customers in an economy exert sufficient demand, firms must constantly improve competitiveness through innovation, higher quality, etc.

Related Supporting Industries – spatial proximity with related industries facilitates the exchange of communication, information, and innovation. Related industries may also share in the development of business infrastructure that is shared by the larger cluster.

The Strategy, Structure, and Rivalry of Firms – direct competition with rival firms within the same cluster drives innovation.

In Porter's model, government plays an important role as a challenger and a facilitator by impacting various pieces of the 4-part Diamond of Competitive Advantage. Areas where local government is best situated to impact factor conditions include: investing in appropriate workforce development activities and programs, assisting firms in finding capital, and investing in appropriate public infrastructure projects.



# Methodology

Staff utilized both quantitative and qualitative research in completing this industry cluster analysis. The following section describes efforts of project staff to delineate a project study boundary, compile an industry cluster database application, define the region's industry clusters, and collect qualitative industry information.

## Study Area Boundary

One of the first tasks faced by the RVARC staff was to set a reasonable study area boundary. Staff determined early in the project that most industry data focused solely on Alleghany County and the City of Covington would be subject to data suppression requirements related to nondisclosure and confidentiality agreements with the Virginia Employment Commission. Furthermore, it was determined that it would be worthwhile to examine industry concentrations and interactions in neighboring localities for a variety of reasons.

Staff utilized the US Census Bureau's Longitudinal Employer Household Dynamics Onthe-Map program to visually portray the Alleghany Highlands region's labor and commute shed to help determine which counties might reasonably be included in the industry cluster analysis.

The resulting map has been included in the figure below:



1 to 12 workers per sq. ni.

- 19 to 55 workers per sq. ml.
- 56 to 110 workers per sq. mi.
- 119 to 236 workers per sq. ml.
   297 to 788 workers per sq. ml.

The study area was drawn to include industrial data from these adjacent areas from which significant numbers of individuals commute to work in the Highlands. Counties and cities included in the study area include the Counties of Alleghany, Bath, Botetourt, Craig, Greenbrier (WV), Highland, Monroe (WV) and Rockbridge; and the City of Covington.

# Data Source

Industry data was collected from the United States Bureau of Labor Statistics, the Virginia Employment Commission and the Labor Market Information of Workforce West Virginia. Data was requested for the fourth quarter of 1992, 2002 and 2006. Using this raw employer data from the Quarterly Census of Employment and Wages, staff compiled a database application whereby data could be queried.

The data obtained was raw, unsuppressed industry data. This data is superior to other sources of publicly available industry data since no industry data has been suppressed. There are no gaps in the data since a record is entered for each location of each business within the study area in the Quarterly Census of Employment and Wages. Furthermore, since the RVARC is a state data center affiliate, QCEW wage data was also made available for the study.

Potential errors in the data source obtained include potential problems with NAICS classification or more seriously potential problems with the SIC to NAICS conversion in the VEC employer database. Staff uncovered no evidence of any problems in the data set as it worked on the quantitative research phase of this project.

# **Cluster Definitions**

The database queries were written using cluster definitions developed by Purdue University, Indiana University, and the Strategic Development Group for their 2007 study, "Unlocking Rural Competitiveness: The Role of Regional Clusters." The Indiana research team had adapted a set of clusters from a previous study effort and added cluster component lists developed by Michael Porter and Edward Feser to formulate a list of clusters applicable to the every county in the United States. RVARC staff further adapted the list by adding the industry supersectors of retail trade, construction, and healthcare and social assistance.

It was determined that using an existing set of cluster definitions was advantageous for several reasons. First, it saves time modeling buyer/supplier relationships on the front end of a cluster project by building on decades of work performed by nationally prominent cluster experts. Second, the Indiana report and resulting website includes a plethora of useful data including national cluster behavior and cluster concentrations in every city and county across the United States (albeit subject to suppression error).

The following is a list of the industry clusters included in the study along with a brief textual description of included industry sectors. For a full list of component industry NAICS codes, please see pg. I-25 in Appendix I-A.

Advanced Materials – a cluster comprised of a series of related industries including clay and ceramics, rubber and plastics, specialized laminates and coatings, oil, gas, petrochemicals, synthetics, chemicals and chemical processes, composites, explosives, electronics, industrial mold manufacturing, machinery, gaskets, defense manufacturing and other related industries for example. There is significant overlap between advanced materials and several other manufacturing clusters. Location quotient measures for advanced materials show relative concentration in a variety of advanced manufacturing industries. Example firms include (or once included) AET Films, Virginia Forge, and Carris Plastics (all three firms are also members of other clusters).

Agribusiness, Food Processing, and Technology – a cluster comprised of agricultural activities as well as canning, food processing and manufacturing processes and also including wineries. The cluster also includes employment in agricultural equipment and food processing equipment manufacturing and farm suppliers. Rockbridge Vineyard and Southern States Cooperative are examples of larger firms located in this region.

Apparel and Textiles – a cluster comprised of industries involved in producing fabrics, yarns and threads (textile mills) and industries involved in producing finished textile products (textile product mills and apparel manufacturers). Kool Dri Rainwear and Bacova Guild are examples of larger firms within the study region.

Arts, Entertainment, Recreation and Visitor Industries – a cluster comprised of industries involved in tourism, entertainment, arts, and leisure including lodging establishments, camps, nature parks, museums, other attractions, sporting goods stores, sports teams, racetracks, sports promoters and agents, theater and dance companies, and independent artists. Wilderness Adventure at Eagle Landing, the Homestead and Cliftondale Country Club are example firms.

Biomedical and Biotechnical Life Sciences – a cluster comprised of industries engaged in the manufacturing of medicinal products, botanical products, pharmaceutical products, in-vitro diagnostic products, optical instruments and lenses, electromedical apparatus, laboratory instruments, surgical supplies and medical instruments, medical equipment, ophthalmic goods and industries involved in wholesale and retail of the aforementioned products. The cluster also includes medical centers and certain medical providers including a number of medical specialists. In the study region, this cluster is composed mainly of retail pharmacies and medical service providers and is not indicative of any concentration of the traditional notion of biomedical industry.

Business and Financial Services – a cluster comprised of industries engaged in banking, printing, data processing, web development, financing and credit, securities and investment banking, insurance, trusts and estates, property management, law, tax preparation, payroll, engineering, drafting, building inspection, technical design,

marketing, advertising, consulting, and public relations. Example firms include Sonabank and Highland Data Services.

Chemicals and Chemical Based Products – a cluster comprised of industries engaged in manufacturing of a variety of chemicals, fertilizers, pesticides, rubber, plastic, paints, adhesives, soaps, detergents, films, plastic packaging, foam, tires, and chemical and petrochemical wholesalers. Example firms included AET Films, Lear Corporation, and Parker Hannifin before their closures.

Computer and Electronic Product Manufacturing – a cluster comprised of industries engaged in manufacturing computer terminals, communications equipment, audio visual equipment, and other electronics components and equipment. There are very few firms in this cluster within the study region.

Construction – a cluster comprised of the entire construction NAICS supersector (all commercial, residential and highway construction firms). Example firms include Littleton & Associates and Hammond Mitchell Inc..

Defense and Security – a cluster comprised of a variety of industries that support the national defense infrastructure and/or provide security services at a local, regional, state, or national level. The cluster includes a broad range of industries including uranium mining, power and communication line manufacture and construction. explosives, hydraulics, small arms manufacturing, ammunition, surgical appliances and instruments, aircraft, missiles, ship and boat building, motor vehicles, computer development, computer facilities management, research programming, and investigation services, security guards, armored cars services, locksmiths, courts, police, parole and probation, fire protection, space research, and national security. The cluster is composed of both public and private firms and organizations. Examples in the study region are almost entirely involved in public sector law enforcement.

Education and Knowledge Creation – a cluster comprised of a variety of higher education institutions from community colleges to four year institutions and also including business and technical trade schools. Apprenticeship training, fine arts schools, exam preparation and tutoring, driving schools, and other miscellaneous instruction is also included. This cluster also includes news media and publishers and libraries. It should be noted that K-12 education is not included in this calculation. Example firms include Dabney S. Lancaster Community College and the Charles P Jones Library in Covington.

Electrical Equipment, Appliance, and Component Manufacturing – a cluster that includes industries involved in manufacturing lighting, fans, home appliances, electrical power equipment, motors, industrial controls and relays, batteries, fiber optics, other cables, wiring, and other electrical equipment.

Energy – a cluster comprised of oil, gas and coal industries (manufacturing, mining, transportation, and support activities), nuclear energy, renewable energy industries, utilities, some chemical manufacturing, some electrical manufacturing, engineering

services, laboratories, environmental consultants, research and development, and utilities regulation. Example firms include Dominion Power and Amerigas Propane.

Fabricated Metal Product Manufacturing – a cluster comprised of industries engaged in forging, metal stamping, cutlery and tools manufacturing, manufacturing of metal structural beams, metal plates, metal window and door frames, sheet metal, architectural metal, cans, metal tanks, machine shops, pipe and valve and a variety of other metal industries. Example firms include Creative Fabrications and JenFab.

Forest and Wood Products – a cluster comprised of manufacturing activities related to packaging, paperboard, office paper, sanitary paper, saw and wood cutting blades, household furniture, institutional furniture, architectural woodwork, caskets, plywood and lumber, and musical instruments. Book printing and woods products wholesalers are also included. Example firms include MeadWestvaco and Union Church Millworks.

Glass and Ceramics – a cluster comprised of industries involved in the manufacture of products related to china and porcelain applications in electronics, flooring, and plumbing, glass including pressed and blown glass, and minerals. Example firms include Cardinal Glass and Polycoat Inc in the Roanoke Valley to the south of the study area.

Government and Public Administration Sector – a cluster comprised of the entire spectrum of local, state, and federal government activities including education, fire, local government management, community and economic development, etc.

Healthcare and Social Assistance Sector – a cluster comprised of hospitals, primary care providers, specialists, residential care, nursing homes, nonprofit agencies engaged in social assistance and advocacy, etc. The main difference between this cluster and the Biomedical and Biotechnical Life Sciences is that this particular grouping does not include manufacturing of prosthetics or surgical apparatus, electrical equipment, and other associated industries. Example firms include Alleghany Regional Hospital and Highlands Home Health Inc.

Information Technology and Telecommunications – a cluster comprised of electrical equipment manufacturers and computer and electronics manufacturers but also including software programmers, audio and video reproduction, magnetic media manufacturing, software publishers, telecommunications, paging, cellular and wireless companies, computer systems design, research and development, and related regulatory agencies. Example firms include Verizon and NTelos.

Machinery Manufacturing – a cluster including industries involved in manufacturing machinery used in a variety of applications including plastics, construction, agriculture, textiles, food products, electronics, vending, drycleaning, air purification, photographic equipment, metal forming, metal cutting, pumps, welding, packaging, and other industrial applications. Gala Industries is an example firm..

Mining – a cluster comprised of a wide variety of mining and quarrying and related support activities. Example firms include Boxley and Blue Ridge Stone.

Motor Vehicle Manufacturing – a cluster comprised of industries involved in automobile manufacturing, glass, plastics, electrical components, and other industries that supply automotive manufacturers. Example firms include JTEKT Automotive and Metalsa Roanoke.

Primary Metals Manufacturing – a cluster comprised of iron and steel mills, manufacturers of iron and steel pipe, foundries and those that cast products out of metals. Roanoke Electric Steel and Walker Machine & Foundry are example firms in the Roanoke Valley south of the study area.

Printing and Publishing – a cluster comprised of industries involved in commercial printing, prepress services, newspaper publishing, periodical publishing, book publishing, miscellaneous publishing, radio, television, digital media, news syndicates, graphic design, marketing, advertising, public relations, marketing research, and commercial photography.

Retail Trade – a sector included to compare the region's retail employment to other regions. This cluster includes all retail NAICS codes.

Transportation and Logistics – a cluster comprised of industries engaged in air transportation, rail transportation, sea-borne freight, inland water transportation, truck freight, commuter rail, charter bus transportation, all ground passenger transportation, pipeline transportation of oil and gas, air traffic control, airport operations, cargo handling, couriers, local messengers, warehousing and storage, and packaging and labeling.

Transportation Equipment Manufacturing – a cluster similar to motor vehicle manufacturing but including a slightly different variety of firms related not only to motor vehicle manufacturing but also to aircraft/aerospace, rail equipment, boat building, motorcycle and bicycle and parts manufacturing, military and armored vehicles and all other miscellaneous transportation equipment manufacturing.

### Qualitative Research Phase

After staff utilized its custom regional cluster database constructed from the quantitative data from labor market information offices to calculate cluster concentration, changes in cluster concentration and growth relative to national trends, and average wages by cluster, staff classified each cluster into a simple typology (found on page 23) by which each cluster was labeled either at-risk, a potential missed opportunity, regional economic engines, and/or emerging.

Using initial quantitative data, project staff consulted the Alleghany Highlands Economic Development Corporation to identify clusters for further investigation. It was suggested that staff further investigate the clusters of forest and wood products, apparel and textiles, and chemicals and chemical based products based on the concentrations of those clusters in the Highlands region. Project staff was directed to investigate economic development policies and projects that would help transition the Highlands core industries to the new realities of a global economy.

Staff proceeded to schedule interviews with firms from each of the three clusters. When interviews were not possible due to scheduling conflicts, staff sent a simple survey form to the business. This information proved extremely valuable in understanding trends in the region's industries. This information was forwarded to the Virginia Tech Office of Economic Development research team who incorporated appropriate industry information into their labor survey instruments and into their own industry research.

# **Regional Cluster Data**

Quantitative economic data on industry clusters can be used for several purposes. Most importantly, quantified data can determine if a region appears to have a competitive advantage in a certain industry cluster area and if a given cluster can be considered a 'traded sector' or, in other words, if the cluster or industry grouping is exporting its products. Data can also provide information on trends within clusters and, given sufficient longitudinal data and data in a comparison economy, trends can be compared to determine if local and regional growth is occurring at a level significantly higher than at the national rate.

# Location Quotient

Several analytical tools are employed to determine the relative concentration of a given industry and industrial trends. The location quotient is perhaps one of the most important of the tools typically used to measure the concentration of an industry sector or cluster in a local economy relative to a larger reference economy.

Location quotient is calculated by finding the ratio of percentage employment in a local industry to the percentage of employment in the same industry or industry grouping in the state and/or national economy.

A location quotient value of 1.0 indicates that the local area or region has a comparable concentration of the given industry or industry grouping as in its reference economy. A location quotient value of 2.0 indicates the local area has twice (or 200%) the concentration of a certain industry than the reference economy. A location quotient of 0.8 would indicate that the local area has 80% of the concentration of a given industry as the reference economy.

The significance of the location quotient as a measure lies in its ability to determine if a region is specialized in a given industry and the relative extent of this specialization. Any location quotient value over 1 indicates that the region is somewhat more specialized than the national economy. Location quotient values greater than 1.0 indicate a theoretical basic economic activity in the sense that the local area must be producing more than it consumes and hence is exporting that good or service.

By that same token, location quotients of 1 or less than 1 indicate, at least in theory, that the activity is nonbasic in the sense that the local area or region is producing less of the good or service than it likely needs (as in the case of a location quotient value below 1.0) or the region is producing a sufficient amount of the product for its own purposes and consumption (as in the case of a location quotient value of only 1).

# Shift – Share Analysis

The location quotient is, however, a static measure, describing one point in time for a region. For a measure of change in an industry sector or cluster relative to a reference economy, shift-share analysis techniques are employed.

Shift-share analysis is a common technique for measuring changes in the structure of a local or regional economy in reference to the state or nation. The purpose of shift-share analysis is to better understand growth in a local industry and to better understand the extent to which general economic growth and the extent to which national trends in the same industry play a role. The following interrelated factors are considered in a shift-share analysis:

Economic growth both in the local region and in the overall nation must be considered since any growth or decline in a local industry is impacted to some degree by what is occurring in the broader national economy. Economic cycles of growth and retraction impact all industries. This is referred to as the 'share' portion of the shift-share analysis technique.

Proportional shift measures the relative change of an industry to the total of all industries. Proportional shift measures simply the comparative advantage one industry or industry grouping has when compared to the larger overall national economy. The proportional shift is an important measure because it helps the investigator understand how changes in certain industry groupings are shaping the regional economy. If, for instance, the largest cluster in a region is contracting, then the region will experience harder times economically regardless of whether the nation is in a recession or a growth cycle. If a cluster is growing faster than the overall national economy, then that cluster is likely to be an important source of growth in the future for that region.

Differential shift is perhaps the most widely used statistic from the shift-share analysis technique and can be summarized as the difference in the rate of growth or decline in a local cluster compared to the rate of growth or decline in the national economy. A positive differential shift value usually denotes that the industry cluster is growing more rapidly in the region than nationally, however positive values are also possible when a cluster is declining more slowly in the region than in the nation. Positive differential shift values usually denote a local advantage in a given industry grouping or cluster.

The following table shows the most recent location quotient data computed for the 25 clusters and sectors present in the study area<sup>1</sup>.

Figure 1: Employment and Location	n Quotient by Cluster	for the Study Area
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	Cluster	Location
Cluster	Employment	Quotient
Forest and Wood Products	2,715	4.24
Apparel and Textiles	1,708	4.11
Glass and Ceramics	359	3.30
Mining	209	3.11
Arts, Entertainment, Recreation and Visitor Industries	3,834	2.27
Motor Vehicle Manufacturing	1,339	2.20
Transportation equipment manufacturing subcluster	1,223	2.08
Construction Sector	1,903	2.00
Machinery manufacturing subcluster	542	1.37
Chemicals and Chemical-Based Products	1,044	1.32
Energy (Fossil and Renewable)	2,036	1.01
Retail Trade Sector	5,407	1.00
Transportation and Logistics	1,368	0.98
Healthcare and Social Assistance Sector	5,279	0.95
Government and Public Administration Sector	2,167	0.90
Defense and Security	2,038	0.88
Advanced Materials	1,549	0.85
Biomedical and Biotechnical Life Sciences	3,641	0.82
Fabricated metal product manufacturing subcluster	381	0.76
Computer and electronic product manufacturing subcluster	311	0.71
Education and Knowledge Creaton	718	0.45
Agribusiness, Food Processing and Technology	445	0.44
Printing and Publishing	305	0.37
Information Technology and Telecommunications	578	0.33
Business and Financial Services	805	0.21

<sup>&</sup>lt;sup>1</sup> There were 27 standard cluster definitions used in this study. After constructing the project database and running initial queries, it was discovered that two of the standard definitions taken from the Indiana study are entirely absent both in the Study Area and in Alleghany County and the City of Covington. Primary Metals Manufacturing and Electrical Equipment Manufacturing are not present in the Highlands or in the larger Study Area currently.

The healthcare and social assistance sector is the second largest cluster based on employment in the region (behind retail trade as a sector) but is actually slightly less concentrated than you might expect with a location quotient of .95. Forest and wood products and the apparel and textiles clusters have the strongest concentrations in the region. Glass and ceramics is strongly concentrated but is a very small cluster and in the study area actually consists mostly of firms working in concrete and brick applications. Many of the firms in the glass and ceramics cluster are also in chemicals and chemical based products as a part of a much larger industry cluster. The mining cluster is even smaller and consists mostly of stone quarrying activities in the region.

The figures suggest that arts, entertainment, recreation and visitors industries are of great importance to the study region. The study region has several camps (even one outdoor adventure camp), hotels, beds and breakfasts, golf courses and a major resort. Also of note here is the influence of Rockbridge County and the Natural Bridge area on the data for the study area. A great deal of the concentration in this cluster is in fact in Bath and Rockbridge Counties. The Alleghany Highlands (Alleghany County and City of Covington) is currently involved in a regional tourism project and has partnered with the Counties of Bath, Craig, and Highland. The initial planning effort is being led by the Roanoke Valley – Alleghany Regional Commission. Continued investment in regional tourism initiatives should be encouraged as should continued development of tourism amenities especially surrounding outdoor recreation and art and craft. As will be discussed later, strengthening the core clusters of wood products and textiles and encouraging high-end entrepreneurial activity in those clusters will serve to strengthen the visitor/tourism industry as well. Since another planning effort is ongoing and a marketing plan is being produced currently to help strengthen tourism marketing in the region, this report does not make recommendations to strengthen the tourism industry (except where other target industries are involved) as it would be a duplication of effort.

Notably, motor vehicle manufacturing, transportation equipment manufacturing, and machinery manufacturing are all more concentrated than you would expect. Motor vehicle manufacturing and transportation equipment manufacturing are twice as concentrated. The firms in these clusters are almost all located in southern Botetourt County which is closer to the Roanoke urbanized area and closer to connections with Interstate 81, a key north-south interstate highway and a major interstate facility for freight. Location advantages in southern Botetourt County that are not as strong in the rest of the study area may explain the strong concentration of those industries.

Chemicals and chemical based products is a cluster that includes a wide variety of industries including most of the companies included in glass and ceramics as well as plastics and rubber manufacturing as well as chemical supply and other chemical industries. This industry is of particular interest because it was, in late 2006 (when this data was collected), a reasonably large cluster in the region and one that was

approximately 36% more concentrated than one might expect based on national employment. Some of the largest employers in Alleghany County and the City of Covington were involved in the production of chemical and chemical based products. Recent closures however have almost totally eradicated cluster employment in Alleghany County and Covington. Furthermore, at least 400 jobs have been lost in the cluster within the study area including the losses in Covington and Alleghany County. This would reduce the location quotient to an estimated 0.82.<sup>2</sup>

It should be noted that the *Unlocking Rural Competitiveness* report found that the forest and wood products cluster and the apparel and textiles cluster tend to collocate in many regions. Indeed, apparel and textiles and forest and wood products clusters were found to have a correlation coefficient of .29 in the Indiana study. In many regions, the two clusters are associated with the manufacturing of furniture. The two clusters are not, however, related to furniture manufacturing activity in any large scale in the Alleghany Highlands. The wood products cluster seems to have grown largely out of the influence of MeadWestvaco and the availability of raw product associated with the national forest and tremendous forestall resources of the area. Textiles have grown both through the establishment of larger firms like BACOVA Guild, Base-X Shelters, and also entrepreneurial activity throughout the study area.

There is also a strong connection between wood products, textiles, and chemicals and chemical based products in terms of the occupational skills required for each cluster. Many production occupations within the three target industries share similar skills sets, thus allowing production workers an increased potential for mobility amongst the three industry sectors. Chemicals are often used in the production of certain wood products and in certain textile industries.

Figure 2 below shows percent change in location quotient by cluster for the years 1992-2006.

<sup>&</sup>lt;sup>2</sup> This number is estimated since more recent data is not available for the local area and the national economy. The revised location quotient is based on known, announced job losses.

Cluster	1992 LQ	2006 LQ	Percent Change
Transportation equipment manufacturing subcluster	0.31	2.08	581.27
Fabricated metal product manufacturing subcluster	0.18	0.76	320.82
Motor Vehicle Manufacturing	0.57	2.20	287.03
Machinery manufacturing subcluster	0.56	1.37	144.70
Defense and Security	0.63	0.88	39.68
Glass and Ceramics	2.43	3.30	35.55
Transportation and Logistics	0.78	0.98	26.18
Printing and Publishing	0.32	0.37	15.91
Forest and Wood Products	3.85	4.24	10.00
Business and Financial Services	0.20	0.21	7.41
Electrical equip, alliance and component manufacturing subcl	0.00	0.00	0.00
Retail Trade Sector	1.01	1.00	-0.86
Arts, Entertainment, Recreation and Visitor Industries	2.30	2.27	-1.14
Biomedical and Biotechnical Life Sciences	0.84	0.82	-1.93
Healthcare and Social Assistance Sector	1.00	0.95	-4.66
Government and Public Administration Sector	0.95	0.90	-5.03
Apparel and Textiles	4.35	4.11	-5.46
Agribusiness, Food Processing and Technology	0.47	0.44	-6.45
Advanced Materials	0.96	0.85	-11.32
Energy (Fossil and Renewable)	1.16	1.01	-12.97
Construction Sector	2.36	2.00	-15.17
Computer and electronic product manufacturing subcluster	0.87	0.71	-18.21
Education and Knowledge Creaton	0.55	0.45	-18.59
Chemicals and Chemical-Based Products	1.98	1.32	-33.42
Mining	4.76	3.11	-34.62
Information Technology and Telecommunications	0.51	0.33	-35.15
Primary metal Manufacturing Subcluster	0.13	0.00	-100.00

When looking at the change in location quotient between the two years, it is apparent that transportation equipment manufacturing, fabricated metal manufacturing, machinery manufacturing, and motor vehicle manufacturing have exhibited the strongest growth in the region.

A complete shift-share analysis can be found in Figure 3 below which is a stronger indicator of industry growth because it takes into account national industry growth and growth of the national and local economy as a background influence in the growth of the regional economic sectors.

#### Figure 3: Shift-Share Analysis for the Study Area

		Study Area		Nation					
Cluster	1992 Employment	2006 Employment	Rate of Growth or Decline	1992 Employment	2006 Employment	Rate of Growth or Decline	Share (Overall Growth)	Proportional Shift	Differential Shift
Advanced Materials	1,876	1,549	-0.17	5,816,771	5,430,908	-0.07	0.23	-0.40	-0.11
Agribusiness, Food Processing and Technology	463	445	-0.04	2,921,303	3,009,742	0.03	0.23	-0.27	-0.07
Apparel and Textiles	3,288	1,708	-0.48	2,257,526	1,245,247	-0.45	0.23	-0.71	-0.03
Arts, Entertainment, Recreation and Visitor Industries	3,061	3,834	0.25	3,979,046	5,047,052	0.27	0.23	0.02	-0.02
Biomedical and Biotechnical Life Sciences	2,934	3,641	0.24	10,474,110	13,305,622	0.27	0.23	0.01	-0.03
Business and Financial Services	530	805	0.52	8,091,293	11,752,455	0.45	0.23	0.29	0.07
Chemicals and Chemical-Based Products	1,679	1,044	-0.38	2,527,728	2,374,422	-0.06	0.23	-0.61	-0.32
Computer and electronic product manufacturing subcluster	488	311	-0.36	1,678,055	1,305,656	-0.22	0.23	-0.59	-0.14
Construction Sector	1,532	1,903	0.24	1,939,511	2,854,506	0.47	0.23	0.01	-0.23
Defense and Security	1,202	2,038	0.70	5,694,974	6,931,650	0.22	0.23	0.47	0.48
Education and Knowledge Creaton	694	718	0.03	3,747,529	4,801,665	0.28	0.23	-0.19	-0.25
Electrical equip, alliance and component manufacturing subcluster	0	0	0.00	569,213	430,854	-0.24	0.23	-0.23	0.24
Energy (Fossil and Renewable)	2,108	2,036	-0.03	5,421,703	6,012,314	0.11	0.23	-0.26	-0.14
Fabricated metal product manufacturing subcluster	86	381	3.43	1,421,375	1,510,224	0.06	0.23	3.20	3.37
Forest and Wood Products	2,750	2,715	-0.01	2,129,530	1,917,422	-0.10	0.23	-0.24	0.09
Glass and Ceramics	310	359	0.16	380,074	326,001	-0.14	0.23	-0.07	0.30
Government and Public Administration Sector	2,032	2,167	0.07	6,400,241	7,190,080	0.12	0.23	-0.16	-0.06
Healthcare and Social Assistance Sector	4,052	5,279	0.30	12,137,616	16,711,060	0.38	0.23	0.07	-0.07
Information Technology and Telecommunications	776	578	-0.26	4,551,854	5,311,572	0.17	0.23	-0.48	-0.42
Machinery manufacturing subcluster	246	542	1.20	1,311,505	1,185,514	-0.10	0.23	0.97	1.30
Mining	300	209	-0.30	188,243	201,135	0.07	0.23	-0.53	-0.37
Motor Vehicle Manufacturing	371	1,339	2.61	1,948,155	1,822,914	-0.06	0.23	2.38	2.67
Primary metal Manufacturing Subcluster	26	0	-1.00	590,053	444,219	-0.25	0.23	-1.23	-0.75
Printing and Publishing	256	305	0.19	2,393,734	2,444,264	0.02	0.23	-0.04	0.17
Retail Trade Sector	4,638	5,407	0.17	13,725,018	16,244,061	0.18	0.23	-0.06	-0.02
Transportation and Logistics	833	1,368	0.64	3,201,270	4,188,243	0.31	0.23	0.41	0.33
Transportation equipment manufacturing subcluster	208	1,223	4.88	2,033,519	1,762,009	-0.13	0.23	4.65	5.01
Total	36,473	44,713	0.23	108,868,246	133,833,839	0.23			

Figure 3 on the previous page shows that transportation equipment manufacturing and fabricated metal manufacturing have the highest differential shifts. It should be noted once more that differential shift is the difference in the rate of growth or decline in a local cluster compared to the rate of growth or decline in the national economy. Therefore, higher differential shifts suggest that a region's cluster groupings are growing at a rate much faster than could be expected based on national industrial growth.

As noted earlier, firms engaged in transportation equipment manufacturing are actually clustered mostly in the southern portion of the study area in close proximity to Interstate 81 and almost entirely absent from the Alleghany Highlands. The motor vehicle manufacturing cluster grouping, a very similar cluster grouping, shows similarly high growth but again the same industries make up this grouping and almost all are located in the southern extremes of the study area and in the Alleghany Highlands. Research conducted by the Virginia Tech Office of Economic Development suggests that the fabricated metal cluster is not a traded sector and that much of the activity in that sector represents business with large employers present in the area.

Still it is worthwhile to note that with the growing nature of the fabricated metal cluster, an emerging cluster may be on the horizon for the region since there is evidence of skilled talent involved in fabricating metals in the region.

It is also important to note that while employment in forest and wood products has declined in the Study Area overall over the 14 years covered by this data, the differential shift remains positive. This reflects the fact that while employment has declined in the study region, national declines have occurred at a faster rate. This suggests a longstanding regional advantage in this industry cluster.

Apparel and textiles, another cluster of noteworthy importance due to its overwhelming concentration in the study region, has a negative differential shift but one that reflects only a small difference in local versus national decline. Locally, 48% of the employment in the industry has been lost and nationally 45% of apparel and textiles employment has been lost. It is widely known that the textiles industry is in decline. There is still, however, opportunity for firms that specialize in innovation and/or niche markets and for firms that automate processes to the largest extent possible to grow.

Figure 4 below shows the average wage by industry cluster for the study area. The figure shows that the region's second largest cluster, healthcare and social assistance, only pays on average \$30,103 annually per employee, which is actually below the regional average wage of \$33,525 of this same period. Interestingly, the study area's mix of companies within the healthcare and social assistance cluster group has unusually large numbers of hospice care, assisted living facilities, healthcare supplies sales, and healthcare and social assistance related nonprofit organizations that tend to pay lower wages than hospitals, healthcare practitioners, and laboratories thus making the average wage unusually low.

Forest and wood products, one of the region's most significant clusters, has an average wage of \$50,891. Retail trade and the arts, entertainment, recreation and visitor industries have the lowest wages in the study area, far below the regional average.

CLUSTER	Employment	Average Wage
Advanced Materials	1,549	44,282
Agribusiness, Food Processing and Technology	445	30,137
Apparel and Textiles	1,708	31,595
Arts, Entertainment, Recreation and Visitor Industries	3,834	25,863
Biomedical and Biotechnical Life Sciences	3,641	26,287
Business and Financial Services	805	47,865
Chemicals and Chemical-Based Products	1,044	42,423
Computer and electronic product manufacturing subcluster	311	49,191
Construction Sector	1,903	35,895
Defense and Security	2,038	42,296
Education and Knowledge Creaton	718	33,042
Energy (Fossil and Renewable)	2,036	31,667
Fabricated metal product manufacturing subcluster	381	41,377
Forest and Wood Products	2,715	50,891
Glass and Ceramics	359	49,000
Government and Public Administration Sector	2,167	32,495
Healthcare and Social Assistance Sector	5,279	30,103
Information Technology and Telecommunications	578	53 <i>,</i> 059
Machinery manufacturing subcluster	542	46,222
Mining	209	38 <i>,</i> 468
Motor Vehicle Manufacturing	1,339	39,882
Printing and Publishing	305	23,296
Retail Trade Sector	5,407	19,297
Transportation and Logistics	1,368	38,455
Transportation equipment manufacturing subcluster	1,223	41,770

#### Figure 4: Average Wage by Cluster in the Study Area

### Cluster Typologies

It is useful in conducting cluster analysis to examine graphical representations of cluster growth, concentration, and size. Most reports of this type make use of bubble graphs to visually represent clusters in a study region. Such visual representations simplify

analysis and understanding of industry clusters in a local region by portraying three variables simultaneously.

Figure 5 below is an explanation of the axes and the four quadrants in a typical bubble graph and gives some examples of how various bubbles might be interpreted.



## Figure 5: Bubble Graph Explanation

The values on the X axis represent differential shift from the shift share analysis. Clusters represented by bubbles to the right of the graph are growing faster than their national counterparts. The Y axis represents location quotient. Those clusters represented by bubbles higher on the graph are more concentrated in the region than one might expect and those below the X axis (with negative values) are less concentrated than one might expect.



The bubble graph on the previous page demonstrates visually the size and concentration of the clusters of Forest and Wood Products, Apparel and Textiles, and Arts, Entertainment, Recreation, and Visitor Industries. The Healthcare and Social Assistance cluster grouping is very large indeed but its center is noticeably left of the vertical axis and below the horizontal access suggesting that the cluster is slightly less concentrated and that growth is not keeping pace with national growth trends.

The graph shows that growth in motor vehicle manufacturing and fabricated metal product manufacturing has been quite strong in the previous 14 years. As discussed previously, the majority of the growth in motor vehicle manufacturing has occurred in the southern extremities of the study area.

The following cluster typology helps logically sort the relevant clusters between various categories including clusters at-risk, potential missed opportunities, economic engines for the region, and emerging clusters.

	At-Risk Clusters (Large, but Growing Slowly or Declining)	Potential Missed Opportunities (Small, Growing Slowly, or Declining)	Economic Engine Clusters (Large and Fast Growing Clusters)	Emerging Clusters (Small, Fast Growing Clusters)
High Wage (> 21% above regional average)	<ul> <li>Advanced Materials</li> <li>Chemicals and Chemical-Based Products</li> <li>Forest and Wood Products</li> </ul>	- Information Technology and Telecom.	- Transportation Equip. Manufacturing	<ul> <li>Fabricated Metal Manuf.</li> <li>Business and Financial Services</li> <li>Machinery Manuf.</li> </ul>
Medium Wage (0- 20% above regional average)			- Motor Vehicle Manuf. - Transportation and Logistics	
Low Wage (below regional average)	- Apparel and Textiles	<ul> <li>Education and</li> <li>Knowledge Creation</li> <li>Agribusiness, Food</li> <li>Processing &amp; Tech.</li> </ul>	<ul> <li>Arts Ent., Recreation</li> <li>and Visitor Industries</li> <li>Healthcare and</li> <li>Social Assistance</li> </ul>	

#### Target Cluster Typology

As this typology demonstrates, the region's largest and most heavily concentrated clusters are largely at-risk, due to slow growth and/or the effects of foreign competition. These three clusters appear to be the largest traded clusters in the economy and thus the most important clusters currently contributing to the Alleghany Highlands regional economy.<sup>3</sup>

<sup>&</sup>lt;sup>3</sup> It is important to note that emerging value-added products is a way in which traditional manufacturing industries may achieve a competitive advantage in a global economy. The next section of the report delves into examining value-added processes that may already exist in traditional industries in the region and ways in which the region can build on value-added processes as an asset for economic development.

There are a few interesting growth clusters including those related to machinery, fabricated metals, transportation equipment and motor vehicle manufacturing but most of these firms are located just outside of the distressed Alleghany Highlands area in close proximity to Interstate 81. For the most part, the smaller growth clusters represent clusters that are likely not yet keeping pace with local demand and hence are not 'traded' clusters or export-oriented industries bringing new wealth to the region.

Appendix I-A

NAICS	CLUSTER	
212325	Advanced Materials	
322221	Advanced Materials	
322299	Advanced Materials	
324191	Advanced Materials	
325110	Advanced Materials	
325120	Advanced Materials	
325131	Advanced Materials	
325132	Advanced Materials	
325182	Advanced Materials	
325188	Advanced Materials	
325191	Advanced Materials	
325192	Advanced Materials	
325193	Advanced Materials	
325199	Advanced Materials	
325211	Advanced Materials	
325221	Advanced Materials	
325222	Advanced Materials	
325320	Advanced Materials	
325412	Advanced Materials	
325413	Advanced Materials	
325414	Advanced Materials	
325520	Advanced Materials	
325611	Advanced Materials	
325612	Advanced Materials	
325613	Advanced Materials	
325620	Advanced Materials	
325910	Advanced Materials	
325920	Advanced Materials	
325991	Advanced Materials	
325998	Advanced Materials	
326112	Advanced Materials	
326113	Advanced Materials	
326121	Advanced Materials	
326140	Advanced Materials	
326150	Advanced Materials	
326291	Advanced Materials	
326299	Advanced Materials	
327112	Advanced Materials	
327113	Advanced Materials	
327124	Advanced Materials	
327125	Advanced Materials	
327420	Advanced Materials	
327992	Advanced Materials	
327993	Advanced Materials	
331111	Advanced Materials	
331210	Advanced Materials	
331221	Advanced Materials	
331222	Advanced Materials	
331311	Advanced Materials	
331315	Advanced Materials	
331316	Advanced Materials	
331319	Advanced Materials	
331411	Advanced Materials	
331419	Advanced Materials	
331421	Advanced Materials	
331423	Advanced Materials	
331491	Advanced Materials	
331492	Advanced Materials	
331511	Advanced Materials	
331512	Advanced Materials	
331513	Advanced Materials	
331521	Advanced Materials	
331524	Advanced Materials	
331525	Advanced Materials	
331528	Advanced Materials	
332111	Advanced Materials	
332116	Advanced Materials	
33211/	Advanced Materials	
332322	Advanced Materials	
332618	Advanced Materials	
332710	Advanced Materials	
332812	Advanced Materials	
332813	Advanced Materials	
332911 332001	Advanced Materials	
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#### Description

Clay and ceramic and refractory minerals mining Rubber and plastics footwear manufacturing Coated and laminated packaging paper and plastics film manufacturing All other converted paper product manufacturing Petroleum lubricating oil and grease manufacturing Petrochemical manufacturing Industrial gas manufacturing Inorganic dye and pigment manufacturing Synthetic organic dye and pigment manufacturing Alkalies and chlorine manufacturing Carbon black manufacturing All other basic inorganic chemical manufacturing Gum and wood chemical manufacturing Cyclic crude and intermediate manufacturing Ethyl alcohol manufacturing All other basic organic chemical manufacturing Plastics material and resin manufacturing Synthetic rubber manufacturing Cellulosic organic fiber manufacturing Noncellulosic organic fiber manufacturing Pesticide and other ag. chemical manufacturing Pharmaceutical preparation manufacturing In-vitro diagnostic substance manufacturing Other biological product manufacturing Paint and coating manufacturing Adhesive manufacturing Soap and other detergent manufacturing Polish and other sanitation good manufacturing Surface active agent manufacturing Toilet preparation manufacturing Printing ink manufacturing Explosives manufacturing Custom compounding of purchased resins Photographic film and chemical manufacturing Other miscellaneous chemical product manufacturing Plastics packaging film and sheet (including laminated) manufacturing Unlaminated plastics film and sheet (except packaging) manufacturing Unlaminated plastics profile shape manufacturing Polystyrene foam product manufacturing Urethane and other foam product (except polystyrene) manufacturing All other plastics product manufacturing Rubber product manufacturing for mechanical use All other rubber product manufacturing Vitreous china, fine earthenware, and other pottery product manufacturing Porcelain electrical supply manufacturing Clay refractory manufacturing Nonclay refractory manufacturing Gypsum product manufacturing Abrasive product manufacturing Ground or treated mineral and earth manufacturing Mineral wool manufacturing Iron and steel mills Iron and steel pipe and tube manufacturing from purchased steel Rolled steel shape manufacturing Steel wire drawing Alumina refining Secondary smelting and alloying of aluminum Aluminum sheet, plate, and foil manufacturing Aluminum extruded product manufacturing Other aluminum rolling and drawing Primary smelting and refining of copper Primary nonferrous metal, except CU and AL Copper rolling, drawing, and extruding Copper wire, except mechanical, drawing Secondary processing of copper Nonferrous metal, except CU and AL, shaping Secondary processing of other nonferrous Iron foundries Steel investment foundries Steel foundries, except investment Aluminum die-casting foundries Nonferrous, except AL, die-casting foundries Aluminum foundries, except die-casting Copper foundries, except die-casting Other nonferrous foundries, exc. die-casting Iron and steel forging Metal stamping Powder metallurgy part manufacturing Plate work manufacturing Sheet metal work manufacturing Other fabricated wire product manufacturing Machine shops Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers Electroplating, plating, polishing, anodizing, and coloring Industrial valve manufacturing Ball and roller bearing manufacturing

332995 Advanced Materials Other ordnance and accessories manufacturing 332997 Advanced Materials Industrial pattern manufacturing 332999 Advanced Materials All other miscellaneous fabricated metal product manufacturing 333298 Advanced Materials All other industrial machinery manufacturing 333313 Advanced Materials Office machinery manufacturing 333319 Advanced Materials Other commercial and service industry machinery manufacturing 333511 Advanced Materials Industrial mold manufacturing 333513 Advanced Materials Machine tool (metal forming types) manufacturing Special die and tool, die set, jig, and fixture manufacturing 333514 Advanced Materials 333515 Advanced Materials Cutting tool and machine tool accessory manufacturing 333518 Advanced Materials Other metalworking machinery manufacturing 333912 Advanced Materials Air and gas compressor manufacturing 334119 Advanced Materials Other computer peripheral equipment manufacturing 334220 Advanced Materials Radio and television broadcasting and wireless communications equipment manufacturing 334290 Advanced Materials Other communications equipment manufacturing Advanced Materials Electron tube manufacturing 334411 334412 Advanced Materials Bare printed circuit board manufacturing 334413 Advanced Materials Semiconductors and related device manufacturing 334414 Advanced Materials Electronic capacitor manufacturing 334415 Advanced Materials Electronic resistor manufacturing 334416 Advanced Materials Electronic coils, transformers, and inductors 334417 Advanced Materials Electronic connector manufacturing 334418 Advanced Materials Printed circuit assembly manufacturing 334419 Advanced Materials Other electronic component manufacturing 334510 Advanced Materials Electromedical and electrotherapeutic apparatus manufacturing 334511 Advanced Materials Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing 334512 Advanced Materials Automatic environmental control manufacturing for residential, commercial, and appliance use 334513 Advanced Materials Instruments and related products manufacturing for measuring, displaying, and controlling industrial process varia 334514 Advanced Materials Totalizing fluid meter and counting device manufacturing Instrument manufacturing for measuring and testing electricity and electrical signals 334515 Advanced Materials Irradiation apparatus manufacturing 334517 Advanced Materials Other measuring and controlling device manufacturing 334519 Advanced Materials 335110 Advanced Materials Electric lamp bulb and part manufacturing 335314 Advanced Materials Relay and industrial control manufacturing 335921 Advanced Materials Fiber optic cable manufacturing Current-carrying wiring device manufacturing 335931 Advanced Materials Advanced Materials 336322 Other motor vehicle electrical and electronic equipment manufacturing 336399 Advanced Materials All other motor vehicle parts manufacturing 336419 Advanced Materials Other guided missile and space vehicle parts and auxiliary equipment manufacturing Advanced Materials Laboratory apparatus and furniture manufacturing 339111 Surgical and medical instrument manufacturing 339112 Advanced Materials Advanced Materials 339113 Surgical appliance and supplies manufacturing Advanced Materials 339991 Gasket, packing, and sealing device manufacturing 541380 Advanced Materials **Testing laboratories** 541710 Advanced Materials Research and development in the physical, engineering, and life sciences 541720 Advanced Materials Research and development in the social sciences and humanities 111110 Agribusiness, Food Processing and Technology Sovbean farming Agribusiness, Food Processing and Technology Oilseed, except soybean, farming 111120 111130 Agribusiness, Food Processing and Technology Dry pea and bean farming 111140 Agribusiness, Food Processing and Technology Wheat farming 111150 Agribusiness, Food Processing and Technology Corn farming Agribusiness, Food Processing and Technology 111160 Rice farming 111191 Agribusiness, Food Processing and Technology Oilseed and grain combination farming Agribusiness, Food Processing and Technology 111199 All other grain farming 111211 Agribusiness, Food Processing and Technology Potato farming 111219 Agribusiness, Food Processing and Technology Other vegetable and melon farming Orange groves 111310 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology Citrus, except orange, groves 111320 Agribusiness, Food Processing and Technology 111331 Apple orchards Agribusiness, Food Processing and Technology 111332 Grape vineyards 111333 Agribusiness, Food Processing and Technology Strawberry farming Agribusiness, Food Processing and Technology 111334 Berry, except strawberry, farming Agribusiness, Food Processing and Technology Tree nut farming 111335 111336 Agribusiness, Food Processing and Technology Fruit and tree nut combination farming 111339 Agribusiness, Food Processing and Technology Other noncitrus fruit farming 111411 Agribusiness, Food Processing and Technology Mushroom production 111419 Agribusiness, Food Processing and Technology Other food crops grown under cover 111421 Agribusiness, Food Processing and Technology Nursery and tree production 111422 Agribusiness, Food Processing and Technology Floriculture production Agribusiness, Food Processing and Technology 111910 Tobacco farming 111920 Agribusiness, Food Processing and Technology Cotton farming Agribusiness, Food Processing and Technology Sugarcane farming 111930 Agribusiness, Food Processing and Technology 111940 Hay farming Agribusiness, Food Processing and Technology Sugar beet farming 111991 111992 Agribusiness, Food Processing and Technology Peanut farming 111998 Agribusiness, Food Processing and Technology All other miscellaneous crop farming 112111 Agribusiness, Food Processing and Technology Beef cattle ranching and farming 112112 Agribusiness, Food Processing and Technology Cattle feedlots 112120 Agribusiness, Food Processing and Technology Dairy cattle and milk production 112210 Agribusiness, Food Processing and Technology Hog and pig farming Chicken egg production 112310 Agribusiness, Food Processing and Technology 112320 Agribusiness, Food Processing and Technology Broilers and meat type chicken production Agribusiness, Food Processing and Technology Turkey production 112330 Poultry hatcheries 112340 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology Other poultry production 112390 Agribusiness, Food Processing and Technology 112410 Sheep farming 112420 Agribusiness, Food Processing and Technology Goat farming

112511 Agribusiness, Food Processing and Technology 112512 Agribusiness, Food Processing and Technology 112519 Agribusiness, Food Processing and Technology 112910 Agribusiness, Food Processing and Technology 112920 Agribusiness, Food Processing and Technology 112930 Agribusiness, Food Processing and Technology 112990 Agribusiness, Food Processing and Technology 115111 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 115112 Agribusiness, Food Processing and Technology 115113 Agribusiness, Food Processing and Technology 115114 115115 Agribusiness, Food Processing and Technology 115116 Agribusiness, Food Processing and Technology 311111 Agribusiness, Food Processing and Technology 311119 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 311211 311212 Agribusiness, Food Processing and Technology 311213 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 311221 Agribusiness, Food Processing and Technology 311222 Agribusiness, Food Processing and Technology 311223 311225 Agribusiness, Food Processing and Technology 311230 Agribusiness, Food Processing and Technology 311311 Agribusiness, Food Processing and Technology 311312 Agribusiness, Food Processing and Technology 311313 Agribusiness, Food Processing and Technology 311320 Agribusiness, Food Processing and Technology 311330 Agribusiness, Food Processing and Technology 311340 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 311411 311412 Agribusiness, Food Processing and Technology 311421 Agribusiness, Food Processing and Technology 311422 Agribusiness, Food Processing and Technology 311423 Agribusiness, Food Processing and Technology 311511 Agribusiness, Food Processing and Technology 311512 Agribusiness, Food Processing and Technology 311513 Agribusiness, Food Processing and Technology 311514 Agribusiness, Food Processing and Technology 311520 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 311611 311612 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 311613 311615 Agribusiness, Food Processing and Technology 311811 Agribusiness, Food Processing and Technology 311812 Agribusiness, Food Processing and Technology 311813 Agribusiness, Food Processing and Technology 311821 Agribusiness, Food Processing and Technology 311822 Agribusiness, Food Processing and Technology 311823 Agribusiness, Food Processing and Technology 311830 Agribusiness, Food Processing and Technology 311911 Agribusiness, Food Processing and Technology 311919 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 311920 311930 Agribusiness, Food Processing and Technology 311941 Agribusiness, Food Processing and Technology 311942 Agribusiness, Food Processing and Technology 311991 Agribusiness, Food Processing and Technology 311999 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 312111 312112 Agribusiness, Food Processing and Technology 312113 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 312120 312130 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 312140 312210 Agribusiness, Food Processing and Technology 312221 Agribusiness, Food Processing and Technology 312229 Agribusiness, Food Processing and Technology 325311 Agribusiness, Food Processing and Technology 325312 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 325314 325320 Agribusiness, Food Processing and Technology Agribusiness, Food Processing and Technology 333111 Agribusiness, Food Processing and Technology 333112 Agribusiness, Food Processing and Technology 333294 423820 Agribusiness, Food Processing and Technology 424510 Agribusiness, Food Processing and Technology 424520 Agribusiness, Food Processing and Technology 424590 Agribusiness, Food Processing and Technology 424910 Agribusiness, Food Processing and Technology Apparel and Textiles 313111 313112 Apparel and Textiles 313113 Apparel and Textiles Apparel and Textiles 313210 313221 Apparel and Textiles 313222 Apparel and Textiles 313230 Apparel and Textiles 313241 Apparel and Textiles

Finfish farming and fish hatcheries Shellfish farming Other animal aquaculture Apiculture Horses and other equine production Fur-bearing animal and rabbit production All other animal production Cotton ainnina Soil preparation, planting, and cultivating Crop harvesting, primarily by machine Other postharvest crop activities Farm labor contractors and crew leaders Farm management services Dog and cat food manufacturing Other animal food manufacturing Flour milling Rice milling Malt manufacturing Wet corn milling Soybean processing Other oilseed processing Fats and oils refining and blending Breakfast cereal manufacturing Sugarcane mills Cane sugar refining Beet sugar manufacturing Confectionery manufacturing from cacao beans Confectionery manufacturing from purchased chocolate Nonchocolate confectionery manufacturing Frozen fruit and vegetable manufacturing Frozen specialty food manufacturing Fruit and vegetable canning Specialty canning Dried and dehydrated food manufacturing Fluid milk manufacturing Creamery butter manufacturing Cheese manufacturing Dry, condensed, and evaporated dairy products Ice cream and frozen dessert manufacturing Animal, except poultry, slaughtering Meat processed from carcasses Rendering and meat byproduct processing Poultry processing Retail bakeries Commercial bakeries Frozen cakes and other pastries manufacturing Cookie and cracker manufacturing Mixes and dough made from purchased flour Dry pasta manufacturing Tortilla manufacturing Roasted nuts and peanut butter manufacturing Other snack food manufacturing Coffee and tea manufacturing Flavoring syrup and concentrate manufacturing Mayonnaise, dressing, and sauce manufacturing Spice and extract manufacturing Perishable prepared food manufacturing All other miscellaneous food manufacturing Soft drink manufacturing Bottled water manufacturing Ice manufacturing Breweries Wineries Distilleries Tobacco stemming and redrying Cigarette manufacturing Other tobacco product manufacturing Nitrogenous fertilizer manufacturing Phosphatic fertilizer manufacturing Fertilizer, mixing only, manufacturing Pesticide and other ag. chemical manufacturing Farm machinery and equipment manufacturing Lawn and garden equipment manufacturing Food product machinery manufacturing Farm and garden machinery and equipment merchant wholesalers Grain and field bean whsle Livestock whsle Other farm product raw material merchant wholesalers Farm supplies merchant wholesalers Yarn spinning mills Yarn texturizing, throwing, and twisting mills Thread mills Broadwoven fabric mills Narrow fabric mills Schiffli machine embroidery Nonwoven fabric mills

Weft knit fabric mills
313249	Annarel and Textiles	Other knit fabric and lace mills
313311	Apparel and Textiles	Broadwoven fabric finishing mills
313312	Apparel and Textiles	Textile and fabric finishing (except broadwoven fabric) mills
313320	Apparel and Textiles	Fabric coating mills
314110	Apparel and Textiles	Carpet and rug mills
314121	Apparel and Textiles	Curtain and dranery mills
314129	Apparel and Textiles	Other household textile product mills
314911	Apparel and Textiles	Textile bag mills
314912	Apparel and Textiles	Canvas and related product mills
314991	Apparel and Textiles	Rone cordage and twine mills
314992	Apparel and Textiles	Tire cord and tire fabric mills
314999	Apparel and Textiles	All other miscellaneous textile product mills
315111	Apparel and Textiles	Sheer hosiery mills
315119	Apparel and Textiles	Other hosiery and sock mills
315191	Apparel and Textiles	Outerwear knitting mills
315192	Apparel and Textiles	Underwear and nightwear knitting mills
315211	Apparel and Textiles	Mon's and hove out and sow appared contractors
010211		
315212	Apparel and Textiles	Women s, girls, and infants cut and sew apparel contractors
315221	Apparel and Textiles	Men's and boys cut and sew underwear and nightwear manufacturing
315222	Apparel and Textiles	Men's and boys' cut and sew suit, coat, and overcoat manufacturing
315223	Apparel and Textiles	Men's and hove cut and sew shirt (except work shirt) manufacturing
215224	Apparel and Textiles	Men's and boys cut and sew shirt (except work shirt) manufacturing
315224	Apparei anu Textiles	ivien's and boys cut and sew trouser, slack, and jean manufacturing
315225	Apparel and Textiles	Mens and boys cut and sew work clothing manufacturing
315228	Apparel and Textiles	Men's and boys cut and sew other outerwear manufacturing
315231	Apparel and Textiles	Women's and girls cut and sew lingerie, loungewear, and nightwear manufacturing
315232	Apparel and Textiles	Women's and girls cut and sew blouse and shirt manufacturing
315000		Wemen's and site sut and sour drass and shift manufacturing
010233		women's and girls cut and sew dress manufacturing
315234	Apparel and Textiles	Women s and girls cut and sew suit, coat, tailored jacket, and skirt manufacturing
315239	Apparel and Textiles	Women's and girls cut and sew other outerwear manufacturing
315291	Apparel and Textiles	Infants' cut and sew apparel manufacturing
315292	Apparel and Textiles	Fur and leather apparel manufacturing
315299	Apparel and Textiles	All other cut and sew apparel manufacturing
315991	Apparel and Textiles	Hat cap and millinery manufacturing
315992	Apparel and Textiles	Glove and mitten manufacturing
315993	Apparel and Textiles	Mon's and hove nockwear manufacturing
315000	Apparel and Textiles	Other apparel accessories and other apparel manufacturing
202112	Apparel and Textiles	Commercial accessories and other apparer manufacturing
227010	Apparel and Textiles	Abrasive product monufacturing
2251210	Apparel and Textiles	Inorgania dvo and nigmont monufacturing
325131	Apparel and Textiles	Sunthetic organic dvo and nigment manufacturing
320132	Apparel and Textiles	Synthetic organic dye and pigment manufacturing
325221	Apparel and Textiles	Noncollulosic organic fiber manufacturing
323222	Apparel and Textiles	Mottress manufacturing
227121	Apparel and Textiles	Inducess manufacturing
330003	Apparel and Textiles	Eastener, butten, needle, and nin manufacturing
121210	Apparel and Textiles	Piece goods, potions, and other dry goods morehant wholesalers
424310	Apparel and Textiles	Piece goods, notions, and other dry goods merchant wholesalers
424320	Apparel and Textiles	Men's and boys clothing and furnishings merchant wholesalers
424330	Apparel and Textiles	Women's, children's, and infants clothing and accessories merchant wholesalers
541430	Apparel and Textiles	Graphic design services
541490	Apparel and Textiles	Other specialized design services
541840	Apparel and Textiles	Media representatives
541850	Apparel and Textiles	Display advertising
541860	Apparel and Textiles	Direct mail advertising
541870	Apparel and Textiles	Advertising material distribution services
541890	Apparel and Textiles	Other services related to advertising
339920	Arts, Entertainment, Recreation and Visitor Industries	Sporting and athletic goods manufacturing
339931	Arts, Entertainment, Recreation and Visitor Industries	Doll and stuffed toy manufacturing
339932	Arts, Entertainment, Recreation and Visitor Industries	Game, toy, and children's vehicle manufacturing
423910	Arts, Entertainment, Recreation and Visitor Industries	Sporting goods merchant wholesalers
487110	Arts, Entertainment, Recreation and Visitor Industries	Scenic and sightseeing transportation, land
487210	Arts, Entertainment, Recreation and Visitor Industries	Scenic and sightseeing transportation, water
487990	Arts, Entertainment, Recreation and Visitor Industries	Scenic and sightseeing transportation, other
512110	Arts, Entertainment, Recreation and Visitor Industries	Motion picture and video production
512120	Arts, Entertainment, Recreation and Visitor Industries	Motion picture and video distribution
512131	Arts, Entertainment, Recreation and Visitor Industries	Motion picture theaters, except drive-ins
512132	Arts, Entertainment, Recreation and Visitor Industries	Drive-in motion picture theaters
512191	Arts, Entertainment, Recreation and Visitor Industries	Teleproduction and postproduction services
512199	Arts, Entertainment, Recreation and Visitor Industries	Other motion picture and video industries
512210	Arts, Entertainment, Recreation and Visitor Industries	Record production
512220	Arts, Entertainment, Recreation and Visitor Industries	Integrated record production and distribution
512230	Arts, Entertainment, Recreation and Visitor Industries	Music publishers
512240	Arts, Entertainment, Recreation and Visitor Industries	Sound recording studios
512290	Arts, Entertainment, Recreation and Visitor Industries	Other sound recording industries
515111	Arts, Entertainment, Recreation and Visitor Industries	Radio networks
515112	Arts, Entertainment, Recreation and Visitor Industries	Radio stations
515120	Arts, Entertainment, Recreation and Visitor Industries	Television broadcasting
515210	Arts, Entertainment, Recreation and Visitor Industries	Cable and other subscription programming
561510	Arts, Entertainment, Recreation and Visitor Industries	Travel agencies
561520	Arts, Entertainment, Recreation and Visitor Industries	Tour operators
561591	Arts, Entertainment, Recreation and Visitor Industries	Convention and visitors bureaus
561599	Arts, Entertainment, Recreation and Visitor Industries	All other travel arrangement and reservation services
/11110	Arts, Entertainment, Recreation and Visitor Industries	I heater companies and dinner theaters
711120	Arts, Entertainment, Recreation and Visitor Industries	Dance companies
711130	Arts. Entertainment. Recreation and Visitor Industries	iviusical groups and artists

711190 Arts, Entertainment, Recreation and Visitor Industries Other performing arts companies 711211 Arts, Entertainment, Recreation and Visitor Industries Sports teams and clubs 711212 Arts, Entertainment, Recreation and Visitor Industries Racetracks 711219 Arts, Entertainment, Recreation and Visitor Industries Other spectator sports 711310 Arts, Entertainment, Recreation and Visitor Industries Promoters with facilities 711320 Arts, Entertainment, Recreation and Visitor Industries Promoters without facilities 711410 Arts, Entertainment, Recreation and Visitor Industries Agents and managers for public figures 711510 Arts, Entertainment, Recreation and Visitor Industries Independent artists, writers, and performers Arts, Entertainment, Recreation and Visitor Industries Museums 712110 Arts, Entertainment, Recreation and Visitor Industries Historical sites 712120 Arts. Entertainment, Recreation and Visitor Industries Zoos and botanical gardens 712130 Arts, Entertainment, Recreation and Visitor Industries Nature parks and other similar institutions 712190 713110 Arts, Entertainment, Recreation and Visitor Industries Amusement and theme parks 713120 Arts, Entertainment, Recreation and Visitor Industries Amusement arcades Arts, Entertainment, Recreation and Visitor Industries Casinos, except casino hotels 713210 Arts, Entertainment, Recreation and Visitor Industries Other gambling industries 713290 713910 Arts, Entertainment, Recreation and Visitor Industries Golf courses and country clubs 713920 Arts, Entertainment, Recreation and Visitor Industries Skiing facilities Arts, Entertainment, Recreation and Visitor Industries Marinas 713930 713940 Arts, Entertainment, Recreation and Visitor Industries Fitness and recreational sports centers 713950 Arts, Entertainment, Recreation and Visitor Industries Bowling centers 713990 Arts, Entertainment, Recreation and Visitor Industries All other amusement and recreation industries 721110 Arts, Entertainment, Recreation and Visitor Industries Hotels and motels, except casino hotels 721120 Arts, Entertainment, Recreation and Visitor Industries Casino hotels 721191 Arts, Entertainment, Recreation and Visitor Industries Bed-and-breakfast inns 721199 Arts, Entertainment, Recreation and Visitor Industries All other traveler accommodation 721211 Arts, Entertainment, Recreation and Visitor Industries RV parks and campgrounds 721214 Arts, Entertainment, Recreation and Visitor Industries Recreational and vacation camps **Biomedical and Biotechnical Life Sciences** Medicinal and botanical manufacturing 325411 Biomedical and Biotechnical Life Sciences 325412 Pharmaceutical preparation manufacturing Biomedical and Biotechnical Life Sciences 325413 In-vitro diagnostic substance manufacturing 325414 Biomedical and Biotechnical Life Sciences Other biological product manufacturing 333314 **Biomedical and Biotechnical Life Sciences** Optical instrument and lens manufacturing 334510 **Biomedical and Biotechnical Life Sciences** Electromedical apparatus manufacturing 334516 Biomedical and Biotechnical Life Sciences Analytical laboratory instrument manufacturing **Biomedical and Biotechnical Life Sciences** Irradiation apparatus manufacturing 334517 **Biomedical and Biotechnical Life Sciences** Laboratory apparatus and furniture manufacturing 339111 Biomedical and Biotechnical Life Sciences Surgical and medical instrument manufacturing 339112 339113 **Biomedical and Biotechnical Life Sciences** Surgical appliance and supplies manufacturing Biomedical and Biotechnical Life Sciences Dental equipment and supplies manufacturing 339114 Biomedical and Biotechnical Life Sciences 339115 Ophthalmic goods manufacturing Biomedical and Biotechnical Life Sciences 339116 Dental laboratories 423450 Biomedical and Biotechnical Life Sciences Medical equipment merchant wholesalers 423460 Biomedical and Biotechnical Life Sciences Ophthalmic goods merchant wholesalers 446110 Biomedical and Biotechnical Life Sciences Pharmacies and drug stores 446120 **Biomedical and Biotechnical Life Sciences** Cosmetic and beauty supply stores Biomedical and Biotechnical Life Sciences Optical goods stores 446130 **Biomedical and Biotechnical Life Sciences** Food, health, supplement stores 446191 446199 Biomedical and Biotechnical Life Sciences All other health and personal care stores 541710 Biomedical and Biotechnical Life Sciences R&D in physical, engineering and life sciences 541720 **Biomedical and Biotechnical Life Sciences** R&D in social sciences and humanities Hazardous waste treatment and disposal Biomedical and Biotechnical Life Sciences 562211 621410 Biomedical and Biotechnical Life Sciences Family planning centers Biomedical and Biotechnical Life Sciences Outpatient mental health centers 621420 621491 Biomedical and Biotechnical Life Sciences HMO medical centers 621492 Biomedical and Biotechnical Life Sciences Kidney dialysis centers 621493 **Biomedical and Biotechnical Life Sciences** Freestanding emergency medical centers Biomedical and Biotechnical Life Sciences All other outpatient care centers 621498 **Biomedical and Biotechnical Life Sciences** 621511 Medical laboratories Biomedical and Biotechnical Life Sciences 621512 Diagnostic imaging centers 621610 **Biomedical and Biotechnical Life Sciences** Home health care services 621910 Biomedical and Biotechnical Life Sciences Ambulance services Blood and organ banks 621991 Biomedical and Biotechnical Life Sciences Biomedical and Biotechnical Life Sciences 621999 Miscellaneous ambulatory health care services 622110 Biomedical and Biotechnical Life Sciences General medical and surgical hospitals 622210 Biomedical and Biotechnical Life Sciences Psychiatric and substance abuse hospitals 622310 **Biomedical and Biotechnical Life Sciences** Other hospitals 623110 Biomedical and Biotechnical Life Sciences Nursing care facilities Biomedical and Biotechnical Life Sciences Residential mental retardation facilities 623210 623220 **Biomedical and Biotechnical Life Sciences** Residential mental and substance abuse care 623311 **Biomedical and Biotechnical Life Sciences** Continuing care retirement communities Biomedical and Biotechnical Life Sciences Homes for the elderly 623312 623990 **Biomedical and Biotechnical Life Sciences** Other residential care facilities **Business and Financial Services** 323115 Digital printing Manifold business forms printing Business and Financial Services 323116 518111 Business and Financial Services Internet service providers 518112 **Business and Financial Services** Web search portals 518210 **Business and Financial Services** Data processing and related services Business and Financial Services Credit card issuing 522210 522220 **Business and Financial Services** Sales financing 522291 **Business and Financial Services** Consumer lending 522292 **Business and Financial Services** Real estate credit **Business and Financial Services** International trade financing 522293 522294 Business and Financial Services Secondary market financing All other nondepository credit intermediation Business and Financial Services 522298 Business and Financial Services 522310 Mortgage and nonmortgage loan brokers 522320 **Business and Financial Services** Financial transaction processing and clearing

522390 Business and Financial Services 523110 **Business and Financial Services** 523120 **Business and Financial Services** 523130 **Business and Financial Services** 523140 **Business and Financial Services** 523210 Business and Financial Services 523910 **Business and Financial Services** 523920 **Business and Financial Services** 523930 **Business and Financial Services** Business and Financial Services 523991 523999 Business and Financial Services 524113 **Business and Financial Services** 524114 **Business and Financial Services** 524126 **Business and Financial Services Business and Financial Services** 524127 **Business and Financial Services** 524128 524130 **Business and Financial Services** 524210 **Business and Financial Services Business and Financial Services** 524291 524292 **Business and Financial Services** Business and Financial Services 524298 525110 Business and Financial Services 525120 **Business and Financial Services** 525190 **Business and Financial Services** 525910 **Business and Financial Services** 525920 **Business and Financial Services** Business and Financial Services 525930 525990 **Business and Financial Services** 531311 **Business and Financial Services Business and Financial Services** 531312 531390 Business and Financial Services **Business and Financial Services** 533110 541110 Business and Financial Services 541120 **Business and Financial Services** 541191 **Business and Financial Services** 541199 **Business and Financial Services** Business and Financial Services 541211 **Business and Financial Services** 541213 541214 **Business and Financial Services Business and Financial Services** 541219 Business and Financial Services 541310 541320 Business and Financial Services 541330 Business and Financial Services 541340 **Business and Financial Services** 541350 **Business and Financial Services** 541360 **Business and Financial Services** 541370 **Business and Financial Services** Business and Financial Services 541380 541410 **Business and Financial Services** 541420 **Business and Financial Services** 541430 **Business and Financial Services Business and Financial Services** 541490 541511 Business and Financial Services **Business and Financial Services** 541512 541513 Business and Financial Services 541519 **Business and Financial Services** 541611 **Business and Financial Services** 541612 **Business and Financial Services Business and Financial Services** 541613 Business and Financial Services 541614 541618 **Business and Financial Services** 541620 **Business and Financial Services** Business and Financial Services 541690 541810 **Business and Financial Services Business and Financial Services** 541820 Business and Financial Services 541830 541840 **Business and Financial Services** 541850 **Business and Financial Services** 541860 **Business and Financial Services Business and Financial Services** 541870 541910 **Business and Financial Services** 541922 **Business and Financial Services** 325110 Chemicals and Chemical-Based Products 325120 Chemicals and Chemical-Based Products 325131 Chemicals and Chemical-Based Products Chemicals and Chemical-Based Products 325132 325181 Chemicals and Chemical-Based Products 325182 Chemicals and Chemical-Based Products 325188 Chemicals and Chemical-Based Products Chemicals and Chemical-Based Products 325191 325192 Chemicals and Chemical-Based Products 325193 Chemicals and Chemical-Based Products 325199 Chemicals and Chemical-Based Products 325211 Chemicals and Chemical-Based Products Chemicals and Chemical-Based Products 325212 Chemicals and Chemical-Based Products 325221 325222 Chemicals and Chemical-Based Products

Other credit intermediation activities Investment banking and securities dealing Securities brokerage Commodity contracts dealing Commodity contracts brokerage Securities and commodity exchanges Miscellaneous intermediation Portfolio management Investment advice Trust, fiduciary, and custody activities Miscellaneous financial investment activities Direct life insurance carriers Direct health and medical insurance carriers Direct property and casualty insurers Direct title insurance carriers Other direct insurance carriers Reinsurance carriers Insurance agencies and brokerages Claims adjusting Third party administration of insurance funds All other insurance related activities Pension funds Health and welfare funds Other insurance funds Open-end investment funds Trusts, estates, and agency accounts Real estate investment trusts Other financial vehicles Residential property managers Nonresidential property managers Other activities related to real estate Lessors of other nonfinancial intangible asset Offices of lawyers Offices of notaries Title abstract and settlement offices All other legal services Offices of certified public accountants Tax preparation services Payroll services Other accounting services Architectural services Landscape architectural services Engineering services Drafting services Building inspection services Geophysical surveying and mapping services Other surveying and mapping services Testing laboratories Interior design services Industrial design services Graphic design services Other specialized design services Custom computer programming services Computer systems design services Computer facilities management services Other computer related services Administrative management consulting services Human resource consulting services Marketing consulting services Process and logistics consulting services Other management consulting services Environmental consulting services Other technical consulting services Advertising agencies Public relations agencies Media buying agencies Media representatives Display advertising Direct mail advertising Advertising material distribution services Marketing research and public opinion polling Commercial photography Industrial gas manufacturing Inorganic dye and pigment manufacturing Synthetic organic dye and pigment manufacturing Alkalies and chlorine manufacturing Carbon black manufacturing Carbon black manufacturing All other basic inorganic chemical manufacturing Gum and wood chemical manufacturing Cyclic crude and intermediate manufacturing Ethyl alcohol manufacturing All other basic organic chemical manufacturing Plastics material and resin manufacturing Synthetic rubber manufacturing Cellulosic organic fiber manufacturing

Noncellulosic organic fiber manufacturing

I-30

325311 Chemicals and Chemical-Based Products Nitrogenous fertilizer manufacturing 325312 Chemicals and Chemical-Based Products Phosphatic fertilizer manufacturing 325314 Chemicals and Chemical-Based Products Fertilizer, mixing only, manufacturing 325320 Chemicals and Chemical-Based Products Pesticide and other ag. chemical manufacturing 325411 Chemicals and Chemical-Based Products Medicinal and botanical manufacturing 325412 Chemicals and Chemical-Based Products Pharmaceutical preparation manufacturing 325413 Chemicals and Chemical-Based Products In-vitro diagnostic substance manufacturing 325414 Chemicals and Chemical-Based Products Other biological product manufacturing Chemicals and Chemical-Based Products 325510 Paint and coating manufacturing Chemicals and Chemical-Based Products Adhesive manufacturing 325520 325611 Chemicals and Chemical-Based Products Soap and other detergent manufacturing 325612 Chemicals and Chemical-Based Products Polish and other sanitation good manufacturing 325613 Chemicals and Chemical-Based Products Surface active agent manufacturing 325620 Chemicals and Chemical-Based Products Toilet preparation manufacturing 325910 Chemicals and Chemical-Based Products Printing ink manufacturing Chemicals and Chemical-Based Products Explosives manufacturing 325920 325991 Chemicals and Chemical-Based Products Custom compounding of purchased resins 325992 Chemicals and Chemical-Based Products Photographic film and chemical manufacturing Chemicals and Chemical-Based Products Other miscellaneous chemical product manufacturing 325998 Plastics bag manufacturing 326111 Chemicals and Chemical-Based Products Chemicals and Chemical-Based Products Plastics packaging film and sheet manufacturing 326112 326113 Chemicals and Chemical-Based Products Nonpackaging plastics film and sheet manufacturing 326121 Chemicals and Chemical-Based Products Unlaminated plastics profile shape manufacturing 326122 Chemicals and Chemical-Based Products Plastics pipe and pipe fitting manufacturing 326130 Chemicals and Chemical-Based Products Laminated plastics plate, sheet, and shapes 326140 Chemicals and Chemical-Based Products Polystyrene foam product manufacturing Chemicals and Chemical-Based Products Urethane and other foam product manufacturing 326150 326160 Chemicals and Chemical-Based Products Plastics bottle manufacturing Chemicals and Chemical-Based Products Plastics plumbing fixture manufacturing 326191 Chemicals and Chemical-Based Products Resilient floor covering manufacturing 326192 Chemicals and Chemical-Based Products All other plastics product manufacturing 326199 Tire manufacturing, except retreading 326211 Chemicals and Chemical-Based Products 326212 Chemicals and Chemical-Based Products Tire retreading Rubber and plastics hose and belting manufacturing 326220 Chemicals and Chemical-Based Products 326291 Chemicals and Chemical-Based Products Rubber product manufacturing for mechanical use 326299 Chemicals and Chemical-Based Products All other rubber product manufacturing Chemicals and Chemical-Based Products Vitreous china plumbing fixture manufacturing 327111 Chemicals and Chemical-Based Products Vitreous china and earthenware articles manufacturing 327112 327113 Chemicals and Chemical-Based Products Porcelain electrical supply manufacturing Chemicals and Chemical-Based Products Brick and structural clay tile manufacturing 327121 Chemicals and Chemical-Based Products Ceramic wall and floor tile manufacturing 327122 Other structural clay product manufacturing Chemicals and Chemical-Based Products 327123 327124 Chemicals and Chemical-Based Products Clay refractory manufacturing 327125 Chemicals and Chemical-Based Products Nonclay refractory manufacturing 327211 Chemicals and Chemical-Based Products Flat glass manufacturing 327212 Chemicals and Chemical-Based Products Other pressed and blown glass and glassware 327213 Chemicals and Chemical-Based Products Glass container manufacturing Chemicals and Chemical-Based Products 327215 Glass product manufacturing made of purchased glass 327310 Chemicals and Chemical-Based Products Cement manufacturing 327320 Chemicals and Chemical-Based Products Ready-mix concrete manufacturing 327331 Chemicals and Chemical-Based Products Concrete block and brick manufacturing Chemicals and Chemical-Based Products 327332 Concrete pipe manufacturing 327390 Chemicals and Chemical-Based Products Other concrete product manufacturing 327410 Chemicals and Chemical-Based Products Lime manufacturing Gypsum product manufacturing 327420 Chemicals and Chemical-Based Products 327910 Chemicals and Chemical-Based Products Abrasive product manufacturing Cut stone and stone product manufacturing 327991 Chemicals and Chemical-Based Products 327992 Chemicals and Chemical-Based Products Ground or treated minerals and earths manufacturing Chemicals and Chemical-Based Products 327993 Mineral wool manufacturing Chemicals and Chemical-Based Products Miscellaneous nonmetallic mineral products 327999 424610 Chemicals and Chemical-Based Products Plastics materials merchant wholesalers 424690 Chemicals and Chemical-Based Products Other chemicals merchant wholesalers 424710 Chemicals and Chemical-Based Products Petroleum bulk stations and terminals 424720 Chemicals and Chemical-Based Products Other petroleum merchant wholesalers Computer and electronic product manufacturing subc Computer and electronic product manufacturing subcluster 334 334111 Computer and electronic product manufacturing subc Electronic computer manufacturing Computer and electronic product manufacturing subc Computer storage device manufacturing 334112 334113 Computer and electronic product manufacturing subc Computer terminal manufacturing 334119 Computer and electronic product manufacturing subc Other computer peripheral equipment manufacturing 334210 Computer and electronic product manufacturing subc Telephone apparatus manufacturing 334220 Computer and electronic product manufacturing subc Broadcast and wireless communications equip. 334290 Computer and electronic product manufacturing subc Other communications equipment manufacturing Computer and electronic product manufacturing subc Audio and video equipment manufacturing 334310 334411 Computer and electronic product manufacturing subc Electron tube manufacturing 334412 Computer and electronic product manufacturing subc Bare printed circuit board manufacturing 334413 Computer and electronic product manufacturing subc Semiconductors and related device manufacturing 334414 Computer and electronic product manufacturing subc Electronic capacitor manufacturing 334415 Computer and electronic product manufacturing subc Electronic resistor manufacturing 334416 Computer and electronic product manufacturing subc Electronic coils, transformers, and inductors 334417 Computer and electronic product manufacturing subc Electronic connector manufacturing Computer and electronic product manufacturing subc Printed circuit assembly manufacturing 334418 Computer and electronic product manufacturing subc Other electronic component manufacturing 334419 334510 Computer and electronic product manufacturing subc Electromedical apparatus manufacturing 334511 Computer and electronic product manufacturing subc Search, detection, and navigation instruments 334512 Computer and electronic product manufacturing subc Automatic environmental control manufacturing 334513 Computer and electronic product manufacturing subc Industrial process variable instruments Computer and electronic product manufacturing subc Totalizing fluid meters and counting devices 334514

334515 334516 334517 334518 334519	Computer and electronic product manufacturing subc Electricity and signal testing instruments Computer and electronic product manufacturing subc Analytical laboratory instrument manufacturing Computer and electronic product manufacturing subc Irradiation apparatus manufacturing Computer and electronic product manufacturing subc Watch, clock, and part manufacturing Computer and electronic product manufacturing subc Watch, clock, and part manufacturing		
334611	Computer and electronic product manufacturing subc	Software reproducing	
334612	Computer and electronic product manufacturing subc	Audio and video media reproduction	
236115	Construction Sector	New Single-Family Housing Construction (except Operative Builders)	
236116	Construction Sector	New Multifamily Housing Construction (except Operative Builders)	
236117	Construction Sector	New Housing Operative Builders	
236118	Construction Sector	Residential Remodelers	
236220	Construction Sector	Commercial and Institutional Building Construction	
237110	Construction Sector	Water and Sewer Line and Related Structures Construction	
237120	Construction Sector	Oil and Gas Pipeline and Related Structures Construction	
237130	Construction Sector	Power and Communication Line and Related Structures Construction	
237210	Construction Sector	Highway, Street, and Bridge Construction	
237990	Construction Sector	Other Heavy and Civil Engineering Construction	
238110	Construction Sector	Poured Concrete Foundation and Structure Contractors	
238120	Construction Sector	Structural Steel and Precast Concrete Contractors	
238140	Construction Sector	Masonry Contractors	
238150	Construction Sector	Glass and Glazing Contractors	
238160	Construction Sector	Roofing Contractors	
238170	Construction Sector	Siding Contractors Other Foundation, Structure, and Building Exterior Contractors	
238210	Construction Sector	Electrical Contractors and Other Wiring Installation Contractors	
238220	Construction Sector	Plumbing, Heating, and Air-Conditioning Contractors	
238290	Construction Sector	Other Building Equipment Contractors	
238310	Construction Sector	Drywall and Insulation Contractors	
238330	Construction Sector	Flooring Contractors	
238340	Construction Sector	Tile and Terrazzo Contractors	
238350	Construction Sector	Finish Carpentry Contractors	
238390	Construction Sector	Other Building Finishing Contractors	
238990	Construction Sector	All Other Specialty Trade Contractors	
212291	Defense and Security	Uranium-radium-vanadium ore mining	
237130	Defense and Security	Power and communication line and related structures construction	
325920	Defense and Security	Explosives manufacturing	
332912	Defense and Security	Small arms ammunition manufacturing	
332993	Defense and Security	Ammunition (except small arms) manufacturing	
332994	Defense and Security	Small arms manufacturing	
332995	Defense and Security	Other ordnance and accessories manufacturing	
334290	Defense and Security	Other communications equipment manufacturing	
334511	Defense and Security	Search, detection, navigation, guidance, aeronautical, and nautical system and instrument manufacturing	g
336411	Defense and Security	Aircraft manufacturing	
336412	Defense and Security	Aircraft engine and engine parts manufacturing	
336414	Defense and Security	Guided missile and space vehicle manufacturing	
336415	Defense and Security	Guided missile and space vehicle propulsion unit and propulsion unit parts manufacturing	
336419	Defense and Security	Other guided missile and space vehicle parts and auxiliary equipment manufacturing	
336611	Defense and Security	Ship building and repairing Boat building	
336992	Defense and Security	Military armored vehicle, tank, and tank component manufacturing	
423110	Defense and Security	Automobile and other motor vehicle merchant wholesalers	
423120	Defense and Security	Motor vehicle supplies and new parts merchant wholesalers	
423130	Defense and Security	I ire and tube merchant wholesalers Meter vehicle parts (used) merchant wholesalers	
423860	Defense and Security	Transportation equipment and supplies (except motor vehicle) merchant wholesalers	
541511	Defense and Security	Custom computer programming services	
541512	Defense and Security	Computer systems design services	
541513	Defense and Security	Computer facilities management services	
541710	Defense and Security	Research and development in the physical, engineering, and life sciences	
561611	Defense and Security	Investigation services	
561612	Defense and Security	Security guards and patrol services	
561613	Defense and Security	Armored car services Security systems services (excent locksmiths)	
561622	Defense and Security	Locksmiths	
811490	Defense and Security	Other personal and household goods repair and maintenance (includes gun repair and maintenance)	
922110	Defense and Security	Courts	
922120	Defense and Security	Police protection	
922140	Defense and Security	Correctional institutions	
922150	Defense and Security	Parole offices and probation offices	
922160 922100	Defense and Security	Fire protection Other justice, public order, and safety activities	
926120	Defense and Security	Regulation and administration of transportation programs (includes coastguard and merchant marine)	
927110	Defense and Security	Space research and technology	
928110	Defense and Security	National security	
920120 611210	Education and Knowledge Creaton	Junior colleges	
611310	Education and Knowledge Creaton	Colleges, universities and professional schools	I-3
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611410	Education and Knowledge Creaton	Business and secretarial schools
611420	Education and Knowledge Creaton	Computer training
611430	Education and Knowledge Creaton	Management training
611511	Education and Knowledge Creaton	Cosmetology and barber schools
611512	Education and Knowledge Creaton	Flight training
611513	Education and Knowledge Creaton	Apprenticeship training
611519	Education and Knowledge Creaton	Other technical and trade schools
611610	Education and Knowledge Creaton	
611620	Education and Knowledge Creaton	Sports and recreation instruction
611630	Education and Knowledge Creaton	Language schools
611691	Education and Knowledge Creaton	Evan preparation and tutoring
611602	Education and Knowledge Creaton	Automobile driving schools
611600	Education and Knowledge Creaton	Automobile during schools
611710	Education and Knowledge Creaton	
611/10 511110	Education and Knowledge Creaton	Educational support services
511110	Education and Knowledge Creaton	
511120	Education and Knowledge Creaton	Pendara publishers
511130	Education and Knowledge Creaton	Book publishers
516110	Education and Knowledge Creaton	Internet publishing and broadcasting
519110	Education and Knowledge Creaton	News syndicates
519120	Education and Knowledge Creaton	Libraries and archives
335	Electrical equip, appliance and component manufactu	Electrical equip, appliance and component manufacturing subcluster
335110	Electrical equip, appliance and component manufactu	Electric lamp bulb and part manufacturing
335121	Electrical equip, appliance and component manufactu	Residential electric lighting fixture manufacturing
335122	Electrical equip, appliance and component manufactu	Nonresidential electric lighting fixture manufacturing
335129	Electrical equip, appliance and component manufactu	Other lighting equipment manufacturing
335211	Electrical equip, appliance and component manufactu	Electric housewares and household fan manufacturing
335212	Electrical equip, appliance and component manufactu	Household vacuum cleaner manufacturing
335221	Electrical equip, appliance and component manufactu	Household cooking appliance manufacturing
335222	Electrical equip, appliance and component manufactu	Household refrigerator and home freezer manufacturing
335224	Electrical equip, appliance and component manufactu	Household laundry equipment manufacturing
335228	Electrical equip, appliance and component manufactu	Other major household appliance manufacturing
335311	Electrical equip, appliance and component manufactu	Electric power and specialty transformer manufacturing
335312	Electrical equip, appliance and component manufactu	Motor and generator manufacturing
335313	Electrical equip, appliance and component manufactu	Switchgear and switchboard apparatus manufacturing
335314	Electrical equip, appliance and component manufactu	Relay and industrial control manufacturing
335911	Electrical equip, appliance and component manufactu	Storage battery manufacturing
335912	Electrical equip, appliance and component manufactu	Primary battery manufacturing
335921	Electrical equip, appliance and component manufactu	Finary states in manufacturing
335020	Electrical equip, appliance and component manufactu	The optic communication and anergy wire manufacturing
335031	Electrical equip, appliance and component manufact	Current carrying wiring dovice manufacturing
3350331	Electrical equip, appliance and component manufactu	Noncurrent carrying wining device manufacturing
225001	Electrical equip, appliance and component manufactu	Corbon and graphite product manufacturing
225000	Electrical equip, appliance and component manufactu	Missellenseus electrical equipment manufacturing
011111	Electrical equip, appliance and component manufact	Miscelareous electrical equipment manuacturing
211111	Energy (Fossil and Renewable)	Grude perforeum and natural gas extraction
211112	Energy (Fossil and Renewable)	Natural gas liquid extraction
212111	Energy (Fossil and Renewable)	Bituminous coal and lignite surface mining
212112	Energy (Fossil and Renewable)	Bituminous coal underground mining
212113	Energy (Fossil and Renewable)	Anthracite mining
212291	Energy (Fossil and Renewable)	Uranium-Radium-Vanadium ore mining
213111	Energy (Fossil and Renewable)	Drilling oil and gas wells
213112	Energy (Fossil and Renewable)	Support activities for oil and gas operations
213113	Energy (Fossil and Renewable)	Support activities for coal mining
213114	Energy (Fossil and Renewable)	Support activities for metal mining
221111	Energy (Fossil and Renewable)	Hydroelectric power generation
221112	Energy (Fossil and Renewable)	Fossil fuel electric power generation
221113	Energy (Fossil and Renewable)	Nuclear electric power generation
221119	Energy (Fossil and Renewable)	Other electric power generation
221121	Energy (Fossil and Renewable)	Electric bulk power transmission and control
221122	Energy (Fossil and Renewable)	Electric power distribution
221210	Energy (Fossil and Renewable)	Natural gas distribution
221330	Energy (Fossil and Renewable)	Steam and air-conditioning supply
237110	Energy (Fossil and Renewable)	Water and sewer line and related structures construction (includes geothermal drilling)
237120	Energy (Fossil and Renewable)	Oil and gas pipeline and related structures construction
237130	Energy (Fossil and Renewable)	Power and communication line and related structures construction
237990	Energy (Fossil and Renewable)	Other heavy and civil engineering construction (includes dams and hydroelectric facilities)
238210	Energy (Fossil and Renewable)	Flactical contractors
238220	Energy (Fossil and Renewable)	Plumbing, heating, and air-conditioning contractors
200220	Energy (Fossil and Renewable)	Datroloum rolingerios
324110	Energy (Fossil and Renewable)	All other petroleum and coal products manufacturing
225110	Energy (Fossil and Renewable)	An other periode in and coal products manufacturing
225110	Energy (Fossil and Renewable)	
225120	Energy (Fossil and Renewable)	nuusuidi gas manufacturing Cum and wood chemical manufacturing (include cake and charceal)
325191	Energy (Fossil and Renewable)	Sum and wood chemical manufacturing (include cove and charcoar)
323140	Energy (Fossil and Renewable)	Euryr alconol manufacturing (includes etilanol manuf.) Dewer beiler and boet exebenser manufacturing
33241U	Energy (Fossil and Renewable)	Fower polier and field exchanger manufacturing
33242U	Energy (Fossil and Renewable)	Mining mechinery gauge) manufacturing
333131	Energy (Fossil and Renewable)	Mining machinery and equipment manufacturing
333132	Energy (Fossil and Renewable)	Oil and gas tield machinery and equipment manufacturing
333414	Energy (Fossil and Renewable)	Heating equipment (except warm air turnaces) manufacturing (includes solar and hydronic heating ec
333611	Energy (Fossil and Renewable)	I urbine and turbine generator set units manufacturing
334413	Energy (Fossil and Renewable)	Semiconductor and related device manufacturing
334519	Energy (Fossil and Renewable)	Other measuring and controlling device manufacturing
335311	Energy (Fossil and Renewable)	Power, distribution, and specialty transformer manufacturing
335312	Energy (Fossil and Renewable)	Motor and generator manufacturing
335313	Energy (Fossil and Renewable)	Switchgear and switchboard apparatus manufacturing
335314	Energy (Fossil and Renewable)	Relay and industrial control manufacturing
335911	Energy (Fossil and Renewable)	Storage battery manufacturing
335912	Energy (Fossil and Renewable)	Primary battery manufacturing

335929 Energy (Fossil and Renewable) Other communication and energy wire manufacturing 335931 Energy (Fossil and Renewable) Current-carrying wiring device manufacturing 335991 Energy (Fossil and Renewable) Carbon and graphite product manufacturing Energy (Fossil and Renewable) 335999 All other miscellaneous electrical equipment and component manufacturing 423520 Energy (Fossil and Renewable) Coal and other mineral and ore merchant wholesalers 423610 Energy (Fossil and Renewable) Electrical apparatus and equipment, wiring supplies, and related equipment merchant wholesalers Energy (Fossil and Renewable) 423690 Other electronic parts and equipment merchant wholesalers 423720 Energy (Fossil and Renewable) Plumbing and heating equipment and supplies (hydronics) merchant wholesalers Energy (Fossil and Renewable) 424710 Petroleum bulk stations and terminals Energy (Fossil and Renewable) 424720 Petroleum and petroleum products merchant wholesalers (except bulk stations and terminals) Energy (Fossil and Renewable) 447110 Gasoline stations with convenience stores 447190 Energy (Fossil and Renewable) Other gasoline stations 454311 Energy (Fossil and Renewable) Heating oil dealers 454312 Energy (Fossil and Renewable) Liquefied petroleum gas (bottled gas) dealers 454319 Energy (Fossil and Renewable) Other fuel dealers Energy (Fossil and Renewable) Pipeline transportation of crude oil 486110 486210 Energy (Fossil and Renewable) Pipeline transportation of natural gas 486910 Energy (Fossil and Renewable) Pipeline transportation of refined petroleum products Energy (Fossil and Renewable) 486990 All other pipeline transportation Energy (Fossil and Renewable) 523910 Miscellaneous intermediation (includes mineral and oil rovalties dealing) Energy (Fossil and Renewable) Miscellaneous financial investment activities (includes oil and gas lease brokers) 523999 Construction, mining, and forestry machinery and equipment rental and leasing 532412 Energy (Fossil and Renewable) 533110 Energy (Fossil and Renewable) Lessors of nonfinancial intangible assets (except copyrighted works) (includes oil royalty companies and leasing) 541330 Energy (Fossil and Renewable) Engineering services 541360 Energy (Fossil and Renewable) Geophysical surveying and mapping services Energy (Fossil and Renewable) 541380 Testing laboratories Energy (Fossil and Renewable) Environmental consulting services 541620 541690 Energy (Fossil and Renewable) Other scientific and technical consulting services 541710 Energy (Fossil and Renewable) Research and development in the physical, engineering, and life sciences Energy (Fossil and Renewable) 926130 Regulation and administration of communications, electric, gas, and other utilities Fabricated metal product manufacturing subcluster Fabricated metal product manufacturing subcluster 332 332111 Iron and steel forging Fabricated metal product manufacturing subcluster 332112 Fabricated metal product manufacturing subcluster Nonferrous forging 332114 Fabricated metal product manufacturing subcluster Custom roll forming Fabricated metal product manufacturing subcluster Crown and closure manufacturing 332115 332116 Fabricated metal product manufacturing subcluster Metal stamping 332117 Fabricated metal product manufacturing subcluster Powder metallurgy part manufacturing 332211 Fabricated metal product manufacturing subcluster Cutlery and flatware, except precious, manufacturing Hand and edge tool manufacturing 332212 Fabricated metal product manufacturing subcluster Fabricated metal product manufacturing subcluster 332213 Saw blade and handsaw manufacturing Fabricated metal product manufacturing subcluster Kitchen utensil, pot, and pan manufacturing 332214 Fabricated metal product manufacturing subcluster Prefabricated metal buildings and components 332311 332312 Fabricated metal product manufacturing subcluster Fabricated structural metal manufacturing 332313 Fabricated metal product manufacturing subcluster Plate work manufacturing 332321 Fabricated metal product manufacturing subcluster Metal window and door manufacturing 332322 Fabricated metal product manufacturing subcluster Sheet metal work manufacturing Fabricated metal product manufacturing subcluster Ornamental and architectural metal work manufacturing 332323 332410 Fabricated metal product manufacturing subcluster Power boiler and heat exchanger manufacturing 332420 Fabricated metal product manufacturing subcluster Metal tank, heavy gauge, manufacturing Fabricated metal product manufacturing subcluster 332431 Metal can manufacturing 332439 Fabricated metal product manufacturing subcluster Other metal container manufacturing Hardware manufacturing 332510 Fabricated metal product manufacturing subcluster Spring, heavy gauge, manufacturing 332611 Fabricated metal product manufacturing subcluster 332612 Fabricated metal product manufacturing subcluster Spring, light gauge, manufacturing 332618 Fabricated metal product manufacturing subcluster Other fabricated wire product manufacturing 332710 Fabricated metal product manufacturing subcluster Machine shops 332721 Fabricated metal product manufacturing subcluster Precision turned product manufacturing Bolt, nut, screw, rivet, and washer manufacturing 332722 Fabricated metal product manufacturing subcluster 332811 Fabricated metal product manufacturing subcluster Metal heat treating 332812 Fabricated metal product manufacturing subcluster Metal coating and nonprecious engraving Fabricated metal product manufacturing subcluster Electroplating, anodizing, and coloring metal 332813 Fabricated metal product manufacturing subcluster Industrial valve manufacturing 332911 Fluid power valve and hose fitting manufacturing 332912 Fabricated metal product manufacturing subcluster Plumbing fixture fitting and trim manufacturing 332913 Fabricated metal product manufacturing subcluster 332919 Fabricated metal product manufacturing subcluster Other metal valve and pipe fitting manufacturing 332991 Fabricated metal product manufacturing subcluster Ball and roller bearing manufacturing 332996 Fabricated metal product manufacturing subcluster Fabricated pipe and pipe fitting manufacturing Fabricated metal product manufacturing subcluster Industrial pattern manufacturing 332997 Fabricated metal product manufacturing subcluster Enameled iron and metal sanitary ware manufacturing 332998 332999 Fabricated metal product manufacturing subcluster Miscellaneous fabricated metal product manufacturing Forest and Wood Products Timber tract operations 113110 Forest and Wood Products 113210 Forest nurseries and gathering forest products Forest and Wood Products 113310 Logging 115310 Forest and Wood Products Forestry support activities 238130 Forest and Wood Products Framing contractors 238610 Forest and Wood Products Shake and shingle, roof, installation 238170 Forest and Wood Products Wood siding, installation 238330 Forest and Wood Products Hardwood flooring Forest and Wood Products Finish carpentry contractors 238350 321113 Forest and Wood Products Sawmills 321114 Forest and Wood Products Wood preservation Forest and Wood Products Hardwood veneer and plywood manufacturing 321211 Softwood veneer and plywood manufacturing 321212 Forest and Wood Products 321213 Forest and Wood Products Engineered wood member manufacturing 321214 Forest and Wood Products Truss manufacturing Reconstituted wood product manufacturing 321219 Forest and Wood Products 321911 Forest and Wood Products Wood window and door manufacturing

321912 Forest and Wood Products 321918 Forest and Wood Products 321920 Forest and Wood Products Forest and Wood Products 321991 321992 Forest and Wood Products 321999 Forest and Wood Products 322110 Forest and Wood Products Forest and Wood Products 322121 Forest and Wood Products 322122 Forest and Wood Products 322130 Forest and Wood Products 322231 322211 Forest and Wood Products 322212 Forest and Wood Products 322213 Forest and Wood Products Forest and Wood Products 322214 Forest and Wood Products 322215 322221 Forest and Wood Products 322222 Forest and Wood Products Forest and Wood Products 322223 322224 Forest and Wood Products Forest and Wood Products 322225 322226 Forest and Wood Products 322231 Forest and Wood Products 322232 Forest and Wood Products 322233 Forest and Wood Products 322291 Forest and Wood Products Forest and Wood Products 322299 323117 Forest and Wood Products 325510 Forest and Wood Products Forest and Wood Products 325191 Forest and Wood Products 325520 Forest and Wood Products 327910 332213 Forest and Wood Products 333210 Forest and Wood Products 333291 Forest and Wood Products 333991 Forest and Wood Products Forest and Wood Products 337110 Forest and Wood Products 337121 337122 Forest and Wood Products 337127 Forest and Wood Products Forest and Wood Products 337129 Forest and Wood Products 337211 337212 Forest and Wood Products 337215 Forest and Wood Products 337920 Forest and Wood Products 339992 Forest and Wood Products 339995 Forest and Wood Products Forest and Wood Products 423210 423310 Forest and Wood Products 327111 Glass and Ceramics 327112 Glass and Ceramics 327113 Glass and Ceramics 327121 Glass and Ceramics 327122 Glass and Ceramics 327123 Glass and Ceramics 327124 Glass and Ceramics 327125 Glass and Ceramics Glass and Ceramics 327211 327212 Glass and Ceramics 327213 Glass and Ceramics 327215 Glass and Ceramics 327310 Glass and Ceramics 327992 Glass and Ceramics 327999 Glass and Ceramics 332812 Glass and Ceramics 332813 Glass and Ceramics 921110 Government and Public Administration Sector Government and Public Administration Sector 921120 Government and Public Administration Sector 921130 Government and Public Administration Sector 921140 921150 Government and Public Administration Sector 921190 Government and Public Administration Sector Government and Public Administration Sector 922110 Government and Public Administration Sector 922120 Government and Public Administration Sector 922130 922140 Government and Public Administration Sector 922150 Government and Public Administration Sector 922160 Government and Public Administration Sector Government and Public Administration Sector 922190 923110 Government and Public Administration Sector 923120 Government and Public Administration Sector Government and Public Administration Sector 923130 Government and Public Administration Sector 923140 924110 Government and Public Administration Sector Government and Public Administration Sector 924120 925110 Government and Public Administration Sector Government and Public Administration Sector 925120

Cut stock, resawing lumber, and planing Other millwork, including flooring Wood container and pallet manufacturing Manufactured home (mobile home) manufacturing Prefabricated wood building manufacturing All other miscellaneous wood product manufacturing Pulp mills Paper, except newsprint, mills Newsprint mills Paperboard mills Die-cut paper and paperboard office supplies manufacturing Corrugated and solid fiber box manufacturing Folding paperboard box manufacturing Setup paperboard box manufacturing Fiber can, tube, and drum manufacturing Nonfolding sanitary food container manufacturing Coated and laminated packaging materials manufacturing Coated and laminated paper manufacturing Plastics, foil, and coated paper bag manufacturing Uncoated paper and multiwall bag manufacturing Flexible packaging foil manufacturing Surface-coated paperboard manufacturing Die-cut paper office supplies manufacturing Envelope manufacturing Stationery and related product manufacturing Sanitary paper product manufacturing All other converted paper product manufacturing Books printing Paint and coating manufacturing Gum and wood chemical manufacturing Adhesive manufacturing Abrasive products manufacturing Wood cutting saw blades manufacturing Sawmill and woodworking machinery manufacturing Paper industry machinery manufacturing Power-driven handtool manufacturing Wood kitchen cabinet and countertop manufacturing Upholstered household furniture manufacturing Nonupholstered wood household furniture manufacturing Institutional furniture manufacturing Wood TV, radio, sewing machine cabinet manufacturing Wood office furniture manufacturing Custom architectural woodwork and millwork manufacturing Showcase, partition, shelving and locker manufacturing Blind and shade manufacturing Musical Instrument manufacturing Burial Casket manufacturing Furniture merchant wholesalers Lumber, Plywood, Millwork, and Wood Panel Merchant Wholesalers Vitreous china plumbing fixture manufacturing Vitreous china and earthenware articles manufacturing Porcelain electrical supply manufacturing Brick and structural clay tile manufacturing Ceramic wall and floor tile manufacturing Other structural clay product manufacturing Clay refractory manufacturing Nonclay refractory manufacturing Flat glass manufacturing Other pressed and blown glass and glassware Glass container manufacturing Glass product manufacturing made of purchased glass Cement manufacturing Ground or treated minerals and earths manufacturing Miscellaneous nonmetallic mineral products Metal coating, engraving (except jewelry and silverware), and allied services to manufacturers Electroplating, plating, polishing, anodizing, and coloring **Executive Offices** Legislative Bodies Public Finance Activities Executive and Legislative Offices, Combined American Indian and Alaska Native Tribal Governments Other General Government Support Courts Police Protection Legal Counsel and Prosecution **Correctional Institutions** Parole Offices and Probation Offices Fire Protection Other Justice, Public Order, and Safety Activities Administration of Education Programs Administration of Public Health Programs Administration of Human Resource Programs (except Education, Public Health, and Veterans' Affairs Programs) Administration of Veterans' Affairs Administration of Air and Water Resource and Solid Waste Management Programs Administration of Conservation Programs

Administration of Housing Programs

Administration of Urban Planning and Community and Rural Development

926120 Government and Public Administration Sector Regulation and Administration of Transportation Programs 926130 Government and Public Administration Sector Regulation and Administration of Communications, Electric, Gas, and Other Utilities Government and Public Administration Sector Regulation of Agricultural Marketing and Commodities 926140 926150 Government and Public Administration Sector Regulation, Licensing, and Inspection of Miscellaneous Commercial Sectors 927110 Government and Public Administration Sector Space Research and Technology 928110 Government and Public Administration Sector National Security 928120 Government and Public Administration Sector International Affairs Offices of Physicians (except Mental Health Specialists) Healthcare and Social Assistance Sector 621111 Healthcare and Social Assistance Sector 621112 Offices of Physicians, Mental Health Specialists Healthcare and Social Assistance Sector Offices of Dentists 621210 621310 Healthcare and Social Assistance Sector Offices of Chiropractors 621320 Healthcare and Social Assistance Sector Offices of Optometrists 621330 Healthcare and Social Assistance Sector Offices of Mental Health Practitioners (except Physicians) 621340 Healthcare and Social Assistance Sector Offices of Physical, Occupational and Speech Therapists, and Audiologists Healthcare and Social Assistance Sector 621391 Offices of Podiatrists 621399 Healthcare and Social Assistance Sector Offices of All Other Miscellaneous Health Practitioners 621410 Healthcare and Social Assistance Sector Family Planning Centers 621420 Healthcare and Social Assistance Sector Outpatient Mental Health and Substance Abuse Centers 621491 Healthcare and Social Assistance Sector HMO Medical Centers Healthcare and Social Assistance Sector Kidney Dialysis Centers 621492 621493 Healthcare and Social Assistance Sector Freestanding Ambulatory Surgical and Emergency Centers 621498 Healthcare and Social Assistance Sector All Other Outpatient Care Centers 621511 Healthcare and Social Assistance Sector Medical Laboratories 621512 Healthcare and Social Assistance Sector **Diagnostic Imaging Centers** 621610 Healthcare and Social Assistance Sector Home Health Care Services Healthcare and Social Assistance Sector 621910 Ambulance Services 621991 Healthcare and Social Assistance Sector Blood and Organ Banks 621999 Healthcare and Social Assistance Sector All Other Miscellaneous Ambulatory Health Care Services Healthcare and Social Assistance Sector General Medical and Surgical Hospitals 622110 Healthcare and Social Assistance Sector Psychiatric and Substance Abuse Hospitals 622210 622310 Healthcare and Social Assistance Sector Specialty (except Psychiatric and Substance Abuse) Hospitals 623110 Healthcare and Social Assistance Sector Nursing Care Facilities 623210 Healthcare and Social Assistance Sector **Residential Mental Retardation Facilities** 623220 Healthcare and Social Assistance Sector Residential Mental Health and Substance Abuse Facilities 623311 Healthcare and Social Assistance Sector Continuing Care Retirement Communities Healthcare and Social Assistance Sector 623312 Homes for the Elderly Healthcare and Social Assistance Sector Other Residential Care Facilities 623990 624110 Healthcare and Social Assistance Sector Child and Youth Services Healthcare and Social Assistance Sector Services for the Elderly and Persons with Disabilities 624120 Healthcare and Social Assistance Sector Other Individual and Family Services 624190 624210 Healthcare and Social Assistance Sector **Community Food Services** Healthcare and Social Assistance Sector Temporary Shelters 624221 624229 Healthcare and Social Assistance Sector Other Community Housing Services 624230 Healthcare and Social Assistance Sector Emergency and Other Relief Services 624310 Healthcare and Social Assistance Sector Vocational Rehabilitation Services 624410 Healthcare and Social Assistance Sector Child Day Care Services Information Technology and Telecommunications 238210 Electrical contractors 333613 Information Technology and Telecommunications Mechanical power transmission equipment manufacturing 333295 Information Technology and Telecommunications Semiconductor machinery manufacturing 334111 Information Technology and Telecommunications Electronic computer manufacturing 334112 Information Technology and Telecommunications Computer storage device manufacturing Information Technology and Telecommunications 334113 Computer terminal manufacturing Other computer peripheral equipment manufacturing 334119 Information Technology and Telecommunications 334210 Information Technology and Telecommunications Telephone apparatus manufacturing 334220 Information Technology and Telecommunications Broadcast and wireless communications equip. 334290 Information Technology and Telecommunications Other communications equipment manufacturing 334310 Information Technology and Telecommunications Audio and video equipment manufacturing Information Technology and Telecommunications 334411 Electron tube manufacturing Information Technology and Telecommunications Bare printed circuit board manufacturing 334412 334413 Information Technology and Telecommunications Semiconductors and related device manufacturing 334414 Information Technology and Telecommunications Electronic capacitor manufacturing Electronic resistor manufacturing 334415 Information Technology and Telecommunications Information Technology and Telecommunications 334416 Electronic coils, transformers, and inductors 334417 Information Technology and Telecommunications Electronic connector manufacturing 334418 Information Technology and Telecommunications Printed circuit assembly manufacturing 334419 Information Technology and Telecommunications Other electronic component manufacturing 334512 Information Technology and Telecommunications Automatic environmental control manufacturing 334513 Information Technology and Telecommunications Industrial process variable instruments Information Technology and Telecommunications Electricity and signal testing instruments 334515 334516 Information Technology and Telecommunications Analytical laboratory instrument manufacturing Watch, clock, and part manufacturing 334518 Information Technology and Telecommunications 334611 Information Technology and Telecommunications Software reproducing 334612 Information Technology and Telecommunications Audio and video media reproduction Information Technology and Telecommunications Magnetic and optical recording media manufacturing 334613 335311 Information Technology and Telecommunications Electric power and specialty transformer manufacturing 335312 Information Technology and Telecommunications Motor and generator manufacturing 335313 Information Technology and Telecommunications Switchgear and switchboard apparatus manufacturing 335314 Information Technology and Telecommunications Relay and industrial control manufacturing Information Technology and Telecommunications Storage battery manufacturing 335911 Information Technology and Telecommunications 335912 Primary battery manufacturing 335921 Information Technology and Telecommunications Fiber optic cable manufacturing Information Technology and Telecommunications Other communication and energy wire manufacturing 335929 335931 Information Technology and Telecommunications Current-carrying wiring device manufacturing Noncurrent-carrying wiring device manufacturing 335932 Information Technology and Telecommunications Information Technology and Telecommunications 335991 Carbon and graphite product manufacturing 335999 Information Technology and Telecommunications Miscellaneous electrical equipment manufacturing

Administration of General Economic Programs

926110 Government and Public Administration Sector

423430 Information Technology and Telecommunications 423690 Information Technology and Telecommunications 511210 Information Technology and Telecommunications Information Technology and Telecommunications 517110 517211 Information Technology and Telecommunications 517212 Information Technology and Telecommunications 517310 Information Technology and Telecommunications Information Technology and Telecommunications 517410 517910 Information Technology and Telecommunications 518111 Information Technology and Telecommunications Information Technology and Telecommunications 518112 518210 Information Technology and Telecommunications 541511 Information Technology and Telecommunications 541512 Information Technology and Telecommunications Information Technology and Telecommunications 541513 Information Technology and Telecommunications 541519 541618 Information Technology and Telecommunications Information Technology and Telecommunications 541710 Information Technology and Telecommunications 541720 Information Technology and Telecommunications 926130 Machinery manufacturing subcluster 333 333111 Machinery manufacturing subcluster 333112 Machinery manufacturing subcluster Machinery manufacturing subcluster 333120 Machinery manufacturing subcluster 333131 333132 Machinery manufacturing subcluster 333210 Machinery manufacturing subcluster 333220 Machinery manufacturing subcluster Machinery manufacturing subcluster 333291 333292 Machinery manufacturing subcluster Machinery manufacturing subcluster 333293 333294 Machinery manufacturing subcluster 333295 Machinery manufacturing subcluster 333298 Machinery manufacturing subcluster Machinery manufacturing subcluster 333311 Machinery manufacturing subcluster 333312 333313 Machinery manufacturing subcluster Machinery manufacturing subcluster 333314 333315 Machinery manufacturing subcluster Machinery manufacturing subcluster 333319 Machinery manufacturing subcluster 333411 Machinery manufacturing subcluster 333412 333414 Machinery manufacturing subcluster 333415 Machinery manufacturing subcluster 333511 Machinery manufacturing subcluster 333512 Machinery manufacturing subcluster Machinery manufacturing subcluster 333513 333514 Machinery manufacturing subcluster 333515 Machinery manufacturing subcluster Machinery manufacturing subcluster 333516 333518 Machinery manufacturing subcluster Machinery manufacturing subcluster 333611 333612 Machinery manufacturing subcluster 333613 Machinery manufacturing subcluster 333618 Machinery manufacturing subcluster 333911 Machinery manufacturing subcluster 333912 Machinery manufacturing subcluster 333913 Machinery manufacturing subcluster 333921 Machinery manufacturing subcluster Machinery manufacturing subcluster 333922 Machinery manufacturing subcluster 333923 Machinery manufacturing subcluster 333924 Machinery manufacturing subcluster 333991 333992 Machinery manufacturing subcluster 333993 Machinery manufacturing subcluster Machinery manufacturing subcluster 333994 333995 Machinery manufacturing subcluster 333996 Machinery manufacturing subcluster 333997 Machinery manufacturing subcluster 333999 Machinery manufacturing subcluster 212210 Minina 212221 Minina 212222 Mining 212231 Mining 212234 Mining 212291 Mining 212299 Mining 212311 Minina 212312 Mining 212313 Mining 212319 Mining 212321 Mining Mining 212322 212324 Mining 212325 Mining 212391 Mining 212392 Mining

Computer and peripheral equip and software whsle Other electronic parts and equipment whsle Software publishers Wired telecommunications carriers Paging Cellular and other wireless carriers Telecommunications resellers Satellite telecommunications Other telecommunications Internet service providers (ISPs) Web search portals Data processing and related services Custom computer programming services Computer systems design services Computer facilities management services Other computer related services Other management consulting services Physical, engineering and biological research Social science and humanities research Regulation and administration of communications, electric, gas, and other utilities Machinery manufacturing subcluster Farm machinery and equipment manufacturing Lawn and garden equipment manufacturing Construction machinery manufacturing Mining machinery and equipment manufacturing Oil and gas field machinery and equipment Sawmill and woodworking machinery Plastics and rubber industry machinery Paper industry machinery manufacturing Textile machinery manufacturing Printing machinery and equipment manufacturing Food product machinery manufacturing Semiconductor machinery manufacturing All other industrial machinery manufacturing Automatic vending machine manufacturing Commercial laundry and drycleaning machinery Office machinery manufacturing Optical instrument and lens manufacturing Photographic and photocopying equipment manufacturing Other commercial and service machinery manufacturing Air purification equipment manufacturing Industrial and commercial fan and blower manufacturing Heating equipment, except warm air furnaces AC, refrigeration, and forced air heating Industrial mold manufacturing Metal cutting machine tool manufacturing Metal forming machine tool manufacturing Special tool, die, jig, and fixture manufacturing Cutting tool and machine tool accessory manufacturing Rolling mill machinery and equipment manufacturing Other metalworking machinery manufacturing Turbine and turbine generator set units manufacturing Speed changer, drive, and gear manufacturing Mechanical power transmission equipment manufacturing Other engine equipment manufacturing Pump and pumping equipment manufacturing Air and gas compressor manufacturing Measuring and dispensing pump manufacturing Elevator and moving stairway manufacturing Conveyor and conveying equipment manufacturing Overhead cranes, hoists, and monorail systems Industrial truck, trailer, and stacker manufacturing Power-driven handtool manufacturing Welding and soldering equipment manufacturing Packaging machinery manufacturing Industrial process furnace and oven manufacturing Fluid power cylinder and actuator manufacturing Fluid power pump and motor manufacturing Scale and balance, except laboratory, manufacturing Miscellaneous general purpose machinery manufacturing Iron ore mining Gold ore mining Silver ore mining Lead ore and zinc ore mining Copper ore and nickel ore mining Uranium-radium-vanadium ore mining All other metal ore mining Dimension stone mining and quarrying Crushed and broken limestone mining Crushed and broken granite mining Other crushed and broken stone mining Construction sand and gravel mining Industrial sand mining Kaolin and ball clay mining Clay, ceramic, and refractory minerals mining Potash, soda, and borate mineral mining Phosphate rock mining

212393	Mining
212399	Mining
213114	Mining
212115	Mining
213113	Mining
482111	Mining
482112	Mining
532412	Mining
811121	Motor Vehicle Manufacturing
32551	Motor Vehicle Manufacturing
22551	Motor Vehicle Manufacturing
32552	Motor vehicle Manuacturing
32591	Motor Vehicle Manufacturing
326211	Motor Vehicle Manufacturing
32622	Motor Vehicle Manufacturing
326291	Motor Vehicle Manufacturing
226112	Motor Vehicle Manufacturing
320113	
326121	Motor venicle Manufacturing
32613	Motor Vehicle Manufacturing
326122	Motor Vehicle Manufacturing
32616	Motor Vehicle Manufacturing
326150	Motor Vehicle Manufacturing
226100	Motor Vohiolo Manufacturing
323991	Motor venicle Manufacturing
326191	Motor Vehicle Manufacturing
327211	Motor Vehicle Manufacturing
327212	Motor Vehicle Manufacturing
327215	Motor Vehicle Manufacturing
32627	Motor Vohicle Manufacturing
220644	Motor Vehicle Manufacturing
332011	wotor venicle wanutacturing
336311	Motor Vehicle Manufacturing
33511	Motor Vehicle Manufacturing
335121	Motor Vehicle Manufacturing
335122	Motor Vehicle Manufacturing
226224	Motor Vehicle Manufacturing
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335129	Motor Vehicle Manufacturing
33431	Motor Vehicle Manufacturing
335911	Motor Vehicle Manufacturing
336322	Motor Vehicle Manufacturing
336211	Motor Vehicle Manufacturing
226212	Motor Vehicle Manufacturing
220212	Motor Vehicle Manufacturing
330213	Motor venicle Manufacturing
3363	Motor Vehicle Manufacturing
336211	Motor Vehicle Manufacturing
336312	Motor Vehicle Manufacturing
333618	Motor Vehicle Manufacturing
331	Primary metal manufacturing subcluster
331111	Primary metal manufacturing subcluster
221112	Primary metal manufacturing subcluster
001010	Primary metal manufacturing subcluster
331210	Primary metal manufacturing subcluster
331221	Primary metal manufacturing subcluster
331222	Primary metal manufacturing subcluster
331311	Primary metal manufacturing subcluster
331312	Primary metal manufacturing subcluster
331314	Primary metal manufacturing subcluster
331315	Primary motal manufacturing subcluster
004040	Primary metal manufacturing subcluster
331316	Primary metal manufacturing subcluster
331319	Primary metal manufacturing subcluster
331411	Primary metal manufacturing subcluster
331419	Primary metal manufacturing subcluster
331422	Primary metal manufacturing subcluster
331/23	Primary motal manufacturing subcluster
221404	Drimers metal manufacturing subcluster
331491	Primary metal manufacturing subcluster
331492	Primary metal manufacturing subcluster
331511	Primary metal manufacturing subcluster
331512	Primary metal manufacturing subcluster
331513	Primary metal manufacturing subcluster
331521	Primary metal manufacturing subcluster
331522	Primary metal manufacturing subcluster
331524	Primary motal manufacturing subcluster
001505	Filmary metal manufacturing subcluster
331525	Primary metal manufacturing subcluster
331528	Primary metal manufacturing subcluster
323110	Printing and Publishing
323111	Printing and Publishing
323112	Printing and Publishing
323113	Printing and Publishing
323114	Printing and Publishing
372115	Printing and Publishing
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323116	Printing and Publishing
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Other chemical and fertilizer mineral mining All other nonmetallic mineral mining Support activities for metal mining Support activities for nonmetallic minerals Line-haul railroads Short line railroads Construction, mining, and forestry machinery and equipment rental and leasing Automotive Upholstery Paints, Varnishes, Lacquers, Enamels, and Allied Products Adhesives and Sealants Printing Ink Tires and Inner Tubes Rubber and Plastics Hose and Belting Molded, Extruded, and Lathe-Cut Mechanical Rubber Goods Unsupported Plastics Film and Sheet Unsupported Plastics Profile Shapes Laminated Plastics Plate, Sheet, and Profile Shapes Plastics Pipe Plastics Bottles Foam Plastics Products Manufacturing Custom Compounding of Purchased Plastics Resins Plastics Plumbing Fixtures Flat Glass Pressed and Blown Glass and Glassware, NEC Glass Products, Made of Purchased Glass Automotive Stamping Steel Springs, Except Wire Carburetors, Pistons, Piston Rings, and Valves Electric Lamp Bulbs and Tubes Residential Electric Lighting Fixtures Commercial, Industrial, and Institutional Electric Lighting Fixtures Vehicular Lighting Equipment Lighting Equipment, NEC Household Audio and Video Equipment Storage Batteries Electrical Equipment for Internal Combustion Engines Truck and Bus Bodies Truck Trailers Motor Homes Motor Vehicle Parts Manufacturing Motor vehicle body manufacturing Gasoline engine and engine parts manufacturing Other engine equipment manufacturing Primary metal manufacturing subcluster Iron and steel mills Ferroalloy and related product manufacturing Iron, steel pipe and tube from purchase steel Rolled steel shape manufacturing Steel wire drawing Alumina refining Primary aluminum production Secondary smelting and alloying of aluminum Aluminum sheet, plate, and foil manufacturing Aluminum extruded product manufacturing Other aluminum rolling and drawing Primary smelting and refining of copper Primary nonferrous metal, except CU and AL Copper wire, except mechanical, drawing Secondary processing of copper Nonferrous metal, except CU and AL, shaping Secondary processing of other nonferrous Iron foundries Steel investment foundries Steel foundries, except investment Aluminum die-casting foundries Nonferrous, except AL, die-casting foundries Aluminum foundries, except die-casting Copper foundries, except die-casting Other nonferrous foundries, exc. die-casting Commercial lithographic printing Commercial gravure printing Commercial flexographic printing Commercial screen printing Quick printing **Digital printing** Manifold business forms printing Books printing Blankbook, looseleaf binders, and devices manufacturing Other commercial printing Tradebinding and related work Prepress services Printing ink manufacturing Sign manufacturing Newspaper publishers Periodical publishers Book publishers Directory and mailing list publishers

511191	Printi	ng and	Publ	ishing
511199	Printi	ng and	Publ	ishing
515111	Printi	ng and	Publ	ishing
515112	Printi	ng and	Publ	ishing
515210	Printi	ng and	Publ	ishing
516110	Printi	ng and	Pub	ishina
519110	Printi	ng and	Pub	ishino
519190	Printi	ng and	Pub	ishing
541430	Printi	ng and	Publ	ishing
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541860	Printi	ng and	Pub	ishing
541870	Printi	ng and	Pub	ishing
541890	Printi	ng and	Publ	ishing
541910	Printi	ng and	Publ	ishing
541922	Printi	ng and	Pub	ishina
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441120	Retai	Trade	Sect	tor
441720	Potai	l Trado	Soci	tor
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441222	Retai	Irade	Sect	tor
441229	Retai	Trade	Sect	tor
441310	Retai	Trade	Sect	tor
441320	Retai	Trade	Sect	tor
442110	Retai	Trade	Sect	tor
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444110	Retai	Trade	Sect	tor
444120	Retai	Trade	Sect	tor
444130	Retai	Trade	Sect	tor
444190	Retai	Trade	Sect	tor
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445120	Retai	Trade	Sect	tor
445210	Retai	Trade	Sect	tor
445220	Retai	Trade	Sect	tor
445230	Retai	Trade	Sect	tor
445291	Retai	Trade	Sect	tor
445292	Retai	Trade	Sect	tor
115200	Potai	l Trado	Sect	tor
440299	Detei	Trade	Seci	
445510	Relai	Trade	Seci	
446110	Retai	i Trade	Seci	tor
446120	Retai	Trade	Sect	tor
446130	Retai	Trade	Sect	tor
446191	Retai	Trade	Sect	tor
446199	Retai	Trade	Sect	tor
447110	Retai	Trade	Sect	tor
447190	Retai	Trade	Sect	tor
448110	Retai	Trade	Sect	tor
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448210	Retai	Irade	Sect	tor
448310	Retai	Trade	Sect	tor
448320	Retai	Trade	Sect	tor
451110	Retai	Trade	Sect	tor
451120	Retai	Trade	Sect	tor
451130	Retai	Trade	Sect	tor
451140	Retai	Trade	Sect	tor
151211	Potai	l Trado	Soci	tor
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452111	Retai	Irade	Sect	tor
452112	Retai	Trade	Sect	tor
452910	Retai	Trade	Sect	tor
452990	Retai	Trade	Sect	tor
453110	Retai	Trade	Sect	tor
453210	Retai	Trade	Sect	tor
453220	Retai	I Trade	Sect	tor
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453920	Retai	I I rade	Sect	tor
453930	Retai	Trade	Sect	tor
453991	Retai	Trade	Sect	tor
453998	Retai	Trade	Sect	tor

Greeting card publishers All other publishers Radio networks Radio stations Cable and other subscription programming Internet publishing and broadcasting News syndicates All other information services Graphic design services Marketing consulting services Advertising agencies Public relations agencies Media buying agencies Media representatives Display advertising Direct mail advertising Advertising material distribution services Other services related to advertising Marketing research and public opinion polling Commercial photography New Car Dealers Used Car Dealers Recreational Vehicle Dealers Motorcycle, ATV, and Personal Watercraft Dealers Boat Dealers All Other Motor Vehicle Dealers Automotive Parts and Accessories Stores Tire Dealers Furniture Stores Floor Covering Stores Window Treatment Stores All Other Home Furnishings Stores Household Appliance Stores Radio, Television, and Other Electronics Stores Computer and Software Stores Camera and Photographic Supplies Stores Home Centers Paint and Wallpaper Stores Hardware Stores Other Building Material Dealers Outdoor Power Equipment Stores Nursery, Garden Center, and Farm Supply Stores Supermarkets and Other Grocery (except Convenience) Stores **Convenience Stores** Meat Markets Fish and Seafood Markets Fruit and Vegetable Markets Baked Goods Stores Confectionery and Nut Stores All Other Specialty Food Stores Beer, Wine, and Liquor Stores Pharmacies and Drug Stores Cosmetics, Beauty Supplies, and Perfume Stores **Optical Goods Stores** Food (Health) Supplement Stores All Other Health and Personal Care Stores Gasoline Stations with Convenience Stores Other Gasoline Stations Men's Clothing Stores Women's Clothing Stores Children's and Infants' Clothing Stores Family Clothing Stores Clothing Accessories Stores Other Clothing Stores Shoe Stores Jewelry Stores Luggage and Leather Goods Stores Sporting Goods Stores Hobby, Toy, and Game Stores Sewing, Needlework, and Piece Goods Stores Musical Instrument and Supplies Stores Book Stores News Dealers and Newsstands Prerecorded Tape, Compact Disc, and Record Stores Department Stores (except Discount Department Stores) **Discount Department Stores** Warehouse Clubs and Supercenters All Other General Merchandise Stores Florists Office Supplies and Stationery Stores Gift, Novelty, and Souvenir Stores Used Merchandise Stores Pet and Pet Supplies Stores Art Dealers Manufactured (Mobile) Home Dealers **Tobacco Stores** 

All Other Miscellaneous Store Retailers (except Tobacco Stores)

454111	Retail Trade Sector	Electronic Shopping
454112	Retail Trade Sector	Electronic Auctions
454113	Retail Trade Sector	Mail-Order Houses
454210	Retail Trade Sector	Vending Machine Operators
454317	Retail Trade Sector	Liquefied Petroleum Gas (Bottled Gas) Dealers
454319	Retail Trade Sector	Other Fuel Dealers
454390	Retail Trade Sector	Other Direct Selling Establishments
481111	Transportation and Logistics	Scheduled passenger air transportation
481112	Transportation and Logistics	Scheduled freight air transportation
481211	Transportation and Logistics	Nonscheduled air passenger chartering
481212	Transportation and Logistics	Nonscheduled air freight chartering
481219	I ransportation and Logistics	Other nonscheduled air transportation
482111	Transportation and Logistics	Line-haul railroads Short line railroads
402112	Transportation and Logistics	Deen sea freight transportation
483112	Transportation and Logistics	Deep sea passenger transportation
483113	Transportation and Logistics	Coastal and Great Lakes freight transportation
483114	Transportation and Logistics	Coastal and Great Lakes passenger transportation
483211	Transportation and Logistics	Inland water freight transportation
483212	Transportation and Logistics	Inland water passenger transportation
484110	Transportation and Logistics	General freight trucking, local
484121	Transportation and Logistics	General freight trucking, long-distance TL
484122	I ransportation and Logistics	General freight trucking, long-distance LTL
464210	Transportation and Logistics	Osed household and onice goods moving Other specialized trucking local
484230	Transportation and Logistics	Other specialized trucking, local
485112	Transportation and Logistics	Commuter rail systems
485510	Transportation and Logistics	Charter bus industry
485999	Transportation and Logistics	All other ground passenger transportation
486110	Transportation and Logistics	Pipeline transportation of crude oil
486210	Transportation and Logistics	Pipeline transportation of natural gas
486910	Transportation and Logistics	Refined petroleum product pipeline transportation
486990	Transportation and Logistics	All other pipeline transportation
488111	Transportation and Logistics	Air traffic control
488119	I ransportation and Logistics	Other airport operations
400190	Transportation and Logistics	Support activities for rail transportation
488310	Transportation and Logistics	Port and harbor operations
488320	Transportation and Logistics	Marine cargo handling
488330	Transportation and Logistics	Navigational services to shipping
488390	Transportation and Logistics	Other support activities for water transportation
488410	Transportation and Logistics	Motor vehicle towing
488490	Transportation and Logistics	Other support activities for road transportation
488510	Transportation and Logistics	Freight transportation arrangement
488991	Transportation and Logistics	Packing and crating
488999	Transportation and Logistics	All other support activities for transportation
492110	I ransportation and Logistics	Couriers
492210	Transportation and Logistics	General warehousing and storage
493120	Transportation and Logistics	Refrigerated warehousing and storage
493130	Transportation and Logistics	Farm product warehousing and storage
493190	Transportation and Logistics	Other warehousing and storage
532411	Transportation and Logistics	Commercial air, rail, and water transportation equipment rental and leasing
541614	Transportation and Logistics	Process, phys dist and log consulting services
561910	Transportation and Logistics	Packaging and labeling services
336	Transportation equipment manufacturing subcluster	Transportation equipment manufacturing subcluster
336111	Transportation equipment manufacturing subcluster	Automobile manufacturing
336112	I ransportation equipment manufacturing subcluster	Light truck and utility vehicle manufacturing
330120	Transportation equipment manufacturing subcluster	Meter vehicle body manufacturing
336212	Transportation equipment manufacturing subcluster	Truck trailer manufacturing
336213	Transportation equipment manufacturing subcluster	Motor home manufacturing
336214	Transportation equipment manufacturing subcluster	Travel trailer and camper manufacturing
336311	Transportation equipment manufacturing subcluster	Carburetor, piston, ring, and valve manufacturing
336312	Transportation equipment manufacturing subcluster	Gasoline engine and engine parts manufacturing
336321	Transportation equipment manufacturing subcluster	Vehicular lighting equipment manufacturing
336322	Transportation equipment manufacturing subcluster	Other motor vehicle electric equipment manufacturing
336330	Transportation equipment manufacturing subcluster	Motor vehicle steering and suspension parts
336340	Transportation equipment manufacturing subcluster	Motor vehicle brake system manufacturing
336350	I ransportation equipment manufacturing subcluster	Motor vehicle power train components manufacturing
336370	Transponation equipment manufacturing subcluster	Motor vehicle sealing and interior unit manufacturing
336391	Transportation equipment manufacturing subcluster	Motor vehicle air-conditioning manufacturing
336399	Transportation equipment manufacturing subcluster	All other motor vehicle parts manufacturing
336411	Transportation equipment manufacturing subcluster	Aircraft manufacturing
336412	Transportation equipment manufacturing subcluster	Aircraft engine and engine parts manufacturing
336413	Transportation equipment manufacturing subcluster	Other aircraft parts and equipment
336414	Transportation equipment manufacturing subcluster	Guided missile and space vehicle manufacturing
336415	Transportation equipment manufacturing subcluster	Space vehicle propulsion units and parts manufacturing
336419	Transportation equipment manufacturing subcluster	Other guided missile and space vehicle parts
336510	I ransportation equipment manufacturing subcluster	Rairoad rolling stock manufacturing
336611	ransportation equipment manufacturing subcluster	Ship building and repairing
3360012	Transponation equipment manufacturing subcluster	Boar building
220221	manaponation equipment manufacturing subcluster	motoroyolo, bioyolo, and parts manulacturing



Outreach and International Affairs

# Targeting the next link in the "valueadded" chain: Industry cluster and labor market analysis for the Alleghany Highlands Region

Prepared by: Whitney Bonham John Provo, Ph.D.

June, 2008

**OFFICE OF ECONOMIC DEVELOPMENT** 



*Invent the Future* 702 University City Boulevard • Blacksburg, Virginia 24061-0162 • 540.231.5278 • Fax: 540.231.8850 A recent report on challenges to economic development in The Alleghany Highlands, published by the Alleghany Foundation, highlighted a diverse array issues facing the region.<sup>1</sup> The decline of employment in traditional manufacturing firms is a key concern cited in the Foundation's report.

The research presented in this paper focuses more narrowly on a select set of industries including: wood and wood products, apparel and textile manufacturing, and chemical and chemical products. These industries represent three sectors that were traditionally at the core of the region's economy.

We document the characteristics and conditions of existing firms in these industries, their occupational structures and skills training characteristics, relevant educational and training facilities, and labor market intermediaries. From this research we find potential new value-added niches emerging in each of these industries. These are potential launching points for new opportunities that will be competitive in the face of global competition. They can utilize the aptitude and skills of workers across the region.

We further identified many production occupations within the three industries as sharing similar skill sets, highlighting potential for mobility among workers in the sectors. However, employment levels in many of the region's production occupations are in decline due to offshoring and increased automation. Consequently, a way to help reduce potential declines in the region's manufacturing economy is to take proactive steps to ensure that the region possesses a labor force equipped with the increasingly advanced skill sets required by firms and industries to implement advanced manufacturing and value-added production processes.

With respect to wood products, the report recommends:

- Continued efforts to promote relationships for training workers in advanced manufacturing techniques, forest technology, and fine woodworking at the vocational education, community college, and university level.
- Continued efforts to foster existing relationships with local education and training centers, as well as consider developing additional relationships at the college and university level.
- Explore efforts to promote sustainable wood products and practices by encouraging entrepreneurial growth and small business development.

<sup>&</sup>lt;sup>1</sup> See more information at this link: <u>http://www.alleghanyfoundation.org/</u>

With respect to textiles, the report recommends:

- Formulation of partnerships with local colleges, community colleges, the Jackson River Technical Center, and secondary schools to explore the skills and training needs of textile and apparel manufacturing firms within the region.
- Continue to focus on ways in which local community colleges, the Jackson River Technical Center, and secondary schools may promote and market advanced manufacturing training to both students and members of the existing workforce.
- Promote entrepreneurial activity. This is relevant to all sectors, but Bea Maurer and others in textiles offer particularly strong examples. The region may benefit from consideration of designing a database of small cottage industries (manufacturing/craft firms employing 1-4 people) which may be incorporated onto local websites. Additionally, it may be fruitful to explore how such small businesses may benefit from the existing tourism industry.

With respect to the chemical and chemical products manufacturing the report recommends:

- Consider efforts to focus on promoting sustainability of existing firms; this
  is especially important due to the fact that many large regional employers
  in various other sectors, notably the wood products industry, rely on
  services provided by local chemical and chemical products manufacturers.
  Consequently, one may also argue that the chemical and chemical
  products manufacturing industry is also dependent on other industry
  sectors to purchase their products.
- Support small business development in this sector. As noted through national industry projections, small and specialized chemical companies will be the most likely to experience future growth and sustainability.
- Consideration of efforts to attract chemical and chemical products manufacturing firms to locate in the Alleghany Highlands region.
   Potentially target firms specializing in providing services to the wood products, and apparel and textile manufacturing industries.
- Market the available labor force possessing qualifications relevant to employment in the professional and production sectors of the chemical and chemical products manufacturing industry. Efforts to establish a local campaign similar to Return to Roots may prove beneficial for identifying qualified individuals seeking employment opportunities in the Alleghany Highlands region. Identification and marketing of a labor pool of young retirees, or members of the traditional workforce possessing experience working in the chemical or chemical products manufacturing may also be helpful for efforts to recruit firms to the region.

### Table of Contents

List of Figures and Tables	II-vii
Foreword	II-xi
Introduction	II - 1
Industry Overview	II - 6
Occupational Structure	II-13
Labor Market Intermediaries	II-34
Labor Market Analysis	II-55
Key Findings and Implications	II-73
Appendices	II-79

## List of Figures and Tables

Table 1: Estimated wood products employment by firm
Table 2: Estimated textile and apparel employment by firm
Table 3: Estimated chemical employment by firm
Table 4: Logging operations    II-13
Table 5: Projections, logging equipment operators by industry
Table 6: Average hourly wages, logging occupations by industry
Table 7: Sawmills and production firms         II-19
Table 8: Textile and apparel manufacturing in the region         II-20
Table 9: Openings, VEC Covington Office, June 2008
Table 10: Chemical firms    II-26
Table 11: Earnings in chemical occupations
Table 12: Hourly wages in chemical manufacturing         II-29
Figure 1: Trends for select degrees awarded II-31
Table 13: Hourly wages for chemical manufacturing sectors         II-32
Table 14: Degrees offered nearby relevant to wood products II-38
11-11

Table 15: Degrees offered nearby relevant to textiles         III	-39
Table 16: Degrees offered nearby relevant to chemicals II	-41
Table 17: Degree options and career tracks	-43
Table 18: High school programs       II-	-51
Figure 2: Commute shed extended region II	-56
Figure 3: Labor shed extended region II	-56
Table 19: Commuting costs Alleghany HighlandsII	-57
Table 20: Educational attainment extended region	-58
Table 21: Post-graduation plans, 2006-2007	-59
Figure 4: Population extended regionIl	-59
Figure 5: Unemployment extended region II	-61
Table 22: Focus group student demographics	-64
Table 23: Survey demographics       II	-67
Figure 6: Alumni occupations II	-67
Table 24: Respondents concerns about jobsIl	-68

Table 25: Respondents perceptions about rural opportunities         II-68
Figure 7: Student awareness of the regionII-68
Figure 8: Alumni awareness of the region II-69
Table 26: Focus group student demographics
Table 27: Occupational Report from the Bureau of Labor Statistics (Textile and Apparel Manufacturing) 2006
Table 28: Standard Occupation Classification (SOC) Codes Found in the         Wood Products, Textile/Apparel Manufacturing, and Chemical/Chemical         Products Industry Sectors
Table 29: Common Production Occupations in the Alleghany Highlandsand Related Production Occupations in Chemical and Chemical ProductsManufacturingII-111

# Foreword

During November of 2007, the Virginia Tech Office of Economic Development (OED) presented a response to a request for proposals issued by the Roanoke Valley-Alleghany Regional Commission to conduct an economic analysis in support of a cluster/target industry analysis for the Alleghany Highlands. Within this proposal, OED agreed to provide the following services:

- 1. Assistance with the design of interview and focus group questions
- 2. Assistance with the interpretation of data from quantitative and qualitative phases of the project
- 3. Design and implementation of a labor market survey to dovetail with the industry cluster analysis
- 4. Develop a report summarizing findings
- 5. Presentation of results of this project to stakeholders

This report provides an overview of findings and considerations primarily generated through query of three industry sectors which include: Wood and Wood Products Manufacturing, Textile and Apparel Manufacturing, and Chemical and Chemical Products Manufacturing. These industries were selected based on a number of factors including their significant location quotient change during the period of 1992-2006.

Factors examined for each industry include:

- Existing Industry
  - Overview of firms within the region
- Occupational Structures and Skills Training
  - Examination of national, state, and local industry trends, occupational structures, and skills requirements. Wage and employment projects are also provided in this section.
- Intermediaries
  - Overview of local public and private intermediaries which provide services to job seekers and/or industry
  - Overview of local colleges/universities, community colleges, vocational training facilities, and secondary schools which provide programming to support the target industries
- Labor Market Analysis
  - Provides brief demographical overview of the region.
  - Identifies occupations with overlapping skills sets
  - o Explores and addresses potential labor market challenges
- Final Considerations
  - Provides a summary of the industry examination; emphasis on ways to promote industry sustainability and future growth

Data for this report was drawn from various sources including primary sources such as interviews and focus groups with employers, students and leaders around the region. Their participation was vital. Secondary data from national, state, and local governmental agencies and educational institutions was also collected and analyzed.

Additionally, this study draws on a technical report compiled by The Economic Development Studio @ Virginia Tech. During fall 2007, the studio class completed a detailed report examining the wood and wood products manufacturing sector in the Alleghany Highlands. A copy of the studio's study is included in the addendum section of this report. Further review of the studio's study is study is highly recommended.

This work could not have been completed without the active participation and guidance of a number of individuals in the Alleghany Highlands region including individual leaders in business, government, and education. In addition to those who gave graciously of their time to sit in interviews of participate in focus groups, the authors would particularly like to acknowledge the contributions of David Kleppinger, Executive Director of the Alleghany Highlands Economic Development Corporation; Wayne Strickland, Executive Director of the Roanoke Valley Alleghany Regional Commission, and John Hull, Regional Economic Resources Planner with the Commission. While all their contributions were critical, any errors and omission remain solely the responsibility of the authors.

# Introduction

#### Globalization's impacts and the transition to value-added

Many traditional industries and manufacturing firms began to feel the economic impacts produced by international competition from the forces of economic globalization, felt increasingly since the 1990's, Consequently, this produced significant out-sourcing/offshoring of many traditional manufacturing production processes to regions of the world with cheaper labor. Industries hard hit by the out-sourcing/offshoring phenomena include the textile and apparel industry, the automotive industry, and the wood and wood products manufacturing industry. During the late 1990's, many regions in Virginia were adversely affected by offshoring trends as significant declines in the loss of traditional anchor firms in the aforementioned industries reverberated across the Commonwealth. Like neighboring regions in Southwest Virginia and Southside Virginia, the Alleghany Highlands was adversely impacted by the loss of major employers in the textile/apparel, and automotive components industries. Notably, the region has lost four major employers since the beginning of the decade: Halmode Apparel, Parker-Hannifin, Leer, and AET Films.

The communities of rural Virginia are not the only regions which have faced economic challenges as a result of increased globalization. The steel firms located in Pittsburgh, PA also serves as an example of an industry impacted by out-sourcing/offshoring. However, as recently noted during an NPR broadcast on December 19, 2007, despite tremendous declines in the number of large steel mills, the steel industry is still alive in Pittsburgh - it simply exists in a different form.<sup>2</sup> Today's steel industry is characterized by numerous small firms which specialize in a variety of value-added steel production processes. The emergence of value-added products is a way in which traditional manufacturing industries may achieve a competitive advantage in the international economy. Consequently, the manufacturing processes for production of value-added products often require an extensive understanding of electronics, computers, robotics, and the materials being worked with. Thus, because of the use of such technology, a labor pool equipped with an advanced skills set is a standard requirement. Subsequently, advanced manufacturing processes are often cited as a way through which to inject a value-added component into traditional production processes.

#### Advanced manufacturing as a component of a value-added niche

Upon review of the three industry sectors examined in this report, national and state trends for each industry show an increasing dependency upon a highly

<sup>&</sup>lt;sup>2</sup> For more information see: <u>http://www.npr.org/templates/story/story.php?storyId=17390474</u>

skilled workforce that will adapt to technological advances. Consequently, trends within each industry examined in this report show a dependency upon production workers trained in advanced manufacturing processes. According to the National Council for Advanced Manufacturing, firms considered to be "advanced manufacturers" "…make extensive use of computer, high precision, and information technologies [and integrate such] with a high performance workforce in a production system capable of furnishing a heterogeneous mix of products in small or large volumes, both with efficiency of mass production and the flexibility of custom manufacturing in order to respond rapidly to customer demands."<sup>3</sup>

Examination of existing local industry shows that many existing firms in the Alleghany Highlands will likely be forced to consider implementation of, or further integration of, advanced manufacturing process in efforts to remain competitive in today's global economy. Thus, in efforts to address this growing trend, the communities of the Alleghany Highlands seeking to attract and retain firms engaged in advanced manufacturing must focus efforts to increase the skills set of both emerging and existing workforce, so as to ensure that the available labor pool is able to perform the tasks and duties required for advanced manufacturing production processes. To increase the training and skills set of both the emerging, and existing labor pool, this report recommends consideration of efforts to further promote advanced manufacturing skills/training programs at the secondary, community college, and college/university level.

#### Secondary Schools/ Vocational Education

Although secondary schools and vocational training facilities in the Alleghany Highlands region have been very active in promoting programs related to general career development and educational advancement, this report recommends that such institutions begin to explore ways to further promote training and awareness of advanced manufacturing processes, particularly in the area of wood and wood products manufacturing. Two examples of national programs addressing advanced manufacturing skills training at the secondary and vocational school level include WoodLINKS USA, and Dream It ! Do it!

WoodLINKS USA seeks to provide skills training to help secondary and vocational school students to become certified to a national industry standard for the wood industry (WoodLINKS USA).<sup>4</sup> Additionally, this program also seeks to prepare students for future college/university study in the field of wood products manufacturing. The Virginia Tech Department of Wood Science actively supports this program and has several students who are former program participants. In addition to providing skills training, WoodLINKS USA also seeks to provide career development opportunities for students to explore employment

<sup>&</sup>lt;sup>3</sup> Source: <u>http://www.nacfam.org/</u>

<sup>&</sup>lt;sup>4</sup>Source: <u>http://www.woodlinks.com/</u>

tracks in the areas of management, supervision, skilled trades, production, and professional and technical assistance, in efforts to expose students to a variety of opportunities to match their own interests to job opportunities within the industry. Additionally, WoodLINKS USA also promotes industrial collaboration to further expose students to opportunities in the field of wood products manufacturing. At present, Pocahontas Woods in nearby Pocahontas, WV is the only regional organization participating in the WoodLINKS USA program.

Developed by the National Association of Manufacturers (NAM), and The Manufacturing Institute (MI), Dream It! Do!, Is a national campaign that seeks to promote an awareness of advanced manufacturing careers to secondary and vocational students.<sup>5</sup> Services offered by Dream It! Do It! Include access to national, state, and local job and internship databases, information about local training facilities, promotion of local events, and interactive career development tools. Currently, Dream It! Do It! maintains programs in seven regions – two of which include Southwest Virginia and the Commonwealth of Virginia. The Alleghany Highlands may benefit from marketing opportunities and regional exposure that may be provided through participation in this program.

#### Community College/College and University

Continued support of the Advanced Manufacturing & Packaging Technology (AMPT) program at Dabney S. Lancaster Community College (DSLCC) is an important component for helping to provide additional skills training to members of the existing workforce who seek educational advancement in advanced manufacturing production processes. As existing local firms may experience potential pressures to upgrade their technological processes, providing additional skills training/retraining will be very important to ensuring the stability of existing industry structures. Additionally, this report recommends that AMPT continue to reach out to existing local industry to further promote this program, focusing not only on the large anchor firms, but also on many small and medium sized employers. Furthermore, this report also offers the consideration of generating greater partnerships with local colleges and universities within the region so as to help familiarize students with degree options applicable to the field at the bachelor's level and above. Additionally, outreach to local colleges and universities will help the program stay informed of specific research efforts directly related to the field of advanced manufacturing.

In addition to serving as a way to further train members of the existing workforce, the AMPT program is also important to providing the emerging workforce with a basic skills set that will allow adaptability to future global economic trends. Furthermore, targeting members of the emerging workforce is also important because such will help with retention of local citizens who seek to obtain hightech training without leaving the region. Consideration of ways to provide dual-

<sup>&</sup>lt;sup>5</sup> For more information see: <u>http://www.dreamit-doit.com/</u>

enrollment opportunities for students at secondary schools and vocational training center to participate in this program is also recommended in that such may be attractive to individuals seeking further educational opportunities at the college/university level in subjects such as Industrial Engineering, Wood Science, and Engineering Science and Mechanics. In summary, by providing the emerging workforce with "fast-track" opportunities that would allow greater educational attainment in a shorter period of time, the region is taking proactive measures to increase human capital which may be especially important to filling the positions of retiring "baby boomers" during the next decade.

#### Small firms and value-added products

Firms utilizing advanced manufacturing techniques are not the only type of industries producing value-added products. At present, there are several small firms in the Alleghany Highlands that produce a value-added product. Examples of such firms include the Fincastle Gallery, Mad Maggie's Wool, and Union Church Millworks. Each of these firms is characterized as a value-added firm because such takes a traditional product and uses a labor intensive, or specialized process (hand carving, hand spinning, ect.) to create a product that is unique from a traditionally manufactured product.

Very often, value-added firms begin as an entrepreneurial venture, and thus may have some risk associated with the formation and expansion of such firms. Recognizing this risk, several public agencies are available to provide fiscal assistance. The U.S. Department of Agriculture-Rural Development is an example of such agency that currently offers Value-Added Producer Grants (VAPG). Examples of recent VAPG approvals include funding to market lumber and funding to market towels.

Growth of cottage industries is offered as a consideration of this report due to the fact that such firms may be able to effectively market their goods to local resorts and tourists. In order to promote growth of existing and future cottage industries, this report believes that the region would benefit from using existing organizations, such as the local Chamber of Commerce, as entities through which to market existing grants and programs to provide assistance to individuals hoping to start their own business. The region may also benefit by hiring a consultant to produce a marketing campaign to promote the handicraft of the Alleghany Highlands to local resorts and tourists.

#### **Concluding Remarks**

As noted within this report, the overall vitality of the economy of the Alleghany Highlands correlates to the region's ability to promote growth and sustainability of existing "traditional" industries. To achieve this goal, the region must undertake proactive steps to promote value-added production processes. This is achieved by promoting workforce development efforts to provide the emerging and existing labor pool with opportunities to obtain education advancement, particularly in the area of advanced manufacturing. Additionally, this report urges further exploration into the emergence of cottage industries as a potential way to promote economic diversification. With the presence of two internationally known resorts in the region, such types of firms may potentially find a market for their goods in the regional tourism industry. Additionally, as fiber backbone and internet access becomes more prevalent throughout the region, such cottage industries may further expand the potential market for their goods. To support such, regional collaboration is necessary to effectively "brand" goods produced by the cottage industries.

## **Industry Overview**

#### Wood and Wood Products Manufacturing

Overall, the wood and wood products manufacturing sector in the Alleghany Highlands appears to be a very important driver in the regional economy. As detailed in Tables One (following page), while MeadWestvaco and its supporting contractors employ the greatest number in the region in this sector, many small wood product manufacturing firms and logging companies contribute to the overall vitality of the industry. Consequently, an examination of existing industry reveals the presence of several smaller firms, specializing in the production of custom wood products. Examples of such value-added wood products firms include Union Church Millworks and the Fincastle Gallery. Although the aforementioned firms do not employ many individuals, their presence reveals the existence of a labor force that possesses an extensive knowledge of custom woodcraft.

National and state industry trends suggest challenges and opportunities for firms in the industry. Key factor in remaining competitive the region should focus on include finding ways to address sustainability, as well as increased production mechanization and industrial automation.

Sustainably harvested wood is one market segment that appears strong even as others weaken in the face of the housing slump. The Blue Ridge Forest Cooperative (BRFC)<sup>6</sup> and Appalachian Sustainable Development (ASD) are cooperative organizations providing examples of implementing sustainable practices, while also focusing on marketing their value-added products.

Sustainable wood practices are especially important in order to protect the "natural environment, air and water quality, biodiversity and wildlife" in the region's forest communities. Through protection of natural resources and sustainable wood practices, communities also take proactive steps to protect marketable outdoors recreational opportunities which may be applicable to the region's tourism industry.<sup>7</sup>

<sup>&</sup>lt;sup>6</sup> For more see: <u>http://publicecology.org/brfc/</u> and <u>www.asdevelop.org/sustainable\_woods.html</u>

<sup>&</sup>lt;sup>7</sup> Source: <u>www.asdevelop.org/sustainable\_woods.html</u>

Firm Name	Location	Estimated Number of Employees
Alleghany		1,607-1,672
MeadWestvaco	Covington/Low Moor	1,500
Bennett Logging and Lumber Inc	Covington	45
Union Church Millworks	Covington	16
Bolivia Lumber Company	Clifton Forge	20-49
Sonoco Products Company	Clifton Forge	20-49
Deeds Brothers Logging	Clifton Forge	5-9
Bradley's Sawmill	Covington	1-4
Bath		11-23
Bluegrass Woods	Millboro	1-4
Augusta Lumber Inc	Warm Springs	10-19
Botetourt		2-8
The Fincastle Gallery	Fincastle	1-4
Thompson Building Supply Inc	Buchanan	1-4
Highland		13-31
Hooke Brothers Lumber Company	Monterey	10-19
Barney's Logging	Blue Grass	1-4
Moyers Logging	Monterey	1-4
Kelly Farms Inc	Monterey	1-4
Rockbridge		301-632
Mundent-Hermetite Inc	Buena Vista	50-99
Burke Parsons Bowlby Corporation	Goshen	50-99
Fitzgerald Lumber and Log	Fairfield	50-99
North Fork Lumber Company	Goshen	50-99
Blue Ridge Lumber Company L.L.C.	Goshen	20-49
Taylor Ramsey Corporation	Natural Bridge	20-49
Shenandoah Hardwood Lumber Company	Buena Vista	20-49
George Shumate Inc	Lexington	20-49
Sibold Logging	Goshen	5-9
High Country Forest Products	Lexington	5-9
Value Mart	Buena Vista	5-9
B&D Trucking	Lexington	5-9
Thomas Alphin	Goshen	1-4
W.R. Deacon & Sons	Lexington	unknown

#### Table 1: Estimated Wood Products Employment by Firm

Source: infoUSA - 2008 Edition 2

Additionally, to address sustainability and recent industry technological advances, this report highlights the increasing industry demand for individuals trained in advanced manufacturing processes. Thus, in efforts to capitalize upon such growing trends, it is recommended that measures be undertaken to further market and promote the advanced manufacturing curriculum at Dabney S. Lancaster Community College. Promotion of this program is very important to efforts of both training the existing wood products manufacturing labor force, as well as to equipping traditional students with a diverse skills set that will be necessary for a competitive advantage in today's manufacturing economy.

Continued focus on educational and training opportunities for industries supporting the existing wood and wood products industry sector is also important

to the overall vitality of existing firms. This report notes that strengths in programs such as Welding at both the vocational and community college level, provides both existing and prospective firms with additional support in the area of logistics. Additional efforts to promote skills training in value-added wood product production is also noted through the new degree program for an Associate in Applied Science in Fine Woodworking program being conducted by Pocahontas Woods through New River Community and Technical College in Lewisburg, WV.

Pocahontas Woods provides additional opportunities for promoting training and entrepreneurial activity in the production of hand-crafted furniture.<sup>8</sup> Located in a 3,300 sq. foot workshop in neighboring Marlinton, WV, Pocahontas Woods is a non-profit organization dedicated to training youth and adults in skilled woodworking, as well as to promoting entrepreneurial, business planning, financing, marketing, and quality control education. In addition, Pocahontas Woods also provides numerous specialized courses in techniques such as dovetailing, steam bending a toboggan, and learning to make a turkey call. Enrollment in weekend courses is offered to the general public for a nominal fee. Furthermore, Pocahontas Woods is in the process of establishing a "business incubator" type program through which the organization will lease equipment to the public.

Taking into account the information derived from this portion of our report, we present the following considerations:

Continue efforts to promote relationships for training members of the traditional and emerging workforce in advanced manufacturing techniques, forest technology, and fine woodworking program at the vocational education, community college, and university level. Continue to foster existing relationships with local education and training centers, as well as consider developing additional relationships at the college and university level. Notably, this report recommends further development of relationships and dialogue with the Virginia Tech Department of Wood Science, and the Virginia Tech Department of Chemical Engineering. By fostering relationships with local universities, the region will also be undertaking measures to help address future retirements in the management of local firms.

<sup>&</sup>lt;sup>8</sup> For more information see: <u>http://www.pocahontaswoods.com/</u>

- Focus efforts towards increasing entrepreneurial activity in the local wood products industry. At present, there exists a great opportunity for marketing value-added wood products and high-end wood craft through the local tourism industry. This consideration also builds upon recommendations produced by the Spring 2008 K.W. Poore & Associates report to the Alleghany Foundation for promoting investments in homegrown industries and retail opportunities to attract tourists.<sup>9</sup>
- Consider efforts to explore environmental sustainability issues. Notably, this report urges further review of sustainable forestry practices. Organizations such as the Blue Ridge Forest Cooperative and Appalachian Sustainable Development may provide value resources for helping to begin a regional dialogue in regard to this matter. Through promotion of sustainable forestry practices, the region will also be helping to ensure that the availability and diversity of local hardwoods will continue to be present.

#### Textile and Apparel Manufacturing

Despite a relatively small number of firms, the overall vitality of textile and apparel manufacturing sector in the Alleghany Highlands appears to be consistent (See Table Two below). This consistence is likely attributable to the fact that many firms in the region are textile product mills, and thus able to implement technology advances to maintain industry competitiveness. Mohawk Industries in Rockbridge County is an example of a textile product mill which operates research and development facilities on-site, thus making it an example of a local firm seeking a competitive advantage through focusing on product or production technological advances. However, because textile product mills require consistent technological evolution, provision of a workforce able to diversify to address new skills requirements is very important to the overall sustainability of the industry in the Alleghany Highlands region.

<sup>&</sup>lt;sup>9</sup> Source: <u>www.alleghanyfoundation.org/images/AlleghanySummary.pdf</u> see p 30.

Firm Name	Location	Estimated Number of	
Alleghany		Employeee	
The Bacova Guild	Low Moor	337	
Bath	·	•	
Kool Dri Rainwear	Millboro	10-19	
Diamond Triple C. Ranch (Echo	Millboro	unknown	
Valley Fruit and Fiber)			
Botetourt			
Flag Windcrafters Guild	Troutville	1-4	
Blue Ridge Sportswear	Daleville	10-19	
Highland			
Mad Maggie's Wool	Blue Grass	unknown	
Rockbridge			
Mohawk Industries (Lees Carpet)	Glasgow	1250	
Bea Maurer	Fairfield	120	
Painter Space Print	Buena Vista	51-100	

Table 2:	Estimated	Textile	and Ap	parel Em	plovr	ment by	/ Firm
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Source: infoUSA - 2008 Edition 2

Firm evolution is also important, especially for apparel manufacturing firms which possess large numbers of individuals trained in sewing and cutting processes, the most at-risk position for offshoring/out-sourcing. Therefore, in addition to focusing on skills training, localities may benefit from strategic planning measures to explore how at-risk workers may use their previous experiences in related industry.

Encouraging entrepreneurship and start-up cottage industries in the textile and apparel manufacturing sector may be a potential way to help address at-risk employees, as well as to promote the sustainability of this industry within the region. Entrepreneurship has proven successful in this region, as noted through the histories of firms such as The Bacova Guild and Bea Maurer, Inc. Given the availability of land for fleece production in the area, the crafting yarn and homespun products may find a niche in the local tourism market. Furthermore, there are numerous craft shops within the region which may provide retail outlets for local cottage industries.

Taking into account matters addressed in this report, the Alleghany Highlands may benefit from consideration of the following:

- Formulation of partnerships with local colleges, community colleges, the Jackson River Technical Center, and secondary schools to explore the skills and training needs of textile and apparel manufacturing firms within the region.
- Continue to focus on ways in which local community colleges, the Jackson River Technical Center, and secondary schools may promote and market
advanced manufacturing training to both students and members of the traditional workforce.

 Promote entrepreneurial activity – the region may benefit from consideration of designing a database of small cottage industries (manufacturing/craft firms employing 1-4 people) which may be incorporated onto local websites. Additionally, links may want to be explored as to how small businesses may benefit from the existing tourism industry

#### **Chemical and Chemical Products Manufacturing**

Examination of the chemical and chemical products manufacturing industry in the Alleghany Highlands region reveals that existing firms in this sector generally provide goods and services to large regional employers, notably in the wood products industry. Thus, the future sustainability of this industry is likely dependant on the economic prosperity of other regional firms. Consequently, many existing firms in this sector provide the majority of their services to one firm, MeadWestvaco. Subsequently, one may also make the argument that many regional firms also dependent on the local chemical and chemical products manufacturing sector because such firms allow for increased competitiveness, due to cost reductions produced by purchasing chemical goods and services locally.

In efforts to help promote the sustainability of the existing chemical industry in this region, as well as to encourage future growth, local economic development efforts may benefit through promotion of a labor pool equipped with necessary skills and educational training for employment in professional and production occupations in the chemical and chemical products industry. Notably, targeting firms which utilize polymer technologies may be beneficial since many individuals in this region have previous work experience in this field. Consequently, many wood products and textile firms are becoming increasingly dependent on technological advances related to polymers. Noting such, one may also present the case that growth in polymers may contribute to growth and expansion in the existing wood products, and apparel and textile manufacturing sectors due to the fact that polymers are important components for value-added products.

Taking into account the information collected in this report, the following considerations are offered:

 Consideration of efforts to focus on promoting sustainability of existing firms; this is especially important due to the fact that many large regional employers in various other sectors, notably the wood products industry, rely on services provided by local chemical and chemical products manufacturers. Consequently, one may also argue that the chemical and chemical products manufacturing industry is also dependent on other industry sectors to purchase their products.

- Support small business development in this sector. As noted through national industry projections, small and specialized chemical companies will be the most likely to experience future growth and sustainability.
- Consideration of efforts to attract chemical and chemical products manufacturing firms to locate in the Alleghany Highlands region.
   Potentially target firms specializing in providing services to the wood products, and apparel and textile manufacturing industries.
- Market the available labor force possessing qualifications relevant to employment in the professional and production sectors of the chemical and chemical products manufacturing industry. Efforts to establish a local campaign similar to Return to Roots may prove beneficial for identifying qualified individuals seeking employment opportunities in the Alleghany Highlands region. Identification and marketing of a labor pool of young retirees, or members of the traditional workforce possessing experience working in the chemical or chemical products manufacturing may also be helpful for efforts to recruit firms to the region.

Firm Name	Location	Estimated Number of Employees
Alleghany		
Chemstation	Covington	5-9
General Chemical Corporation	Covington	1-4

#### Table 3: Estimated Chemical Employment by Firm

Source: infoUSA – 2008 Edition 2

# **Occupational Structure**

# Wood and Wood Products Manufacturing

Examination of the wood and wood products manufacturing industry in the Alleghany Highlands region reveals the presence of several firms specializing in a variety of products. For a complete firm listing, please reference Appendix II-A of this report. As one will note, there is a variance amongst these codes; therefore, for purposes of this report, the occupational structures and skills training for this industry sector will be broken down into two primary categories: loggers, and woodworkers. Loggers will be defined as those firms which harvest timber, and the woodworkers' category will encompass all other occupations which create a finished product from lumber. Additionally, this report will also examine national, state, and local occupational structures and skills training for select production workers, notably those positions directly related to paper and pulp mill operations. This section will conclude by offering an overview for how the region may capitalize on the existence of several value-added wood products firms.

For purposes of this report, logging operations will include all existing local firms possessing a NAICS code of 113310 (Logging Operations).

Firm Name	Location	Number of Employees
Deeds Brothers Logging	Alleghany County	5-9
Barney's Logging	Highland County	1-4
Moyers Logging	Highland County	1-4
Kelly Farms Inc	Highland County	1-4
Blue Ridge Lumber Co. LLC	Rockbridge County	20-49
Sibold Logging	Rockbridge County	5-9
High Country Forest Products	Rockbridge County	5-9
Thomas Alphin	Rockbridge County	1-4

# Table 4: Logging Operations

Source: infoUSA – 2008 Edition 2

As noted by the above chart, the majority of local firms are small operations, employing 1-4 individuals. Geographic locations of logging companies tend to be either in the Highland County or Rockbridge County area. Blue Ridge Lumber Company, L.L.C. is the largest employer in the logging industry.

# *Current National Trends – Timber-Cutting and Logging Workers*

According to the Bureau of Labor Statistics' (BLS) *Occupational Outlook Handbook*<sup>10</sup>, many logging workers often work in small crews where each individual is assigned a task related to cutting and hauling trees. While the

<sup>&</sup>lt;sup>10</sup> See: <u>http://www.bls.gov/OCO/</u>

number of crew members tends to vary based on the size of the logging firm, the BLS notes that a small logging crew typically consists of the following:

- 1-2 Tree Fallers (or 1 Tree Harvesting Machine Operator)
- o 1 Bucker
- o 2 Logging Skidder Operators
- 1 Logging Equipment Operator

*Tree Fallers* are the individuals responsible for cutting down the trees; often this is done by using gas-powered chainsaws. Some larger firms may use mobile felling machines. *Buckers* are those responsible for "trimming-up" the tree by removing tops, and branches. Buckers also cut the logs into lengths for shipping purposes.

Choke Setters, Rigging Slingers, Chasers, Log Sorters, Log Markers, Log Movers, and Log Chippers are each positions in the Logging Skidder Operators category. Choke Setters are responsible for fastening chains or cables around the logs, and then moving the logs via tow by a tractor (by Loading Equipment Operators), or winching system, to a loading area. Once in the loading area, Rigging Slingers and Chasers unload the logs from the chains and moving equipment.

Additionally, while the logs remain in the loading area, *Log Sorters*, *Log Markers*, and *Log Movers*, classify and prepare each type of log for use as either pulpwood, saw logs, or veneer logs. Once classified, logs are then inserted into chipping machines, which are tended by *Log Chippers*. *Logging Equipment Operators* then haul the logs from the loading area and place them on the truck. To load the logs onto the truck, Logging Equipment Operators often utilize a grapple loader.

Logging Equipment Operators are often also found on-site at many sawmills and pulp mills. Rather than utilizing a grapple loader, many Logging Equipment Operators at these sites simply unload the logs from the truck by use of a forklift. The BLS also notes that in many large or newer facilities, computer-guided equipment is sometimes used to unload the logs, thus requiring Logging Equipment Operators in such type facilities to be skilled in computer operations.

In addition to possessing labors to cut down the timber, many logging crews also include individuals to access the health and availability of trees to harvest. Examination of national logging industry trends also shows that many logging companies tend to be small. The BLS notes that it is often common to see the owner of a logging company working amongst with one/more of his/her logging crews. While in the field, the BLS notes that many owners often function as site supervisors, or operating load equipment.

National education trends and skills training shows that most individuals need to possess a high school diploma to work in this industry. Additionally, a

competitive advantage for entry into this field may also be obtained by possessing a 2-year community college degree in the field of forest harvesting, forestry, wildlife management, or conservation. Significant on-the-job training is also important for individuals seeking entry or advancement within the logging occupations. Additionally, many workers in this field should have physical stamina, maturity, and ability to quickly discern situations. Previous experience is often noted as one of the most important requirements for professional advancement.

The BLS notes that many logging companies are beginning to utilize professional trade organizations, such as the American Loggers Council, the Forest Resources Association, Inc., and the Northeastern Loggers Association, to conduct in-the-field training exercises. Training *Tree Fallers* is noted as being extremely important for both the safety of the tree, as well as to ensuring that the log is not harmed during the fall. The BLS also presents that many logging equipment manufacturers also routinely conduct training for companies purchasing new machinery.

At present, that majority of individuals (almost 50%) employed in the national logging industry serve in the capacity of *Logging Equipment Operators*. Nationally, Logging Equipment Operators earn an hourly wage of \$14.28. Other occupations within the industry earn comparable wages: Log Graders/ Scalers (\$14.06), and Fallers (\$13.80). Additionally, a total of 28% of all individuals in the logging industry are self-employed. Overall employment projections in the logging industry show a slight decline of 3% from 2006-2016. This decline will likely be attributable to foreign competition, and increased mechanization of equipment and processes. The positions of Tree Fallers, Buckers, and other labor-intensive positions are the most likely to experience decline. Consequently, positions requiring the use of heavy machinery and computer-guided equipment may experience future increases.

Overall, the BLS notes that future trends in the national logging industry are expected to remain steady during the next decade. Although this industry is heavily dependent on seasonal work, there exist emerging opportunities for individuals to find employment in occupations which support the logging industry. This is particularly relevant for machinery and truck repair. Thus, individuals with machinery or welding experience may find opportunity in the logging industry.

Additionally, forest and wildlife conservations may also find employment opportunities, due to national trends promoting sustainable forest practices. As environmental regulations become increasingly strict, many logging companies are employing individuals training in fields related to natural resource, forestry, and wildlife conservation. Consequently, because of such trends, the BLS predicts a 6% increase in the number of forest and conservation workers during 2006-2016.

# Current State Trends – Timber-Cutting and Logging Workers

Research of logging industry trends in Virginia shows that data through the Virginia Employment Commission is classified and reported using the NAICS 3-digit code of 113. Thus, data included in this portion of the report will reflect trends in the following areas:

- NAICS 113110 Timber Tract Operations
- NAICS 113210 Forest Nurseries & Gathering of Forest Products
- NAICS 113310 Logging

According to the VEC, in 2004, an estimated 2,186 individuals were employed forestry and logging operations (NAICS 113). By 2014, this number is expected to drop by 16% to 1,821. Examination of specific occupations within the logging industry show that logging equipment operators make up the majority of individuals employed in Virginia's logging industry. The VEC further classifies logging equipment operators, noting which type of operations are serviced: Crop Production, Forestry and Logging, Paper Manufacturing, Self-Employed Workers, Truck Transportation, and Wood Product Manufacturing.

2004-2014 VEC employment estimates and projections for employment trends amongst Logging Equipment Operators are available for Forestry and Logging, Self-Employed Workers, and Wood Product Manufacturing. Results for each are reflected in the Table Six below. Information for Logging Equipment Operators serving the Crop Production, Paper Manufacturing, and Truck Transportation industry were not disclosed.

	<u>/                                    </u>		
Industry	2004 Estimated	2014 Projected	% Difference
	Employment	Employment	
Forestry and Logging	614	595	-3.1%
Self-Employed Workers	476	418	-12.2%
Wood Product			
Manufacturing	176	161	-8.5%

 Table 5: Projections, Logging Equipment Operators by Industry

Source: Virginia Employment Commission, Labor Market Indicators<sup>11</sup>

Additionally, this report examined current average hourly wages for occupations within the logging industry. Information was available for the following positions: Logging Equipment Operators, and Logging Workers (All Other). The VEC provides data for each type of industry serviced by these positions.

<sup>&</sup>lt;sup>11</sup> See: http://www.vawc.virginia.gov//analyzer/default.asp?

	Logging Equipment Operators	Logging Workers (All Other)
Natural Resource/Mining	\$14.78	N/A
Manufacturing	\$11.58	\$12.25
Wood Products		
Manufacturing	\$11.35	N/A
Sawmills and Wood		
Preservation	\$11.27	N/A
Agriculture, Forestry, Fishing,		
and Hunting	\$14.78	N/A
Forestry and Logging	\$14.78	N/A
Logging	\$14.78	N/A
Total, All Industries	\$14.15	\$12.25

# Table 6: Average Hourly Wages, Logging Occupations by Industry

Source: Virginia Employment Commission, Labor Market Indicators

# Current Local Trends – Timber-Cutting and Logging Workers

With limitation on data available at the local level data on local employment trends and average hourly wages revealed information for the position of Logging Equipment Operator only.

Projected employment estimates from 2004 -2014 for Logging Equipment Operators show a decline in employment from 53 individuals to 44 individuals. Only data for Logging Equipment Operators who are self-employed was disclosed; Forestry/Logging and Wood Products Manufacturing Logging Equipment Operators were non-disclosable data. Results of average hourly wages were also only available for Logging Equipment Operators, revealing an amount of \$12.10/hour. As comparable to proceeding information, this amount is below the national average of \$14.28, and the state average of \$14.15.

# **Current National Trends- Woodworkers**

The BLS defines Woodworkers very generally as "those individuals which create finished products from lumber" (BLS, *Occupation Outlook Handbook*). Information regarding Woodworkers is often classified as either a sawmill operation, or an assembly – line/ production based manufacturing firm. Additionally, this terminology is often frequently utilized to describe woodworkers who complete products by utilizing hand tools, and tend to be artisan in nature. This section of the report will only examine woodworkers in sawmill operations, and production facilities.

## Sawmills

Sawmill operations cut and prepare wood for later use in a variety of products. The size of sawmills range from small/family-owned operations, to large operations, some of which may also be part of a wood products manufacturing firm. The BLS reports that in 2006, there were an estimated 65,000 individuals employed in sawmills, or plants with sawmilling operations, throughout the United States. By 2016, this number is projected to be 68,000 (BLS, 2006). Positions common in sawmills include sawing machine setters, sawing machine operators, and sawing machine tenders.

Each of the aforementioned positions in sawmills often require a high school diploma or a GED. However, due to increasing automation and computer/technology integration, additional vocational or community college training requirements are becoming more widespread. This is likely attributable to the fact that individuals at sawmills must possess basic to moderate mathematical skills, particularly those related to Geometry. Additionally, most training for employment in a sawmill operation is considered on-the-job. Employees at sawmills also must possess an understanding of safety practices, as well as have physical dexterity.

Employment growth in sawmills are likely to be slow. This is primarily because of increasing imports of cut wood, as well as the offshoring/out-sourcing of many wood products manufacturing entities. The BLS notes that firms seeking to remain competitive in this industry should explore efforts to modernize their operations. Nationally, average hourly wages for sawing machine setters, sawing machine operators, and sawing machine tenders are \$12.20/hour.

#### Production

According to the BLS, 3 out of 4 woodworkers in the United States are employed in manufacturing. Consequently, the majority of those employed (2 out of 5) in the manufacturing sector tend to work for firms producing household or office furniture. Review of current national skills and training trends in wood products manufacturing notes many parallels with trends in sawmilling operations.

Although many wood products manufacturing firms hire a diversity of positions, the degree of diversity is often based on the size of the firm, and the product being produced. For very general purposes, many wood products manufacturing firms are likely to hire the positions of woodworking machine operators and woodworking tenders. Individuals employed in the aforementioned positions will likely operate machinery such as lathes, routers, sanders, planers, drill presses, and shapers. Consequently, these standard production line duties will also vary from those wood products firms utilizing lumber, as opposed to wood pulp and wood flour.

Additional information for national, state, and local trends further related to wood products production operations is contained in the 2007 Virginia Tech Economic

Development Studio Study. This study will specifically address information relevant to pulp and paper mills. A copy of the 2007 Virginia Tech Economic Development Studio Study is included in the Appendix of this report.

Sawmills	Location	Number of Employees
Bennett Logging and Lumber		45
Inc	Alleghany County	
Bradley's Sawmill	Alleghany County	1-4
Augusta Lumber Inc	Bath County	10-19
Hooke Brothers Lumber		10-19
Company	Highland County	
Fitzgerald Lumber and Log	Rockbridge County	50-99
North Fork Lumber Company	Rockbridge County	50-99
Shenandoah Hardwood		20-49
Lumber Company	Rockbridge County	
George Shumate Inc	Rockbridge County	20-49
Production Firms	Location	Number of Employees
MeadWestvaco	Alleghany County	1,500
Union Church Millworks	Alleghany County	16
Bolivia Lumber Company	Alleghany County	20-49
Sonoco Products Company	Alleghany County	20-49
Bluegrass Woods	Bath County	1-4
Thompson Building Supply Inc.	Botetourt County	1-4
Mundent-Hermetite Inc	Rockbridge County	50-99
Burke Parsons Bowlby		50-99
Corporation	Rockbridge County	
Value Mart	Rockbridge County	5-9
B&D Trucking	Rockbridge County	5-9

#### **Table 7: Sawmills and Production Firms**

Source: Virginia Employment Commission, Labor Market Indicators

#### Summary- Wood and Wood Products Manufacturing

Upon examination of national, state, and local trends of the wood and wood products manufacturing industry, there are two prevailing themes: find the valueadded niche, or increase automation and mechanization. Addressing each of these themes will be important to achieving sustainable growth in the wood and wood products industry in the Alleghany Highlands. Consequently, when collecting data for existing industries, it was discovered that several value-added wood products firms are present in the Alleghany Highlands region. The Fincastle Gallery, located in the Fincastle community of Botetourt County is a great example of a value-added firm.

Operated by artist Jake Cress, the Fincastle Gallery produces high-end, custom furniture. Additionally, Cress has created a niche in the custom furniture industry by creating "animated furniture," such as chairs and clocks with intricately carved facial features. Cress' products have attained considerable national attention and currently retail in the range of \$6,000-\$20,000 per piece.

Union Church Millworks, located in Covington is also an example of an existing local firm specializing in the production of wood products such as wainscoting, paneling, and flooring for primarily interior use. Union Church Millworks also advertises their product as value-enriched because the company is able to practice quality control throughout the entire process. Notably, Union Church Millworks states their product to be superior to others in that the trees are grown locally and monitored, arguable ensuring that only the best trees were selected to produce the final product.

As noted in this report, increasing automation is a national trend which is likely to impact firms in the Alleghany Highlands. Therefore, in efforts to address opportunities and challenges related to increasing manufacturing and production technologies, educational and skills training programs must next be examined. Such examination is necessary for the assurance that the regional workforce be equipped with the abilities necessary to compete in an increasingly globalized society.

# Apparel and Textile Manufacturing

Examination of the Apparel and Textile Manufacturing industry in the Alleghany Highlands reveals that existing firms possess NAICS codes in the range of 313-315.

# **Current National Trends**

The Bureau of Labor Statistics (BLS) classifies textile and apparel firms in three ways as noted by the chart below. The number of firms located in the Alleghany Highlands is also represented. Cottage industries were not included in this total.

Type of Facility	Number of Firms in the Region	Firm Name
Textile Mills		
Fabric Mills		
Textile and Fabric Finishing and		-Mohawk Industries –
Fabric Coating Mills	2	Painter Space Print Inc.
Fiber, Yarn, Thread Mills		
Textile Product Mills		
Textile Furnishing Mills/Other Textile Product Mills	5	-The Bacova Guild - Flag Windcrafters Guild -Mohawk Industries –Bea Maurer Inc.
Apparel Manufacturing		
Cut and Sew Apparel Manufacturing	1	Kool Dri Rainwear
Apparel Knitting		
Apparel Accessories and other		
Apparel Manufacturing		

#### Table 8: Textile and Apparel Manufacturing in the Region

Current trends reflect that there has been an overall national decline in textile and apparel manufacturing industries during the past decade. Of the three industry subsectors, apparel manufacturing has been the hardest hit. This is because many apparel manufacturing processes can easily be replicated in foreign countries for lower costs. However, many textile mills and textile product mills have been able to curtail decline by implementing new automation production processes which allow such industries to remain competitive in the global market. On average, 40% of all textile and apparel manufacturing firms are located in California, North Carolina, or Georgia.

According to the Bureau of Labor Statistics, textile mills provide the raw material to make apparel and textile products. Commonly, many textile mills produce yarns, threads, and fiber which are then used for the weaving and knitting of additional textile fabrics/products. In many textile mills, chemical, mechanical, and finishing processes also occur. Textile Product Mills are those textile mills which also produce an end-product at the same facility. Items manufactured at textile product mills can include carpets, rugs, towels, bedding, cord and twine, upholstery, and fire hoses. Because of the diversity of manufacturing processes used in the production of the above products, many textile product mills specialize in one area. As noted by the above chart, the majority of textile and apparel manufacturing firms in the Alleghany Highlands are textile mills or textile product mills.

Apparel Manufacturing is the most labor intensive subsector of the textile and apparel manufacturing industry. This is attributable to the organizational structure of most apparel manufacturing firms – most are primarily production workers engaged in cutting and sewing processes. According to 2006 Occupational Reports produced by the Bureau of Labor Statistics, sewing and cutting machine operators are two of the fastest declining occupation within the textile and apparel manufacturing sector. A 27% decline is expected in both sewing machine and cutting machine operators by 2016.

Other projected sector trends predict significant employment declines for positions related to operation of knitting and weaving machinery (30.9% by 2016) and textile twisting/winding and drawing-out machinery (24.3% by 2016). Despite such decline, the Bureau of Labor Statistics notes that firms which are able to implement advanced manufacturing processes, and increased usage of technology and robotics will be more likely to maintain a competitive advantage, thus promoting industry sustainability. In summary, firms which are able to automate, and innovate, will remain more competitive in the global market place. Additionally, the Bureau of Labor Statistics also notes that "…as these technologies and advancements in textile production are implemented, the need

will grow for more highly-skilled workers who can work in an increasingly high-technology environment."<sup>12</sup>

2006 Occupational Report from the Bureau of Labor Statistics, included in Appendix II-B of this report, highlights both current trends, as well as industry projections for 2016. As noted in this table, most education and training levels require high school degrees at minimum. Also notable, this table presents forms of postsecondary education or training often required for each position. On average, textile knitting and weaving machine operators require the most production experience, while the majority of other positions require moderate onthe-job training.

# **Current State Trends**

A query of Virginia Employment Commission Labor Market Information data for textile and manufacturing trends for the three subsectors: textile mills, textiles product mills, and apparel manufacturing revels that both textile mills and apparel manufacturing are likely to experience annual employment declines between 6.32%-6.5% during 2008.<sup>13</sup> However, employment opportunities are expected to grow by 9% in the textile product mills sector. Additionally, data indicates carpet and rug mills are the fastest growing subsector, with a projected growth rate of 20.1% (90 jobs/annually) between 2004-2014.

Of the specific occupational titles examined, textile knitting and weaving machine setters and operators are projected to experience the largest decline in employment (49.3%) from 2004-2014. Textile winding, twisting, and drawing out machine setters employment opportunities are also projected to decrease by 40.6% during 2004-2014. Further examination reveals that textile cutting machine setters, operators, and tenders will also see a 19.4% decrease in projected employment during 2004-2014.

Employment decline in the aforementioned occupations within the textile and apparel manufacturing industry are likely attributable to increased technology and mechanization of production processes. Additionally this decline may also be the result of offshoring of this phase of the production process. Although these declines appear drastic, employment projections for textile apparel and furnishing workers are projected to decrease by only 12.9% during 2004-2014. The difference in declines in this occupational category, as opposed to the others, reflects that production steps in this phase are more likely to require specialized processes, or produce value-added products. This figure may also help to explain why there are projected growth rates in the textile product mills sector.

<sup>&</sup>lt;sup>12</sup> See: <u>http://www.bls.gov/OCO/</u>

<sup>&</sup>lt;sup>13</sup> See: <u>http://www.vawc.virginia.gov//analyzer/default.asp</u>?

# **Current Local Trends**

A job query was conducted through the Virginia Employment Commission for each of the counties and communities included in this study. Results of this query reveal a low job turn-over in the textile industry since October 2007. Of the positions recently advertised in this sector, most required minimal skills training.

The following table represents positions recently advertised in the Textile/Apparel Industry in the Alleghany Highlands. Age, education, testing, and skills requirements were examined for each position.

Position	Min.	Educational	Testing Requirements	Necessary Skills
Creel Tufting Operator	18	No High School Diploma or GED	None	<ol> <li>Ability to confer with engineering, technical, and manufacturing personnel</li> <li>Ability to maintain records, reports, or files</li> </ol>
Graphics Machine Operator	14	No High School Diploma or GED Required	None	<ol> <li>Ability to monitor assembly quality</li> <li>Ability to sort manufacturing materials or products</li> </ol>
Air Entangle ment Operator	18	No High School Diploma or GED Required	None	1. Ability to follow manufacturing methods and technologies
Cable Twister Operator	18	No High School Diploma or GED Required	None	<ol> <li>Ability to follow manufacturing methods and technologies</li> <li>Ability to troubleshoot electronics manufacturing equipment</li> </ol>
Winder Operator	18	No High School Diploma or GED Required	None	<ol> <li>Ability to follow manufacturing methods and technologies</li> <li>Ability to make independent judgments in assembly procedures</li> <li>Ability to troubleshoot electronics manufacturing equipment</li> </ol>

 Table 9: Openings, VEC Covington office, June 2008

Additional examination of the occupational structures of many local textile and apparel firms reveals that the majority of individuals employed in this industry sector fall into one of two categories; 1. Textile winding, twisting, and drawing out machine setters, operators, and tenders, or 2. Textile knitting, and weaving machine setters, operators, and tenders. Regional mean salaries could not be obtained for these occupation codes; however national mean salaries were obtained from the Resolution regional industry cluster matrix at the Virginia Economic Development Partnership. As noted in the national trends section, these operations are likely to experience significant decline by 2016.

According to the Virginia Economic Development Partnership's ReSolution matrix<sup>14</sup>, an estimated 220 individuals are employed as either textile winders, twisters, or drawing out machine setters, operators, or tenders in the Alleghany Highlands region. National mean salaries for these positions are \$23,550 (estimated \$11.32/hour). Textile knitting and weaving machine setters, operators, and tenders encompass about 120 individual in the Alleghany Highlands. National salaries average about \$24,530 (estimated \$11.79/hour).

Further examination into occupational structures of regional textile and apparel firms shows that First-Line Supervisors and Managers of Production tend to earn annual salaries slightly below the national average, \$47,902, as opposed to \$50,480. Given the structure of the Resolution matrix, it is impossible to determine the exact number of First-Line Supervisors and Managers of Production employed in firms located in the Alleghany Highlands region. Additionally, the textile and apparel cluster in the Alleghany Highlands also has a presence of sales representative in this sector. Notably, sales representatives appear to be the highest paid non-management positions in this sector. On average, sales representatives in the region earn an annual salary of \$48,788. This is significantly less than the annual national salary of \$58,540 indicated by the Bureau of Labor Statistics.

As noted in the overview section of this report, most textile and apparel manufacturing firms in the Alleghany Highlands fall into the general classification as textile product mills. Notably, textile product mills specializing in the manufacture of floor coverings, such as rugs, carpet, and door mats. As previously stated, firms in the Alleghany Highlands are thus likely to employee large numbers of individuals with skills to be textile winding, twisting, and drawing out machine setters, operator.

#### Summary-Textile and Apparel Manufacturing

Based upon the above data, one may conclude that most positions in local textile and apparel manufacturing firms require only minimal skills training. The most frequently identified skills include possessing knowledge of electronics manufacturing equipment, as well as an ability to understand basic manufacturing principles and processes. Relevant work experience in the textile and apparel manufacturing industry is important for individuals seeking midhigher levels of line and supervision positions. Additionally, soft skills, such as an ability to follow instructions, also appear to be important skills required by local employers. This report also infers that possession of soft skills, as opposed

<sup>&</sup>lt;sup>14</sup>See: <u>http://virginiascan.yesvirginia.org/Data\_Center/REsolution/map.aspx</u>

to knowledge and experience working in large textile and apparel mills, may be in greater demand by cottage industry employers.

Additional examination of the above firms also reveals that at least one facility in the region, Lees Carpet, has both a strong managerial and design/research presence at their facility in the Alleghany Highlands. Therefore, positions open at this facility may sometimes require higher education degrees in areas related to business administration, apparel or textile sciences, engineering, or chemistry.

Therefore, when identifying potential regional training facilities which may be of asset to the apparel and textile sector, this report chose to focus on a wide-range of local educational and skills training facilities. This broad overview is intended to address both the need for line labor, as well as upper management and research and development positions. Subsequent sections of this report will thus examine how the following local educational and training institutions may best service the regional textile and apparel sector:

- Secondary Schools
- Vocational Training Centers
- Community Colleges
- Colleges and Universities

Emphasis on education and skills training opportunities in advanced manufacturing techniques and practices will be important to all textile and manufacturing firms seeking to maintain operations in the Alleghany Highlands during the next decade. As national trends reflect significant industry decline, firms must ensure that their workers possess the advanced skills necessary to operate technically advanced machinery which will allow regional firms to maintain a competitive advantage in the globalized economy. Given the large number of individuals in the Alleghany Highlands employed in at-risk occupational titles, such as textile winding, twisting, and drawing out machine setters, operators, and tenders, it is especially important that efforts be undertaken to provide these persons with additional skills training, notably in advanced manufacturing processes.

#### Chemical and Chemical Products Manufacturing and Related Industries

Examination of the Chemical and Chemical Products Manufacturing industry in the Alleghany Highlands examines firms that posses NAICS codes in the range of 325-327.

- o 325- Chemical Manufacturing
- o 326- Plastics and Rubber Products Manufacturing
- o 327- Nonmetallic Mineral Product Manufacturing

#### **Current National Trends**

At present, data to locate regarding specific industry trends for NAICS codes 326 (plastics and rubber products manufacturing), and 327 (nonmetallic mineral product manufacturing) is difficult to locate through a query of the Bureau of

Labor Statistics. However, the BLS did have significant data on NAICS 325 – chemical manufacturing. Therefore, this section will focus primarily on the chemical manufacturing sector (NAICS 325). According to the BLS, chemical manufacturing contains the following seven subsectors. Please note that only six subsectors are included; exclusion of the seventh, pharmaceutical and medicine manufacturing, was not included in this summary.

Type of Facility	Number of Firms in the Region	Firm Name
		General Chemical
Basic Chemical Manufacturing	1	Corporation
Resin, Rubber, and Artificial and		
Synthetic Fibers and Filaments		
Agricultural Chemicals		
Paint, Coating, and Adhesive		
Manufacturing		
Soap, Cleaning Compound, and Toilet		
Preparations		
Other Chemical Products	1	Chemstation

## **Table10: Chemical Firms**

The basic chemical manufacturing subsector employees the most workers nationally (25.7%), while the soap, cleaning compound, and toilet preparation manufacturing subsector employees the next largest group (19.6%). Agricultural chemicals are the smallest employment subsector in the chemical manufacturing sector (6.8%). The remaining subsectors are each very similar in size. Current trends reflect that there will be a 19% decline in future job opportunities in the chemical manufacturing sector by 2016 (BLS). Declines in this sector will likely be attributable to increased production technology, volatility in the petroleum and natural gas markets, technical advances in plant automation, company mergers and consolidations, and increasing environmental health and safety regulation (BLS, 2008). However, despite the sector decline, the soap, cleaning compound, and toilet preparation subsector is projected to experience future growth.

The majority of people employed in the chemical manufacturing sector are employed in larger firms. On average, 80% of all individuals employed in this sector, work at firms with more than 50 employee. On average, the majority of individuals employed in the chemical manufacturing sector are classified as production workers (46%). Occupation titles falling into this category include:

- First-line supervisors/managers of production and operating workers
- Team assemblers
- Extruding and drawing machine setters, operators, and tenders, metal and plastic
- o Machinists
- Molding, coremaking, and casting machine setters, operators, and tenders, metal and plastic

- Extruding and forming machine setters, operators, and tenders, synthetic and glass fibers
- Chemical plant and system operators
- o Chemical equipment operators and tenders
- Separating, filtering, clarifying, precipitating, and still machine setters, operators, and tenders
- o Crushing, grinding, polishing, mixing, and blending workers
- o Mixing and blending machine setters, operators, and tenders
- Extruding, forming, pressing, and compacting machine setters, operators, and tenders
- o Inspectors, testers, sorters, samplers, and weighers
- o Packaging and filling machine operators and tenders
- Helpers-production workers
- o Production workers, all other

Examination of skills and training requirements for production occupations reveals that while many individuals with high school diplomas qualify for most positions, increasing emphasis on a 2-year degree is common. Additionally, significant on-the-job training, and work experience are key factors for advancement. Consequently, the production occupations in the chemical manufacturing sector tend to allow upward mobility based on seniority, experience, and education. However, it is important to note that many of these jobs are very competitive, due to employment declines resulting from increased levels of plant automation.

Professionals and related occupations make up the second largest employment sector in most chemical manufacturing firms. Typical job titles of this sector include:

- o Computer Specialists
- Chemical Engineers
- Industrial Engineers
- o Chemists
- Chemical Technicians

The majority of individuals employed in the aforementioned positions require a minimum of a Bachelor's degree. Consequently, because of projected declines in this industry, competition to fill job openings in professional occupations of this sector is extremely high. Because of this competition, many candidates are likely to possess advance degrees at the Master's and Doctorate level. One exception to these educational requirements is the job title of chemical technician. In some instances, chemical technicians may possess a 2-year degree with previous work experience in the field. This is largely because the duties of chemical technicians involve providing assistance to the other specialists.

Management, sales, office administrative support, and transportation logistics are the other main occupational groups of most chemical manufacturing firms. Educational requirements vary based upon the tasks and duties required of each position. On average, management and finance positions often require college or advance degrees.

The Bureau of Labor Statistics notes considerable variation in the wages of many employees in the chemical manufacturing sector due to the size of the firm, and the specific industry segment. The following table provides the median hourly earnings of the largest occupations in the chemical manufacturing sector during 2006.

Occupation	Chemical Manufacturing	All Industries
Chemists	\$28.84	\$28.78
First-line supervisors/managers of		
production –operating workers	\$26.65	\$22.74
Chemical plant and system operators	\$23.68	\$23.60
Maintenance and repair workers,		
general	\$20.20	\$15.34
Chemical technicians	\$20.32	\$18.87
Chemical equipment operators and		
tenders	\$19.26	\$19.37
Inspectors, testers, sorters, samplers		
and weighers	\$15.40	\$14.14
Mixing and blending machine setters,		
operators, and tenders	\$14.64	\$14.10
Packaging and filling machine		
operators and tenders	\$12.24	\$11.06
Team assemblers	\$11.77	\$11.63

#### **Table 11: Earnings in Chemical Occupations**

Source: Bureau of Labor Statistics- Occupational Outlook

Although job opportunities in the chemical manufacturing sector are projected to decline through 2016, new technical advances may create jobs in related sectors. For example, the increasing popularity of nanotechnology is helping to expand the research and development field in the chemical manufacturing sector. Additionally, the Bureau of Labor Statistics notes that in effort for many chemical manufacturing firms to remain competitive, firms must diversify their products by producing more specialty chemicals, notably those designed for customer-specific uses, such as advanced polymers and plastics.

# **Current State Trends**

VEC labor market information industry data from 2004-2014 identifies a 12.1% decrease in chemical manufacturing (NAICS 325) jobs during this period. Although, additional examination of the plastics and rubber products industry (NAICS 326) and the nonmetallic mineral product manufacturing sector (NAICS 327) shows projected job increases of 9.8% for each sector. However, short-term projects conducted for 2006-2008 reveal 2% decreases in the chemical manufacturing and plastics and rubber products sectors. The nonmetallic mineral product manufacturing this period, increasing 14%.

Of the specific occupational titles examined for the professional groups in the chemical manufacturing sector (NAICS 325), the following data reflects overall growth in the professional occupations. Occupation projections for 2004-2014 show that the number of chemical engineers is expected to grow by 17.9%. Industrial engineering is also expected to experience substantial job growth, at 21.3%. Chemist and Chemical Technicians are projected to grow as well, totaling 9.5% and 3.1% respectfully (VEC-LMI). Production occupations in the chemical manufacturing sector were also examined. On average, the following positions remained rather stable: crushing, grinding, and polishing machine setters, operators (+1.1%); extruding, forming, pressing and compacting machine setters (-.6%); and mixing and blending machine setters, operators, and tenders (-.1%). However, notable declines were detected for chemical equipment operators and tenders (-11.5%) and chemical plant and system operators (-26%).

Wage rates for various production and professional occupations in the chemical manufacturing sector were also examined. The following table depicts the hourly wages for individuals in Virginia's chemical manufacturing sector.

Professiona	Occupation	National Rates	Virginia Rates
	Chemists	\$28.84	\$34.84
	3251-Basic Chem. Mfg.	\$30.20	\$32.23
	3259-Other	\$29.10	\$32.59
	Chemical Engineers	\$37.81	\$42.38
	3251- Basic Chem. Mfg.	\$37.93	\$41.69
	3252- Plastics/Rubber Mfg.	\$37.89	\$56.66
	3259- Other	\$38.45	\$40.67
	Industrial Engineers	\$33.12	\$31.36
	Chemical technicians	\$20.32	\$24.30
	3251-Basic Chem. Mfg.	\$21.11	\$21.18
	3259- Other	\$19.67	\$23.69
Production	Chemical equipment operators and tenders	\$19.26	\$20.63
	3259-Other	\$18.16	\$20.85
	Chemical plant and system operators	\$23.68	\$22.71
	3251-Basic Chem. Mfg.	\$23.25	\$24.74
	3252-Plastics/Rubber Mfg.	\$23.62	\$22.30
	Crushing, Grinding, and Polishing Machine Setters and Operators	\$13.04	\$14.22
	Mixing and blending machine setters,		
	operators, and tenders	\$14.64	\$17.57
	3252	\$17.01	\$18.58
	3253	\$13.48	\$12.68
	3255	\$14.81	\$18.29
	3256	\$14.76	\$19.47
	3259	\$14.70	\$15.22
	Extruding, Forming, Pressing, and Compacting Machine Setters	\$16.13	\$14.12

Table 12: Hourly Wages in Chemical Manufacturing

Source: The Virginia Employment Commission – LMI Data (May 2005) and BLS Occupational Outlook

As can be derived from the above table, hourly wages in the chemical manufacturing sector tend to be higher in Virginia than the national average. There are likely several factors which may contribute to this difference. One factor may be that Virginia may possess small firms which specialize in specific types of chemicals. Another may be that the physical location of Virginia places it within a geographic proximity of many eastern ports, thus reducing the costs for shipping chemicals. By reducing shipping costs, firms may be more inclined to pay higher wages.

# **Current Local Trends**

Data for the chemical manufacturing sector (NAICS 325) was very difficult to locate for the Alleghany Highlands region. Estimated and projected employment numbers for 2004-2014 were available from the VEC<sup>15</sup> for plastics and rubber products manufacturing (NAICS 326) and nonmetallic mineral product manufacturing (NAICS 327). Projections from the two aforementioned sectors reveal significant increases in regional employment opportunities. Plastics and rubber products manufacturing is estimated to experience an 8.8% growth rate, and nonmetallic mineral product manufacturing is employment projected to grow 10%. However, this report urges the reader to utilize discretion when evaluating the aforementioned results for NAICS 326 in that such may be altered due to the recent closing of Parker-Hannifin in Iron Gate.

As aforementioned, occupations trends for both professional and production positions in the chemical manufacturing sector (NAICS 325) are currently unavailable for either the Alleghany Highlands region, or the Shenandoah WIA region. This lack of data is likely attributable to the small number of firms in the region. Although, data was obtained through the Shenandoah WIA for chemical equipment operators and tenders, and the crushing, grinding, and polishing machine setters and operators. Results of this data show minimal employment in each of these positions, with only one employee in each position. The projected growth rates for 2004-2014 show that only one additional position may be created in each of these occupations during the period.

Despite these low numbers, examination of individuals completing degrees for professional occupations in chemical manufacturing show a potential for promoting growth in this sector. Educational attainment data for individuals in the Alleghany Highlands region show a number of chemical engineers, industrial engineers, chemists, and computer specialists. The educational attainment data presented in the following chart spans a period of 1985-2005.

<sup>&</sup>lt;sup>15</sup> See <u>http://www.vawc.virginia.gov//analyzer/default.asp</u>?

Figure 1: Trends for select degrees awarded



Data Source: Virginia Employment Commission – Labor Market Indicators – Labor Force Educational Attainment Data. Data was unavailable for 1999. Additionally, as noted in this data output chart, some degrees were not issued to individuals during certain years; this is notable in Chemical Engineering.

This report also examined wage data for this sector, using the Shenandoah WIA region as the standard. The following table provides a comparison to wages in the Alleghany Highlands chemical manufacturing sector, to both national and state average wage data. In some instances, data was unavailable for certain occupations, or the firm(s) possessing such workers elects not to disclose this information.

Professional	Occupation	National Rates	Virginia Rates	Shenandoah WIA
	Chemists	\$28.84	\$34.84	\$34.36
	3251-Basic Chem. Mfg.	\$30.20	\$32.23	Not Available
	3259-Other	\$29.10	\$32.59	Not Available
	Chemical Engineers	\$37.81	\$42.38	\$39.17
	3251- Basic Chem. Mfg.	\$37.93	\$41.69	Not Available
	3252- Plastics/			
	Rubber Mfg.	\$37.89	\$56.66	Not Available
	3259- Other	\$38.45	\$40.67	Not Available
	Industrial Engineers	\$33.12	\$31.36	\$32.76
	Chemical technicians	\$20.32	\$24.30	Not Available
	3251-Basic Chem. Mfg.	\$21.11	\$21.18	Not Available
	3259- Other	\$19.67	\$23.69	Not Available
Production	Chemical equipment operators			
	and tenders	\$19.26	\$20.63	Not Available
	3259-Other	\$18.16	\$20.85	Not Available
	Chemical plant and system			
	operators	\$23.68	\$22.71	Not Available
	3251-Basic Chem. Mfg.	\$23.25	\$24.74	Not Available
	3252-Plastics/			
	Rubber Mfg.	\$23.62	\$22.30	Not Available
	Crushing, Grinding, and Polishing			
	Machine Setters and Operators	\$13.04	\$14.22	Not Available
	Mixing and blending machine		•	<b>•</b>
	setters, operators, and tenders	\$14.64	\$17.57	\$15.50
	3252	\$17.01	\$18.58	Not Available
	3253	\$13.48	\$12.68	Not Available
	3255	\$14.81	\$18.29	Not Available
	3256	\$14.76	\$19.47	Not Available
	3259	\$14.70	\$15.22	Not Available
	Extruding, Forming, Pressing, and	<b>•</b> • • • • •	<b>•</b> • • • • •	<b>•</b> · · <b>•</b> ·
	Compacting Machine Setters	\$16.13	\$14.12	\$14.54

Table 13: Hou	rlv Wages	for	Chemical	Manufacturing	Sectors
	ily magee		ononnoai	manalaotannig	

Source: Virginia Employment Commission – Labor Market Indicators

# Summary-Chemical and Chemical Products Manufacturing

Based on the information contained in this section, one may conclude that the chemical manufacturing sector in the Alleghany Highlands consists primarily of smaller firms offering specialized services. Notably, the majority of chemical

manufacturing firms in this region primarily service the wood products industry, notably MeadWestvaco. Additionally, displaced workers from Acadia Polymers may likely provide a sizeable workforce familiar with polymer technologies. This understanding of polymers may prove very beneficial to potential efforts to recruit a polymer-based firm to the region. As noted, many firms in the chemical and chemical products industry prefer to hire workers with experience working in the sector.

While many firms appear to be small and specialized to address the needs of local industries, this may prove important to the sustainability of this sector in the region. As noted earlier in this section, smaller chemical manufacturing firms are the most likely to experience stable growth, despite declines in the overall industry. Additionally, the sustainability of this sector may be further promoted through establishing connections with local citizens possessing degrees or experience in occupations related to this sector. Local wages for professional occupations in this sector are consistent with national and state averages.

Consequently, there exists potential for growth opportunities in this sector. As regional wood products and textile mills are becoming increasing dependent on technological advance to maintain competitiveness, many firms are beginning to recognize the importance of understanding the chemical processes relevant to their own products. Thus, future growth of the chemical manufacturing sector may best be achieved by establishing links between firms which require chemical components, and recruitment of chemical manufacturing firms, notably those utilizing polymers or provide services applicable to existing local firms. Chemical companies engaging in the production of polymers used in plastics appear to provide an especially promising opportunity. Consequently, nanotechnology may also be an emerging field applicable to servicing local industries.

# **Labor Market Intermediaries**

# What are Intermediaries?

According to Garmise<sup>16</sup> (2006), intermediaries play an important role in examining workforce issues because such play an important role as "information brokers that match supply and demand in the marketplace" (p. 47). Intermediaries may be classified into three categories: traditional, customized, and labor-market negotiators (Garmise, 2006, p.47). Garmise (2006) describes traditional intermediaries as focused on matching jobseekers to available employment opportunities within an area, based on the jobseekers skills set (p. 48).

Customized intermediaries differ from traditional intermediaries in that this form of intermediary has more interaction with both the jobseeker and employer. The focus of this form of intermediary is to worker with local employers to "identify specific skill requirements and industry trends" (Garmise, 2006, p.48). After disseminating such, the customized intermediary works with jobseekers to recruit and train such individuals in skills necessary for entry into the local labor market. (Garmise, 2006, p. 49). Examples of customized intermediaries include universities, community colleges, vocational training centers, and secondary schools.

The third type of intermediary, a labor-market negotiator, is very similar to customized intermediaries. However, the labor-market negotiators have a greater degree of interaction with employer firms, thus adopting a more policy-based approach to addressing overall labor market demands. Examples of labor-market negotiators include local and regional economic development organizations, as well as local government stakeholders (Garmise, 2006, pg. 48).

Intermediaries are important for community and economic development efforts because such entities serve as important sources for obtaining information about workforce dynamics. Because many public and private intermediaries often engage in face-to-face interactions with members of a region's labor force, and/or industry, consultation with intermediaries helps to provide a more normative approach for understanding other quantitative forms of labor market data,

An examination of intermediaries servicing the wood products, textile and apparel manufacturing, and chemical and chemical products industry sectors in the Alleghany Highlands region reveals a presence of each of the three previously mentioned types of intermediaries: traditional, customized, and labor-market

<sup>&</sup>lt;sup>16</sup> Garmise, Shari. 2005. <u>People and the Competitive Advantage of Place: Building a Workplace</u> <u>for the 21<sup>st</sup> Century</u>. Sharpe.

negotiators. Examples of how such intermediaries service each industry sector are highlighted within this section. Additionally, distinctions will be made between publicly funded intermediaries, and those that operate through the private sector.

# **Public Intermediaries**

#### Virginia Employment Commission

The Virginia Employment Commission (VEC) serves as the primary traditional public intermediary serving the Alleghany Highlands region. Located in Covington, the VEC is committed towards helping localities match jobseekers to available employment opportunities. The VEC provides jobseekers with job placement assistance, transition or training services, and temporary income support. To achieve these goals, the VEC routinely undertakes efforts to ensure that its own practices and procedures are being implemented in a manner so as to best address local workforce development issues.<sup>17</sup>

#### Alleghany Highlands Economic Development Corporation

Formed in 2002, the Alleghany Highlands Economic Development Corporation (AHEDC) is a collaborative partnership amongst the City of Covington, Alleghany County, and the Towns of Clifton Forge and Iron Gate. Located on the campus of Dabney S. Lancaster Community College, this organization is comprised of public and private stakeholders from each of the partnering localities. Through the use of both public funds provided by the localities, as well as the Commonwealth Virginia, this organization is an important driver for shaping economic development policy in the Alleghany Highlands region.<sup>18</sup>

The AHEDC focuses economic development efforts around the promotion of five objectives:

- 1. Marketing and Business/ Industry Recruitment
- 2. Business/Industry Retention and Expansion
- 3. Small Business and Entrepreneurial Development
- 4. Workforce Development
- 5. Travel and Tourism

Noting a desire to engage in efforts to promote economic diversification, the AHEDC possess great potential for serving as an important labor market negotiator capable of using an awareness of industry and local economic trends in efforts to shape future economic policy efforts.

#### Roanoke Valley-Alleghany Regional Commission

The Roanoke Valley-Alleghany Regional Commission (RVARC) plays an important role as a labor market negotiator in the Alleghany Highlands region.

<sup>&</sup>lt;sup>17</sup> See: <u>http://www.vec.virginia.gov/vecportal/about\_vec.cfm</u>

<sup>&</sup>lt;sup>18</sup> See: <u>http://www.allhighlands.org/</u>

Through its role as a planning commission, the RVARC serves as an important intermediary serving as a liaison between local and state government. Furthermore, the RVARC is a key facilitator of regional strategic planning efforts.<sup>19</sup>

# Private Intermediaries

## Manpower – USA

Manpower, Inc. is the only private for-profit intermediary offering services to the Alleghany Highlands. Manpower USA provides Human Resource services to both jobseekers and employers. Examples of such Human Resource services include assessment services, behavioral interviewing, and outplacement services. Additionally, Manpower USA offers employers on-site management services such as coordinating interview processes. An international staffing agency headquartered in Milwaukee, WI, Manpower USA has over 4,400 offices worldwide. Manpower USA has a regional office located in Covington which seeks to address employment needs in Covington, Clifton Forge, Hot Springs, Lexington, Fincastle, Lewisburg, WV, and White Sulpher Springs, WV.<sup>20</sup>

The Covington office of Manpower USA provides specialty placement services in the administrative and light industrial sectors. Most relevant to their role as intermediaries in the wood products sector, Manpower USA provides local wood products manufacturing firms with individuals possessing desirable light industrial skills. Manufacturing positions often requiring this skills set include electronics assemblers, inventory workers, material handlers, mechanical assemblers, packaging workers, production line workers, quality control inspectors, shipping/receiving clerks, and stockpickers/packers.

As a staffing agency, Manpower offers temporary worker placement services for various industries. The Manpower USA office in Covington does a great deal of work to address staffing needs at MeadWestvaco As of this writing Manpower, Inc. in Covington does not have any advertisements related to employment opportunities in textile or apparel manufacturing and chemical manufacturing. Available light industrial positions most applicable to employment in those industries include job opportunities in packaging, shipping, and logistics.

#### Non-Profit Intermediaries

Two private nonprofit intermediaries which may be applicable to the textile and apparel manufacturing industry are the Alleghany Highlands Chamber of Commerce and the North Carolina/Virginia division of the Southern Textile Association. The Alleghany Highlands Chamber of Commerce is an important potential intermediary in that such may help to promote collaboration amongst

<sup>&</sup>lt;sup>19</sup> Seehttp://www.rvarc.org/

<sup>&</sup>lt;sup>20</sup> See <u>http://localsite.manpower.com/localhome/index.jsp?site=595</u>

existing local firms, as well as to provide marketing exposure opportunities for local textile and apparel cottage industries.

The Southern Textile Association – North Carolina/Virginia Division is a non-profit organization which seeks to promote social, educational, personnel relations, and research opportunities in textile and apparel manufacturing firms located in the North Carolina and Virginia area. Additionally, local firms may benefit from membership opportunities offered by this organization in that such seeks to organize stakeholders in regional, state, national, and international textile and apparel manufacturing policy and trends

Two private nonprofit intermediaries which may be applicable to the chemical and chemical products manufacturing industry are the Alleghany Highlands Chamber of Commerce and the American Chemistry Council. The Alleghany Highlands Chamber of Commerce is an important potential intermediary in that such may help to promote collaboration amongst existing local firms, as well as to provide networking opportunities for firms seeking to market their chemicals to new industrial customers.

The American Chemistry Council (ACC) is a trade organization of many of the top chemical and chemical product manufacturers in the United States. Headquartered in Arlington, the ACC seeks to promote collaboration amongst its member organization, as well as to provide political advocacy services. The ACC is divided into several divisions which provide specialized services to members in the following areas of chemical and chemical product manufacturing: plastics, chlorine chemistry, and chemical products and technology.

#### Four year universities

#### Wood

Individuals possessing undergraduate or graduate degrees in Wood Science, Chemical Engineering, or interdisciplinary engineering programs, often possess skills which best address wood and wood products industrial demands. Present industry trends suggest that many larger firms are becoming increasingly technical, thus requiring more workers with advanced educational training. Of the colleges and universities located in the region, Virginia Tech provides the most expansive pool of applicants receiving degrees in Wood Science, Chemical Engineering, or interdisciplinary engineering programs such as Engineering Science and Mechanics. Additional information about Virginia Tech's Department of Wood Science may be obtained in the 2007 Virginia Tech Economic Development Studio Study in the appendices of this report.

The following table outlines college degree options most applicable to wood and wood products manufacturing firms located in the Alleghany Highlands region.

Field	Institution	Degree Options	Coursework or Program Track Most Applicable to Local Industry
Chemical Engineering	Virginia Tech	B.S. ; M.S.; Ph.D.	Polymers; Students have discretion at graduate level as to how best to construct a curriculum that best suits their professional and research goals
Wood	Virginia		6 areas- All applicable to the Alleghany
Science	Tech	B.S.; M.S. ; Ph.D.	Highlands
Engineering			Mechanics of Materials; Thermal Sciences;
Science and	Virginia		Polymers Research; Dynamics of Fluids and
Mechanics	Tech	B.S. ; M.S.; Ph.D.	Gases

Table 14: Degrees I	Relevant to Wo	od Products	Offered in the Area
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Many wood products production firms could benefit most through employment of graduates from the Virginia Tech Department of Wood Science and Chemical Engineering. Notably, large firms, such as MeadWesvaco, may benefit most from employment of such graduates due to their familiarity with pulp production processes. MeadWesvaco and other similar paper packaging firms would also benefit through recruitment of Wood Science graduates with experience in the Packaging Science track. However, small to medium size production firms would likely benefit from technical expertise of Wood Science graduates with experience in Manufacturing Systems, Packaging Science, and Forest Products Marketing and Management tracks. Logging companies seeking to implement sustainable harvesting practices would also likely benefit through the recruitment of Forest Products Marketing and Management track students.

#### Textiles

Individuals possessing undergraduate or graduate degrees in textile or apparel programs, chemical engineering, or interdisciplinary engineering programs often possess skills which best address textile and apparel industry demands. An understanding of how fibers and polymer components interact is a basic requirement by most firms within the industry sector. Furthermore, general chemistry degrees which include coursework or specialization in organic chemistry are also important to apparel and textile industry.

An examination of local colleges and universities within the Alleghany Highlands region reflects several institutions which possess chemistry departments offering coursework in organic chemistry. Furthermore, this report also discovered one institution, Virginia Tech, which offered degree options directly related to the apparel industry. Additionally, Virginia Tech was the only local university to offer degrees in chemical engineering, and an interdisciplinary engineering program offering coursework in polymer and materials interaction.

The following table outlines local colleges and universities offering degrees most applicable to textile and apparel manufacturing firms located in the Alleghany Highlands region.

Field	Institution	Degree Options	Coursework or Program Track Most Applicable to Local Industry
	Washington & Lee University	B.S.	
	Virginia Military Institute	B.S.	Organic Chemistry* *Program focuses vary from institution to institution – VT most broad – Smaller colleges
Chemistry	Hollins University	B.S.	
(General)	Roanoke College	B.S.	
	Radford University	B.S.	
		B.S.;	
	Virginia Tech	M.S.;	
		Ph.D.	
Chemical Engineering	Virginia Tech	B.S. ; M.S.; Ph.D.	Fibers Track; Students have discretion at graduate level as to how best to construct a curriculum that best suits their professional and research goals
Apparel	Virginia Tech	B.S.; M.S. ; Ph.D.	Apparel and Textiles Business and Economic Analysis Track; Apparel and Textiles Quality Analysis Track
Engineering Science and Mechanics	Virginia Tech	B.S. ; M.S.; Ph.D.	Mechanics of Materials; Thermal Sciences; Polymers Research; Dynamics of Fluids and Gases

## Table 15: Degrees Relevant to Textiles Offered in the Area

Analysis of the occupational structures of existing textile and apparel firms in the region suggest that two major employers may be most likely to benefit from the recruitment and hiring of graduates in the above fields. These firms include Lees Carpet, and The Bacova Guild. This assumption is based on the fact that such are the largest textile employers in the region, and that these firms are the most likely to require managerial staff, and researchers.

Lees Carpet is the most likely regional employer to require graduates possessing a Bachelor's or higher degree. This is mostly attributable to the fact that Lees Carpet contains a product development laboratory at their facility in Glasgow. Furthermore, the Glasgow facility also includes several management divisions which require the hiring of individuals possessing knowledge of carpet and fiber manufacturing processes. Physical and color testing laboratories are also located on-site at Glasgow. Additionally, this facility implements several quality assurance, and product capability practices. Bea Maurer, Inc. is also very likely to benefit through the recruitment and hiring of individuals possessing college and graduate degrees. As a large facility specializing in the manufacture of products requiring chemical and radiological weaponry resistance for military use, this firm may also want to consider a partnership with the Chemical Engineering majors in the Virginia Tech Corp of Cadets. The Bacova Guild may also profit from the recruitment and hiring of college graduates. However, this firm is more likely to benefit from the managerial attributes such candidates may possess, as opposed to knowledge in fiber component processes. This is because The Bacova Guild does not conduct product research and development, at their manufacturing facilities in the Alleghany Highlands region.

Kool-Dri Rainwear, the only apparel firm in the region, may also benefit from the hiring of a graduate possessing an apparel degree; however given the small size of this facility, it is unlikely that the specific recruitment of college graduates would be necessary. The Apparel program at Virginia Tech may be the most likely source through which to recruit potential employees.

#### Chemicals

Individuals possessing undergraduate or graduate degrees in Chemical Engineering, Chemistry, or interdisciplinary engineering programs such as Industrial Engineering often possess skills which best address chemical and chemical products industrial demands. Present industry trends suggest that many firms are increasingly likely to prefer candidates possessing either a Master's or Doctorate degree. A substantial understand of how chemicals react with materials, as well as each other, is a basic requirement by most firms within the industry sector. Due to the potential health and environment hazards associated with working with chemicals, individuals in this field must have training and awareness of safe research and production processes. In many instances, computer specialists may be hired in larger firms that possess several automated processes; however, due to the size and nature of chemical and chemical manufacturing firms in the Alleghany Highlands, computer specialists will be less likely to be required.

An examination of local 4 year colleges and universities within the Alleghany Highlands region reflects several institutions which possess general chemistry programs. Of the institutions examined, only Virginia Tech offered degrees in chemical engineering and industrial engineering. In addition to offering coursework in industrial engineering, Virginia Tech also offers degree tracks in engineering science and mechanics. Individuals possessing degrees in engineering science and mechanics may be candidates for employment in this sector because they often possess skills related to how polymers react to materials.

The following table outlines local colleges and universities offering degrees most applicable to the chemical and chemical manufacturing firms located in the Alleghany Highlands region.

Field	Institution	Degree Options	Notes
	Washington & Lee University	B.S.	*Program focuses vary from institution to
	Virginia Military Institute	B.S.	
Chomistry	Hollins University	B.S.	institution – VT most broad – Smaller
(General)	Roanoke College	B.S.	colleges tend to focus in Pre-Med training
	Radford University	B.S.	
	Virginia Tech	B.S.; M.S.; Ph.D.	
Chemical Engineering	Virginia Tech	B.S. ; M.S.; Ph.D.	Undergraduate work is very broad- graduate students will specialize according to their research interests
Industrial Engineering	Virginia Tech	B.S.; M.S. ; Ph.D.	Nationally Ranked Program: #6 for Undergraduate and #8 for Graduate;
Engineering Science and Mechanics	Virginia Tech	B.S. ; M.S.; Ph.D.	Program Tracks Most Applicable Include: Mechanics of Materials; Thermal Sciences; Polymers Research; Dynamics of Fluids and Gases

Table 16: Degrees Relevant to Chemical Manufacturing Offered in the Area

Analysis of occupational structures of chemical and chemical manufacturing firms in the region reveals that large firms are more likely to benefit from the recruitment and hiring of graduates in the above fields. Thus, if efforts are undertaken to recruit a larger firm, professional relationships should be established between the region and local colleges and universities. This assumption is based on the fact that such types of firms will be the most likely to require managerial staff, and researchers.

Additionally, chemistry and chemical engineering majors may also be an important occupational group in that such individuals possess skills that may also be beneficial to existing wood products and textile manufacturing firms. As employment trends in these industry sectors become increasingly dependent on developing value-added products which require chemical process advances, it is important that existing firms in the Alleghany Highlands recognize potential local impacts of such trends. Thus, this report recommends that efforts be undertaken to form partnerships between local wood products and textile firms to chemistry and chemical engineering departments at regional colleges and universities.

The remainder of chemical and chemical manufacturing firms located in the Alleghany Highlands, are distribution terminals or franchises, of larger chemical firms. Thus, it is highly unlikely that these firms require many large numbers of individuals possessing college or advanced degrees. However, if growth in this sector is a future objective, highlighting the number of higher education institutions offering curriculum specialized to the chemical industry will be helpful for attracting firms in this industry sector to the Alleghany Highlands region.

#### **Community Colleges**

Dabney S. Lancaster Community College offers three types of degree options most applicable to the wood products industry in the Alleghany Highlands region. These programs include A.A.S. in Forest Technology, Technical Studies in Advanced Manufacturing and Packaging Technology, and Technical Studies in Welding. Certificates are also available in each of these programs for members of the existing workforce, retirees, or others seeking to pursue continuing education opportunities.

Of the aforementioned degree tracks, Welding is the most distantly related to the wood products industry; however, it appears to be a necessary skill in sectors supporting the wood products industry, such as product logistics. Advanced Manufacturing and Packaging Technology is important to the wood products industry in the Alleghany Highlands region because the largest regional employer uses wood products as the raw material construct of bleach board and fiberboard packaging material. However, of the three aforementioned majors, Forest Technology addresses wood and wood products the most intensely.

Major	Future Career Track/ Skills Base
Forest Technology	Forestry, Urban Tree Care, Forest Products
Technical Studies in Advanced Manufacturing and Packaging Technology	Ergonomics, Robotics, Machine Technology, Packaging, Distribution
Technical Studies in Welding	Oxyfuel Welding/Cutting, Shielded Metal Arc Welding, Inert Gas Welding, Welding Metallurgy

The Alleghany Highlands is fortunate to have the only community college program in forest technology in the Commonwealth of Virginia. Marketed as an intensive training in wood science basics and forestry, this program is designed to both equip students with necessary skills for pursuing a career path in forestry, urban tree care, or forest products. Furthermore, this program also seeks to prepare students planning to pursue further their training at the college or university level.

On average, the Forest Technology program graduates fourteen students annually. This is an important statistic to note given that it presents an opportunity for the region to capitalize on a specially trained labor pool that express a general desire to remain in the region. This is important for addressing projected mid and upper level management shortages during the coming decade.

At the community college level, Dabney S. Lancaster Community College also possesses a Continuing Education and Workforce Services division which seeks to design curriculum to best address the needs of local employers, as well as jobseekers. Consequently, this may be a valuable resource for local textile and apparel manufacturing firms seeking to recruit employees native to the region. Continuing Education and Workforce Services is also engaged in economic development efforts to help local firms achieve a competitive edge in the global market, while remaining located in the region. This may be of especial benefit to local textile and apparel manufacturing firms.

DSLCC has two programs which may provide skills training necessary for future employment in the textile or apparel industry in the Alleghany Highlands. These programs include the Associate's degree in Science and the Associate's degree in Applied Sciences for Advanced Manufacturing and Packaging Technologies (AMPT). The A.A. Science program was selected because such curriculum is designed to assist students seeking to pursue higher education opportunities at the undergraduate level. According to the DSLCC website, completion of the Science program will equip students with mathematical and science knowledge necessary for entrance into a four-year college or university program in the following areas:

- o Agriculture
- o Biology
- o Chemistry
- Environmental Protection
- o Forestry
- o **Geology**
- o Mathematics
- o Nursing
- o Pharmacology
- o Physical Therapy
- o Physics
- o Pre-Dental
- o Pre-Medicine

The A.A. Science program is applicable to the existing textile and apparel industry in the Alleghany Highlands because such is a route through which students may complete coursework to pursue an eventual career track in chemistry, chemical engineering, or additional fields related to the industry. At present, DSLCC does not offer specific chemistry or engineering courses directly related to the study of polymers, fiber technology, or organic chemistry.

The A.A.S. program in Advanced Manufacturing and Packaging Technologies (AMPT) is included in this report because this program offers the most comprehensive training in manufacturing processes directly related to industry trends Alleghany Highlands region. Although this program has a focus geared towards the manufacture of packaging materials, the curriculum of the AMPT allows both pre-career and mid-career students the opportunity to develop skills in advanced manufacturing processes. DSLCC believes that through helping students to develop skills training in advanced manufacturing processes, such individuals will possess greater flexibility and mobility to transition throughout various industrial and manufacturing sectors. Skills developed through completion of this program include experience and understanding of the following:

- Electricity/Electronics
- Applied Hydraulics and Pneumatics
- o Graphics
- Technical Computer Applications
- Manufacturing Processes
- Electromechanical Devices

- Programmable Logic Controllers
- World Class Manufacturing
- o Robotics
- o Computer Integrated Manufacturing
- Introduction to Packaging Systems Technology

When skills provided through study in the AMPT program are compared to skills requirements necessary for most employment opportunities, there exist several correlations. The greatest of these similarities is directly related to the ability to understand basic manufacturing processes, an understanding of electronics, ability to operate computer integrated manufacturing machinery, and programmable logic controllers. Such abilities are especially applicable to employment at Lees Carpet and The Bacova Guild.

Additionally, an understanding of graphics is especially applicable to employment opportunities through The Bacova Guild. As a manufacturer of doormats and floor coverings requiring graphical design elements, The Bacova Guild often seeks employees possessing basic skills in graphic design and graphic transfer knowledge.

At the community college level, Dabney S. Lancaster Community College the Continuing Education and Workforce Services division may also be a valuable resource for local chemical and chemical product manufacturing firms seeking to recruit employees native to the region. This department may provide a means through which to contact members of the traditional workforce of retiree pool who possess previous experience working in the manufacturing sector. An April 2004 article of Virginia Business, notes that community colleges play a role in helping to address needs of the chemical and chemical products manufacturing sector. In this article, J. Sergeant Reynolds Community College is noted for providing intermediary services to local chemical companies seeking to hire experienced retirees to fill production occupations in the industry (Virginia Business, 2004).<sup>21</sup> Continuing Education and Workforce Services may also provide assistance to this industry sector through their involvement in economic development efforts to help local firms achieve a competitive edge in the global market, while remaining located in the region. This may be of especial benefit to additional local manufacturing firms outside of this sector which rely on chemical components in their production processes.

Although DSLCC does not possess curriculum specifically designed for employment opportunities in the chemical and chemical products manufacturing industry sector, DSLCC does have an Associate's program in Science which may provide skills training necessary for future educational advancement to

<sup>&</sup>lt;sup>21</sup> Source: <u>http://www.gatewayva.com/biz/virginiabusiness/magazine/yr2004/apr04/chemical.shtml</u>

institutions providing programs in chemistry, chemical engineering, industrial engineering, or engineering science and mechanics.

According to the DSLCC website, completion of the Science program will equip students with mathematical and science knowledge necessary for entrance into a four-year college or university program in the following areas:

- o Agriculture
- o Biology
- o Chemistry
- Environmental Protection
- o Forestry
- o Geology
- o Mathematics
- o Nursing
- Pharmacology
- o Physical Therapy
- o Physics
- o Pre-Dental
- o Pre-Medicine

At present, DSLCC does not offer specific chemistry or engineering courses directly related to the study of polymers, or materials science. If the region seeks to encourage growth in the chemical or chemical products manufacturing sector, DSLCC may want to consider looking into curriculum for training chemical technicians. According to the Bureau of Labor Statistics (BLS), most chemical technicians possess 2-year degrees; however it is noted that such work requires significant coursework in applied science and process technology, with additional on-the-job training.<sup>22</sup> Generally, there are two types of chemical technicians often work in experimental labs, while process control technicians often are employed in manufacturing or industrial facilities. Training for chemical technicians serving as process control technicians will most service the existing industries, as well as many future industries. Tasks of many process technicians include focusing on quality assurance, quality monitoring, and production process overview and development.

Although not directly related to the chemical and chemical products manufacturing sector, the A.A.S. program in Advanced Manufacturing and Packaging Technologies (AMPT) may provide skills training to future chemical and chemical products manufacturing firms which produce an end product requiring packaging. Very often, packaging specialists are required at chemical firms producing cosmetics or soaps. Additionally, this program may be beneficial

<sup>&</sup>lt;sup>22</sup> See: <u>http://www.bls.gov/OCO/</u>
to both existing and future firms which require automated processes in the production of their chemicals or chemical products.

Currently, DSLCC does not offer any dual programs for incorporating general science curriculum to other programs such as forestry or advanced manufacturing. In the future, it may be beneficial to offer curriculum which would allow students to enroll in course tracks which would allow for a "cross" between science, notably chemistry, and the aforementioned programs. In the case of forestry, this may be helpful to students planning to transfer into the Wood Sciences Department at Virginia Tech in that such students may possess an ability to further understand wood composites manufacturing processes.

Each college and university examined in the education and skills training section of this report possess institutional or departmental career service offices which seek to provide assistance to students seeking job opportunities, as well as to employers looking to recruit students to participate in internship programs, or to fulfill current job openings.

#### **Vocational Training Centers**

The Jackson River Technical Center is the primary provider of vocational educational services in the Alleghany Highlands region. The Jackson River Technical Center (JRTC) functions primarily as a provider of skills training for the supply-side. At present, JRTC wood products-related curriculum provides hands-on training in basic carpentry, building trades, and welding. Secondary school students compose of the majority of individuals enrolled in coursework; however, the JRTC also offers courses to members of the traditional workforce, as well as retirees, seeking to diversify their skill sets.

The welding program at JRTC is very advanced and includes up-to-date equipment for student training. The curriculum in the JRTC welding is very much geared towards training students to pursue further welding at a higher educational level. Students in this program also have the opportunity to enroll in a dual-credit program in conjunction with the welding program at Dabney S. Lancaster Community College.

# Welding Lab at Jackson River Technical Center

In addition to serving as a provider of skills education, the JRTC also helps its students to learn soft skills often critical to success in the vocational trade sector. Examples of potential soft skills training at JRTC includes learn the value of teamwork, professionalism, and a healthy attitude. In efforts to help further promote the development of soft skills, JRTC offers its students opportunities to participate in a variety of state and national vocational skills competitions. Furthermore, JRTC also offers students opportunities to complete apprenticeships in fields related to their vocational coursework.

According to survey results collected in 2007 by the Virginia Tech Center for Assessment, Evaluation, and Educational Programming, JRTC possess a high job placement rate, upon completion of their portion of the training program. Results show that over 95% of graduates are able to transition to full-time employment, pursue military careers, or enter into higher education institutions. Of the surveyed respondents who attain full-time employment in their training area upon graduation, 100% report possessing satisfaction in their employment and career field. Furthermore, of the respondents surveyed, over 61% were able to find full-time employment in the field related to their skills training at JRTC. (Center for Assessment, Evaluation, and Educational Programming at Virginia Tech, 2007, p. 1).

Given JRTC's high job placement rates proceeding graduation, this report believes JRTC has potential to serve as an effective labor market intermediary in the wood products sector. Although JRTC does not offer extensive training directly correlated to the wood products industry, local firms may still benefit from employment of JRTC graduates due to the fact may bring desirable soft-skills.

Local vocational training centers and secondary schools often rely on the services of guidance departments for intermediary services. Many high schools in the region offer students the opportunity to shadow at local employers, or to receive course credit for work experience. Additionally, the Jackson River Technical Center offers students an opportunity to complete an apprenticeship with a local employer.

The Jackson River Technical Center in Covington is the primary vocational training center serving the Alleghany Highlands region. Alleghany County, Bath County, Highland County, and Rockbridge County are all served by this institution. An additional vocational training center also exists in Botetourt County; however, for purposes of this study this institution was not examined due to the fact that it only serves the Botetourt communities. Further rational for the exclusion of the Botetourt vocational training facility is also attributable to the lack of significant textile and apparel industry presence in Botetourt County, and the fact that the majority of Botetourt's labor pool seeks employment in the Roanoke metropolitan area, as opposed to communities in the Alleghany Highlands.

Examination of programs offered through the Jackson River Technical Center reveals that there exist no courses providing training specifically to the manufacturing, or textile/apparel industries. However, there do exist opportunities to complete coursework in welding, a skills that may be beneficial to textile and apparel manufacturing possessing heavy machinery, or firms seeks to hire facilities maintenance personnel. At present, Jackson River Technical Center offers three courses in welding, and one course in electrical wiring.

Additional examination of coursework offered through the Jackson River Technical Center also reflects several opportunities to equip individuals with entrepreneurial and business skills which may be helpful to persons seeking to develop a small "cottage industry" related to the textile or apparel industry. Consequently coursework in such may also be helpful to individuals seeking to complete additional two-year and four-year educational opportunities to further develop business skills necessary for the further growth, or expansion of a cottage industry. Skills and training offered through the Entrepreneurship Education course at Jackson River Technical Center include:

- o Developing of a business plan
- o Determining of type of business enterprise
- o Understanding legal considerations
- o Understanding location selection
- o Financing
- o Business start-up
- Marketing strategies
- o Developing interaction skills with successful entrepreneurs

In addition to coursework related to entrepreneurial skills, courses in Business Management and Business Law are also offered through the Jackson River Technical Center. According to course descriptions offered for Business Management, the purpose of the class is to equip students with a basic understanding of the principles of business related to ownership, management, and marketing techniques. Subsequently, the Business Law class builds upon such understandings and provides students with a general knowledge of legal practices and procedures related to business operation and management.

Because of health and safety requirements for employees of chemical and chemical product manufacturing firms, apprenticeships in this sector may be restricted to individuals over the age of 18. Consequently, this may limit access to opportunities for hands-on training and exposure to manufacturing processes at existing firms. Therefore, skills training and educational opportunities for future employment in this sector will likely be promoted through the science curriculum in the secondary school systems. Chemistry is offered at each of the high schools serving the region. Additionally, offering students interested in careers in the sciences an opportunities in the chemical and chemical products manufacturing sector. Science fair programs may also provide a means for gauging student interest in the sciences and chemical fields. Of the regional secondary schools examined in this report, only Covington City has an active Science Club.

#### Secondary Schools

Both Alleghany County High School (AHS) and Covington High School (CHS) offer intermediary services through their Guidance Departments. Within these departments, students are provided career consultation and exposed to existing job opportunities within their individual areas of interest. Additionally, both Guidance Departments engage in dialogue with local employers to better

understand how the secondary schools may undertake efforts to promote local employment opportunities.

Furthermore, both AHS and CHS are participants in the Tech Prep program. Designed to help students develop career awareness at an early age, Tech Prep establishes a career path for students seeking to enter the workforce upon high school commencement, or continue their education at the community college level. Dabney S. Lancaster Community College is an active participant in the Tech Prep program at both Alleghany County High School and Covington High School. In partnership with DSLCC, the secondary schools are able to construct curriculum to provide students with competitive skills in the local labor market. The Tech Prep program is unique in that it affords students the opportunity to engage through the utilization of hands-on teaching methods, and applied learning techniques. Furthermore, the program allows students to pursue options for work-based learning. Students may also participate in workshops specifically structured towards providing an understanding of both the wood products industry, as well as advanced manufacturing.<sup>23</sup>

Students at both Alleghany County High School and Covington High School are able to take course work at the Jackson River Technical Center. Statistics compiled by the Alleghany County High School Guidance Department show that over 60% of the high school's 900 students take at least once course through Jackson River Technical Center during their secondary school experience.

In addition to providing vocational training opportunities through Jackson River Technical Center, AHS also possess a Vocation Tech Education curriculum through their high school. Notably, this AHS program offers students the opportunity to pursue coursework in two subjects applicable to the wood products industry in the Alleghany Highlands region. These two subjects include a materials and processes class, and a manufacturing technology class. According to course outlines for these two classes, each focuses on promoting an understanding of processing skills, and basic machinery operations.

<sup>&</sup>lt;sup>23</sup> See: <u>http://www.dslcc.edu/PRESIDENT/continuing\_ed/techprep/index.htm</u>

One of the most important ways a secondary school can promote skill development and training opportunities for future textile and apparel employees is to encourage the development of "soft skills." According to the popular website, MSN Careers, soft skills is a term which often refers to a "cluster of personal qualities, habits, attitudes and social graces that make someone a good employee and a compatible co-worker" (Kate Lorenz, Careerbuilder.com). Lorenz notes ten characteristics of good soft skills:

- 1. Strong Work Ethic
- 2. Positive Attitude
- 3. Good Communication Skills
- 4. Time Management Abilities
- 5. Problem-Solving Skills
- 6. Acting as a Team Player
- 7. Self-Confidence
- 8. Ability to Accept and Learn from Criticism
- 9. Flexibility/Adaptability
- 10. Working Well Under Pressure

Understanding how individuals develop soft skills is a vague task given that people often acquire such skills throughout their life-long socialization and unique experiences. However, many high school guidance offices offer programming which help specifically target soft skills training. Consequently, many programs also offer professional and career development opportunities for participants. The below table offers an overview of soft skills and career development programs offered by secondary schools in the Alleghany Highlands region:

County	School	Program(s) Offered
		Tech Prep
Alleghany	Alleghany County High School	Talent Search
		Tech Prep
	Covington (City) High School	Talent Search
		None
Bath	Bath County High School	
		None – guidance office website did have
		several links for career development
Botetourt	Lord Botetourt High School	websites
	James River High School	Tech Ed Club (not part of guidance office)
Highland	Highland County High School	Tech Prep
Rockbridge	Rockbridge County High School	Talent Search

#### Table 18: High School programs

In addition to career and soft skill development opportunities offered through guidance departments, many secondary schools also possess career and technical curriculum tracks. Although programming varies from school-to school, many offer students the opportunity to gain exposure to basic welding, word processing, and general business skills. Furthermore, traditional "home economic" curriculum may be especially beneficial to individuals seeking

employment in the textile and apparel industry in that such will expose students to basic sewing skills.

#### Final Considerations: Education and Skills Training

Presently, many educational and skills training institutions within the region offer several opportunities for advancement in the field of wood and wood products manufacturing. At the college/university level, the Virginia Tech Department of Wood Science offers a nationally recognized program for educating students to pursue careers related to the following areas of study: adhesion science, forest products marketing and management, manufacturing systems, non-timber forest products, packaging science, and wood structures and materials. In addition to providing a specialized curriculum, the Virginia Tech Department of Wood Science seeks to further engage university-industry relationships, as well as to further promote wood science career awareness at the secondary school level through the WoodLINKS-USA program. Further exploration of the WoodLINKS-USA program is offered as a matter for further consideration. Additionally, the Virginia Tech Department of Chemical Engineering may also provide unique opportunities for firms utilizing composite and other chemical processes. Students in the Virginia Tech Department of Chemical Engineering possess skills very applicable to work in the paper manufacturing industry.

Additionally, the A.A.S. in Forestry Technology, and the A.A.S. in Advanced Manufacturing and Packaging Technologies programs at Dabney S. Lancaster Community College (DSLCC) serve as potential ways to target both the emerging workforce, as well as the existing workforce. Due to their proximity to many local employers, these programs are especially hopeful in that they provide students and workers an opportunity to seek educational advancement while remaining within the local community. Additionally, these programs may be a more cost-effective alternative for individuals eventually seeking a four year degree in a related field. Subsequently, this portion of the report urges consideration of ways to better promote transfer from DSLCC programs to local wood and wood products related departments at regional colleges/universities.

Jackson River Technical Center (JRTC) is another potential avenue for promoting career training and awareness of job opportunities in the wood and wood products industry. Examination of programs at JRTC reveals the presence of a very strong welding program. This is important in that such provides a skilled labor pool for industries supporting the wood and wood products industry. Furthermore, the welding curriculum allow JRTC students to dual-enroll at DSLCC. However, in efforts to further promote wood and wood products career opportunities, this report urges JRTC to consider implementing a program such as WoodLINKS-USA to run in conjunction with courses such as Building Trades. Additionally, focus on soft skills acquisition is also important for both students participating in vocational technical education, as well as secondary school students. At present, the majority of institutions examined in this report do not offer education or skills training directly related to employment in local textile and apparel firms. However, the majority of positions available in the region's existing industry do not require skills or educational training prior to employment. Consequently, given the industry structure of most local firms, only management and research positions are likely to require advanced skills training, or specialized knowledge of textile and apparel manufacturing processes. Of the employers examined in this report, Lees Carpet requires the greatest number of individuals possessing industry specific knowledge.

As aforementioned, Lees Carpet is a manufacturer of rug and carpet floor coverings. Additionally, the Lees Carpet facility in Glasgow also is a yarn spinning mill, which requires on-site yarn coloring and dying procedures. Taking into consideration the manufacturing, and research and development, processes generally practiced at facilities similar to Lees Carpet in Glasgow, firms of this capacity are likely to require individuals with chemical engineering, or other engineering backgrounds, directly related to an understanding of polymer adhesion and material processes. These assumptions are based upon examination of Lees Carpet competitors such as Milliken & Company. Additionally, textile research programs at other higher education institutions were also reviewed to help determine how certain skills may be applicable to the manufacture of yarn, rugs, and carpet.

Taking into consideration the above factors, this report believes that Lees Carpet may likely benefit through a partnership with the Chemical Engineering, Chemistry, or Engineering Science and Mechanics departments at Virginia Tech. This may be helpful for future recruitment and internship program development. Additionally, other local firms may benefit by establishing relationships with the Advanced Manufacturing and Packaging Technologies program at Dabney S. Lancaster Community College. Although this program is focused on the packaging industry, program participants are likely to acquire a greater understanding of advanced manufacturing techniques. Through acquisition of employers possessing an understanding of advanced manufacturing skills, local textile and apparel firms may gain a competitive advantage in an industry which most assuredly requires such.

At present, the majority of institutions examined in this report do not offer education or skills training directly related to employment in the local chemical or chemical product manufacturing firms. However, the number of positions currently available in the existing industry is very small, and likely has a low employment turnover rate. Therefore, implementing additional training programs specifically targeted to this sector is not recommended at this time. Currently, there appears to be a sufficient pool of college graduate who possess degrees applicable to employment in the professional occupations of this sector. As many firms are becoming increasingly advanced, possession of college degrees will be increasingly important. If targeting growth in the chemical or chemical products manufacturing sector is a regional goal for economic diversification and firm sustainability, it is recommended efforts be undertaken to contact those individuals known to possess educational training and degrees applicable to employment in the professional occupations of this industry. A campaign similar to Southwest Virginia's Return to Roots may be helpful for identify these individuals. Additionally, programming oriented towards the training of chemical technicians or process control technicians should also be explored if recruitment efforts targeting the chemical or chemical products manufacturing sector become an economic development priority.

Identification of existing industry and buyer-supplier networks is only one aspects of an industry cluster analysis. In order to appropriately understand how a cluster analysis may be applicable to policy efforts to address existing industry sustainability, and future industrial recruitment, regional stakeholders must also firmly grasp the aptitude and availability of the current workforce. Through an increased understanding of the current workforce dynamics, stakeholders will thus be better equipped with knowledge for promoting regional labor market attributes, and addressing existing or potential workforce challenges. Effectively understanding current labor market conditions is also an important component for helping to maximize the competitive advantage of the Alleghany Highlands region.

# *Demographic and Labor Market Characteristics: Alleghany Highlands Commuting Patterns*

The majority of the Alleghany Highlands workforce (60 % in the 2000 Census) lives and works in the region. In addition, a slightly greater proportion of the workforce commutes from homes outside the region into the Highlands than the proportion that leave the Highlands region for employment elsewhere. This suggests a relatively strong home-grown workforce in the region. At the same time, commuters entering and leaving the region form a substantial part of the workforce, suggesting that the Highlands region has a strong interdependence with surrounding areas. The Highlands supplies workers to other regions, and depends on workers coming from other industries as well.

These trends are further visible in a visual representation of the labor shed and commute shed for the Highlands region. These maps were created using the U.S. Census Bureau's Local Employment Dynamics (LED) 'On the Map' tool, available online at <u>http://lehd.did.census.gov/led/datatools/onthemap2.html</u>. This tool allows users to specify an area, and then displays maps associating census data with spatial locations. The following maps display:

- The "labor shed" of the Alleghany Highlands, which shows where people working in the Highlands region live (i.e., where they commute from to Highlands jobs).
- The "commute shed" for the Alleghany Highlands, which shows where people who live in the Highlands work (i.e., where Highlands residents commute to for their jobs).



# Figure 2: Commute Shed Extended Region





Source for Maps Above: U.S. Census Bureau's Local Employment Dynamics (LED) 'On the Map' tool, available online at <u>http://lehd.did.census.gov/led/datatools/onthemap2.html</u>. Data is based on 2004 projections/estimates, and is the most current information available.

Of those Highlands residents commuting to jobs outside of the region, a significant number of these individuals are commuting to the Roanoke, VA area. Due to recent industry closings in the Alleghany Highlands in the region not reflected in this data the number of commuters to the Roanoke, VA area may be much greater.

Comparatively few of the Highlands commute to West Virginia for employment. Conversely, many West Virginia residents travel to the Highlands for employment.

Understanding the residency and commuting patterns of workers in the Alleghany Highlands is becoming increasingly important. As rising fuel costs begin to become a major economic concern for many individuals, the proximity of residency and employer is likely to become an influential factor affecting employee retention and recruitment.

One staff member at a regional labor market intermediary interview for this project argued that the a large factor contributing to underemployment within the Alleghany Highlands is a lack of access to public transportation between an individual's place of residency, and major regional employers. Focus groups conducted with secondary school students at Alleghany County High School and Jackson River Technical Center also highlight local concern over the lack of adequate public transportation, and desire to avoid commuting due to high fuel costs.

Destination	Daily Round Trip (Miles)	Average Monthly Cost of Commuting
Lexington	86	\$1,038.45
Roanoke	112	\$1,352.40
Waynesboro	168	\$2,028.60
Lynchburg	186	\$2,245.95
Harrisonburg	202	\$2,439.15

Table 19: Commuting Costs from Alleghany Highlands<sup>24</sup>

Source: commuterpage.com See:

http://www.commuterpage.com/Userweb/CostCommuting/CostCommuting.htm.

# **Educational Attainment**

National trends for the wood products, textile and apparel manufacturing, and chemical and chemical products industry sectors each reveal that in order for many domestic firms to remain competitive against offshore firms, there must be a shift towards advanced manufacturing processes and increased technological automation. Consequently, as production processes begin to change, the workforce must also evolve to adapt to such technology advances. Thus, increased education and skills training are becoming an important component to helping to promote the sustainability of manufacturing entities within a region. Whereas many manufacturing production jobs of the past decades often required minimal educational attainment, today's production jobs are increasingly

<sup>&</sup>lt;sup>24</sup> Calculated from Main St., Covington, VA to Main St., Destination. Based on 23 day/month work, \$3.80/gallon gas, 28mpg averages, miles commuted round trip, and fixed standards est. by the cost per mile estimates. Cost per mile estimates based on the 2001 Federal Highway Administration's Cost of Owning and Operating a Vehicle.

requiring high school graduates, and very often individuals possessing a bachelor's degree.

The table below reflects educational attainment levels for residents of the Alleghany Highlands region. As noted, many localities within the region possess educational attainment levels significantly below state and national averages. Consequently, such levels of educational attainment present potential challenges for recruiting firms practicing advanced manufacturing production processes.

Location	% over Age 25 with High School Diploma or GED	% over Age 25 with a Bachelor's Degree or Higher			
Alleghany	77.5%	13.6%			
Bath	74.0%	11.1%			
Botetourt	81.4%	19.6%			
Highland	72.8%	13.2%			
Rockbridge	71.0%	18.7%			
Covington (City)	71.4%	6.4%			
Lexington (City)	77.1%	42.6%			
Greenbrier (WV)	73.4%	13.6%			
Monroe (WV)	73.7%	8.2%			
Pocahontas (WV)	70.9%	11.8%			
Virginia State Avg,	81.5%	29.5%			
West Virginia State Avg,	75.2%	14.8%			
United States Average	80.4%	24.4%			

 Table 20: Educational Attainment in the Extended Region

Source: U.S. Census Bureau State and Country QuickFacts – Accessible at <u>http://quickfacts.census.gov/qfd/index.html</u>. Information is based on the 2000 U.S. Census

Despite below average numbers, some evidence suggesting that educational attainment levels are improving within the region. Recent figures noted in a VEDP Community Profile of the region indicate approximately 85% of the 2005 high school class in the region's secondary schools graduated.<sup>25</sup> Of course, this assumes graduates will stay in the area, or at least will not be replaced by those without diplomas. In addition, 1,316 people were enrolled in two-year degree programs at regional higher education institutions, with nearly 200 students graduating with two-year degrees in 2005<sup>26</sup>

These graduates and degree holders continually add valuable skills and training that enrich the local community and labor market. These degrees provide valuable information to employers. In essence, the degree is proof that these individuals have obtained proficiency in a given subject, with recognized standards for the level of skills and understanding needed to graduate and obtain the degree. As such, the educational institutions provide a valuable service for the region's residents and firms, allowing individuals to advance their careers and

<sup>&</sup>lt;sup>25</sup> <u>http://virginiascan.yesvirginia.org/Data\_Center/Community\_Profiles/Default.aspx</u>

<sup>&</sup>lt;sup>26</sup> See VT Economic Development Studio, Technical Report located in the appendix

obtain better employment, and allowing firms to be confident that the degree holders they hire will possess the desired skills. Consequently, recognition of the importance of retaining the region's human capital is an important factor for helping to promote the region's industrial sustainability, as well as to helping to promote future industry growth.

School	Enrollment	4 Yr. College or University	Community College	Workforce
Alleghany County				
High School	900	30%	47%	15%
Covington High				
School	347	45%	38%	11%

Table 21: Post-Graduation Plans, 2006-2007

Source: http://www.alleghany.k12.va.us/AlleghanyHigh/IMAGES/school%20prOFILE.doc and http://www.covington.k12.va.us/CHS/CHSprofile.doc

# Population Trends and Employment

Examination of population trends since July 2000, reflect that many areas have experienced slight population declines. The areas experiencing the most significant declines include Alleghany County, Bath County, Highland County, and Pocahontas County. However, it is notable that during this period Botetourt County, Rockbridge County, and Monroe County, experienced population increases. Rational for such increases and decreases in population are likely attributable to several factors including, but not limited to: plant/industry closures, aging population, and increases in tourism/retirement relocation to the area.

#### **Population Estimates** July 2000-July 2007 Alleghany 40,000 Bath Botetourt 30,000 Highland 20,000 Rockbridge 10,000 Greenbrier Monroe 0 Pocahontas

# Figure 4: Population Estimates for the Extended Region

Source: US Census Bureau Population Estimates, July 2000 – July 2007

As noted throughout previous sections of this report, a query with US Census Bureau Local Employment Dynamics-Industry Focus<sup>27</sup> of major industry sectors within the region reveals that a majority of counties within the region have a strong manufacturing presence, notably in the wood products manufacturing sector. Pocahontas County, WV, Greenbrier, WV and Alleghany County, VA had the strongest wood products manufacturing employment base within the region. Notably, in the city of Covington, VA, almost 1/4<sup>th</sup> (1,483) of all employees were employed by paper manufacturing firms.

Offshoring and decline of traditional manufacturing industries in the wood products and textile and apparel manufacturing industries have impacted unemployment rates within the region throughout the past decade. Additionally, recent plant closures in the chemical and chemical products industry has lead to several displaced workers in this portion of the region's manufacturing base. At present, the majority of localities with a manufacturing presence, experience unemployment rates greater than state averages.

Although above average unemployment rates produce additional economic stress upon the region, such rates may also highlight an available labor pool for firms seeking to relocate within the area, Notably, highlighting an available labor pool of displaced workers from chemical and chemical products manufacturing firms, such as Parker-Hannifin, may be used as a potential advantage for attracting firms engaged in value-added production processes which utilize polymer technology. As previously highlighted in this report, national and state trends show that many chemical and chemical products manufacturing firms often seek employees with past experience within the industry sector.

<sup>&</sup>lt;sup>27</sup> See <u>http://lehd.did.census.gov</u>



Figure 5: Unemployment Rates in the Extended Region

Source: Bureau of Labor Statistics, Labor Force Data by County, Annual Averages 2000-2007

In summary, the workforce dynamics of the Alleghany Highlands region show that employment trends are often dependent on the strength of the local manufacturing base, notably the vitality of the wood products manufacturing industry. Subsequently, national trends reflect a decline in the overall wood products manufacturing industry, thus creating concerns over the sustainability of the industry within the Alleghany Highlands. Therefore, in efforts to help address potential decline in the region's wood products manufacturing industry, stakeholders must explore efforts to cultivate a workforce equipped with advanced manufacturing skills, and greater levels of educational attainment in fields related to the region's manufacturing industries. Additionally, the region must also undertake efforts to attract firm investments in industries seeking employees with the skills sets possessed by the existing workforce.

## Sustaining the Region's Manufacturing Industries

Although the region has experienced recent declines in the textile and apparel manufacturing industry, and the chemical and chemical products manufacturing industry, concentrating efforts to promote growth in the chemical and chemical products industry sector may contribute to the sustainability, and potential growth of existing textile and apparel manufacturing industries, and wood and wood products manufacturing. This rational is based on the fact that many firms within each of these sectors seek employees with similar aptitudes and skills. Examination of Standard Occupation Classification (SOC) codes for each of the three industries examined in this study show several overlapping occupations, thus revealing that the skills sets of workers within each of the three industry sectors may share similarities. Standard Occupation Classification (SOC) Codes Found in the Wood Products, Textile & Apparel Manufacturing, and Chemical & Chemical Products Industry Sectors, found in Appendix II-B of this report, provides a summary of the interrelatedness of occupations within the three industry sectors examined in this report. Common Production Occupations in the Alleghany Highlands and Related Production Occupations in the Chemical and Chemical Products Manufacturing Industry Sector, found in Appendix II-B of this report also highlights how common production jobs in the region's wood project and textile industry are related to those in the chemical and chemical products manufacturing sectors. Data for Table I-B is noteworthy in that such reflects directly related occupations as noted by the U.S. Department of Labor. As noted in Table I-A, similarities in occupations within the three industry sectors are not limited to production occupations, but also include similar industry demand for various professional and managerial occupations. Notably, Chemical Engineers were a common occupation desired by firms within the three industry sectors.

# Chemical Engineering, Wood Scientists and the Alleghany Highlands

As discussed throughout this report, focusing on increasing the production of value-added products is considered an important component for the overall sustainability and future growth potential of the three major industries. In the area of wood products manufacturing, textile and apparel manufacturing, and chemical and chemical products manufacturing, an understanding of polymers is important in the production of a value-added product. Consequently, the field of Chemical Engineering is often viewed as a way through which to link an understanding of polymers to industrial applicability. Additionally, university programs in Wood Science also provide students with a very specialized understanding for how polymer technologies may be applied within the wood and wood products industry sector. In many instances, Wood Science programs often overlap with Chemistry and Chemical Engineering curriculum.

While there are available production workers possessing skills applicable to employment in production processes of each of the three target industries, as well as a sizeable population of displaced workers possessing experience working with polymers, there exist some shortages in the number of qualified engineering professionals. Thus, in efforts to further attract and promote industry investment, this report urges the region to consider ways to increase the number of chemical engineers, and engineering professionals within the region.

#### Chemical Engineering

Recognizing the increasing importance of Chemical Engineering to the three industries examined in this cluster analysis, this report found it beneficial to explore ways through which to examine ways through which to increase the availability of Chemical Engineers in the workforce of the Alleghany Highlands. An important method for increasing the number of Chemical Engineers within the Alleghany Highlands involves exploration into establishing a relationship with the Virginia Tech Department of Chemical Engineering. To further explore the potential of this relationship, interviews, a focus group, and surveys of current students and alumni were conducted to help further understand the potential aptitude and availability of VT students and alumni to firms within the Alleghany Highlands region. Within these discussions and outreach efforts, the Virginia Tech Office of Economic Development sought to understand the following:

- Basic Student/Alumni Demographics
- How the skills set of VT Chemical Engineers may be applicable to existing or future manufacturing firms in the Alleghany Highlands
- Factors influencing Student/Alumni Career Decisions
- Student and Alumni Perceptions of Job Opportunities for Chemical Engineers in Rural Locations- Familiarity With the Alleghany Highland Region

Throughout our dialogue with the Virginia Tech Department of Chemical Engineering, over 150 department seniors and alumni participated in a survey answering questions related to the factors above. Additionally, a total of 8 students participated in a focus group session that also explored the topics above. Results of both the Virginia Tech Department of Chemical Engineering survey and focus group are provided below.

# Chemical Engineering Focus Group Summary

The Chemical Engineering Focus Group composed of 50% Seniors, and 50% Juniors. Students for this group were selected from student members of the Virginia Tech Chapter of the American Institute of Chemical Engineers (AIChE). As of Spring 2008, 100% of this group had completed either a Co-Op or Internship experience. 4 of the 6 students in this group were male. 3 of the 6 students identified themselves as Virginia residents, 2 students were from out-of-state, and 1 student did not disclose his residency.

Student	Year	Gender	Home State	Internship or Co-Op Experience
				2 Internships-Firm that assembles cables
				and antennas-adhesives and sealants;
				will work in a design consulting firm upon
Student 1	Senior	Female	New Hampshire	commencement (Virginia firm)
				2 Co-op experiences; 1 with a large
				manufacturing plant that worked with
				plastics; 1 forthcoming with a company
				that researched how bulletproof vests are
Student 2	Junior	Male	Did not disclose	made
				2 Co-Ops; 1 with Honeywell (Richmond)
				- worked with health and safety issues
				and nylon; 1 with Eastman (Kingsport)-
				worked with process development and
Student 3	Senior	Male	Tennessee	plant design
				4 Compostor Co. On: Evison Mahilo
				4 Semester Co-Op; Exxon-Mobile
Chudant 4	Comion	Mala		(Houston, TX)- worked with plant support
Student 4	Senior	male	virginia	and oil refinery processes
				3 Co-Ops: Dow Chemical Company(
				Louisiana, Michigan, California) –
				Research 1 Internship: Novizomes
Student 5	Junior	Male	Virginia	Biological- Roanoke-Research
				2 Internships- 1 with a pharmaceutical
				company (Virginia) and 1 with a company
Student 6	Junior	Female	Virginia	making cigarette filters (Virginia)

	Table 22:	Focus	Group	Student	Demogra	phics
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Skills possessed by student focus group participants varied according to the student's academic year, and personal interests within the field of Chemical Engineering. However, a common theme amongst the students was that each felt to be very academically prepared for work within the industry. Consequently, each of the students attributed this preparedness to their participation in either an internship program, or co-op experience. Students stated that such "real world" experiences provided them with exposure to the organizational culture of their host firm(s), a better understanding of national trends within the industry, specialized training in their particular field of study within Chemical Engineering, experience in safety practices, and overall professional development.

Inquiry into factors influencing a student's career decisions revealed several common themes. One of the most prevailing decision factors amongst the students within this group showed that the majority felt the organizational culture and structure of the firm to be one of the most critical factors for determining whether or not to accept a job at a firm. Students cited a desire to work for a company which would afford them opportunities for advancement, as well as an ability to perform a diversity of tasks. Because of their desire for fluidity and mobility with a firm, many students felt that such would guide them towards larger firms within the industry. However, most students were also quick to note that if

medium to smaller size firms were able to offer this fluidity, they would also consider options available, especially if the students would be given an opportunity to eventually play an influential role within the company.

Despite a desire for mobility and fluidity within a firm, almost all members expressed a desire for stable employment. Most viewed changing jobs more than three times throughout their career was as less desirable. Social capital decisions such as proximity to family and friends were also considered as important factors influencing the student's career decisions. Several students also expressed that their career decisions also were dependent upon the consideration of employment opportunities for current or future spouses. In addition to social capital, the students also considered the health and safety risks associated with employment in certain firm as influential factors. Regarding benefits, many students felt such to be merely benchmarks for consideration.

When guestioned about the location of the firm, the majority of students felt such to be a less influential factor than the organizational culture and structure of the firm. Although, students did note that they felt that many desirable career opportunities were more likely to exist in urban areas, notably in the chemical industry "hubs" of Houston, Baton Rouge, New Orleans, and the industrial corridor of New England. While many students felt as though they would eventually settle in an urban or suburban location, there were also several students who would prefer to reside or settle in a rural locality if able to be employed in a stable company with chances for advancement and task diversity. Additionally, students were quick to note that regardless of urban or rural location, there was an overall agreement that commuting times between residence and employer should be minimal; commuting distances over thirty to sixty miles in one direction were considered undesirable. When asked of familiarity with the Alleghany Highlands region, the student participants in this group knew of the region's geographic location, but lacked a familiarity with firm locations within their field in the region. Only one student participant knew of MeadWestvaco's Covington facility.

#### Student and Alumni Chemical Engineering Survey

As noted above, electronic/email surveys were conducted of senior chemical engineering students, as well as chemical engineering alumni who graduated after 1987. A total of 19 current students (39%) responded to our survey, and a total of 130 alumni responded (% of total unknown-this is due to the fact that the VT Office of Alumni Affairs does not possess email addresses for all Chemical Engineering alumni). The major findings of these surveys are reported below. A copy of all survey responses is included in the addendum section of this report.

#### Demographics

Similar to the focus group, the majority of students and alumni surveyed were male. Data is reported in percentages of question respondents.

Т	able	23:	Survey	Demographics
•	abic	20.	Ourvey	Demographics

	Current Student	Alumni
Male	61.1%	68.7%
Female	38.9%	31.3%

Skills and Educational Attainment

The majority of survey respondents for current students possessed very diversified interests within the field – relating from polymers to pharmaceuticals. Similar diversity was also noted in the alumni respondents as well. Although, it is noteworthy that many alumni are involved with process engineering and production. Amongst the alumni, there are also similarities in the occupational sectors held by the alumni.



Figure 6: Chemical Engineering Alumni Occupations

Overall, the majority of current students and alumni believed their academic and occupational interests to align with their current occupational choices. When surveyed as to the satisfaction with their current educational attainment levels, the majority of individuals in both categories considered themselves to be satisfied. This was true for bachelor's, master's, and doctoral recipients.

# Perceptions of Career Opportunities in Rural Localities and Career Decision Factors

When asked to rank the most important factors (excluding social connections and family concerns) influencing career choices, alumni and current students ranked their three top concerns in the following order:

	Most Important	Second Most Important	Third Most Important
	Location &	Salary & Nature of	Organizational
Current Student	Benefits (Tie)	the Job (Tie)	Culture of Firm
Alumni	Nature of the Job	Benefits	Salary

# Table 24: Respondents Concerns About Jobs

In relation to location, the majority of current students (66.7%) and alumni (68.2%) expressed a desire to relocate to a rural area in ten or more years. At present, the majority of current students (66.7%) and alumni (63.7%) reside in suburban localities. Potential advantages for relocation to a rural community, identified by both groups, include availability of outdoors amenities, close-knit communities, and reduced costs of living. Potential disadvantages of relocation noted by both groups include limited amenities, and commuting and transportation challenges. Also, it is important to note that a significant majority of alumni also expressed a concern over poor school systems.

When asked to gauge their perception of job opportunities within their field in rural localities, alumni and current students responded accordingly:

	Alumni	Current Students
Very Good	0%	3.7%
Good	18.7%	33.3%
Fair	45.8%	33.3%
Poor	26.2%	33.35
Extremely Poor	5.6%	0%

#### Table 25: Respondents perceptions of rural opportunities

Also noteworthy, when asked to identify a familiarity with the Alleghany Highlands region, the following was reported:

# Figure 7: Student awareness of the region



II-68



Figure 8: Alumni awareness of the region

#### Wood Science

In addition to Chemical Engineering serving as a means through which to promote value-added manufacturing, Wood Science is a very specialized field also focusing on promoting value-added manufacturing processes within the production of wood and wood products. Like Chemical Engineering, Wood Science also explores the relevancy of polymers to advancement of the industry. However, the curriculum of many Wood Science programs are unique in that such also include coursework on wood properties, wood and wood products industry marketing and management, and how to incorporate sustainable practices into a manufacturing setting. Because wood and wood products manufacturing is especially important to the economic vitality of the Alleghany Highlands, this report also felt it important to explore how a relationship between the Virginia Tech Department of Wood Science, and the Alleghany Highlands, may be utilized as a means through which to attract Wood Scientists to the region. To further explore this relationship, a series of interviews and a focus group was conducted with department faculty and current students. Similar to discussions with representatives from the Virginia Tech Department of Chemical Engineering, these discussions sought to further explore the following:

- Basic Student Demographics
- How the skills set of VT Wood Scientists may be applicable to existing or future manufacturing firms in the Alleghany Highlands
- Factors influencing student career decisions
- Student Perceptions of Job Opportunities for Chemical Engineers in Rural Locations- Familiarity With the Alleghany Highland Region

# Wood Science Focus Group Summary

The Wood Science Focus Group composed of 4 Seniors, with the exception on one Master's student, one Junior, and one student who did not disclose his academic year. Students for this group were members a wood products marketing class. Similar to the Chemical Engineering students, almost all students had completed at least one internship experience. 5 of the 7 students were from Virginia.

				Field of Study Within Wood
Student	Year	Gender	Home State	Science
Student 1	Senior	Male	Virginia	Manufacturing
Student 2	Senior	Male	Virginia	Manufacturing
Student 3	Senior	Male	Virginia	Marketing & Management
Student 4	Junior	Male	Maryland	Wood Structures
Student 5	Master's	Male	Virginia	Manufacturing
Student 6	N/A	Male	International	Marketing & Management
Student 7	Senior	Male	Virginia	Marketing & Management

### Table 26: Focus Group Student Demographics

When asked about factors influencing their career decisions, many students believed that quality of life should be a top consideration. Of the students

participating in our focus group, many believe that the location and work environment of a firm are more important factors than salary and benefits packages. Furthermore, students cite opportunities for advancement to also be important considerations when evaluating employment opportunities.

Of the students we talked too, many individuals would consider firms located both in rural or urban areas. However, a notable factor in addressing place issues is that preferred locations would offer outdoor recreational opportunities for hunting, fishing, and hiking. Many also expressed willingness to commute up to a distance of one hour.

Concerning work environments, students also desired firms in which other young people worked, so as to help them construct social networks in a locality. Additionally, students prefer employment opportunities in firms that have low occupational hazard rates. Furthermore, students hope for a work environment in which they will have good working relationships with both other employees and supervisors.

Noting that the majority of students enrolled in the Virginia Tech Department of Wood Science possess skills training for future managerial employment tracks, many students desire employment opportunities that will allow for future career advancement. Students believe that working 5-10 years with a firm upon graduation is very important in helping them to develop professional experience that will allow them to then transition to firms where they hope to spend the remainder of their career in upper management positions. Interestingly, when asked if anyone foresaw themselves as entrepreneurs in the wood products industry, many replied that such is difficult given that many firms in the industry are either very large, or very small. One student noted that it was not cost-effective to start a small wood products business from the ground-up; rather the student felt that such entrepreneurship is best explored as a retirement hobby.

# Summary- Labor Market Analysis

Although the region possess a significant number of production workers possessing skills applicable to each of the three industry sectors examined in this report, there exists a shortage in the number of engineers, scientists, and other professionals necessary to attain significant industry advancement. Thus, it is encouraged that stakeholders concentrate on efforts to attract and retain employees with higher degrees in technical occupations within each industry sectior. Exploration of partnerships with the Virginia Tech Department of Chemical Engineering and Department of Wood Science is strongly encouraged, particularly in regards to the formation of internship programs between current students and existing local employers.

Furthermore, it is also recommended that the region undertake efforts to increase educational attainment levels by continued support of technical and community college education. Continuing efforts to promote local partnerships amongst

secondary schools, technical schools, and Dabney S. Lancaster Community College is encouraged not only for communities in Alleghany County, but also for other school systems within the region. Additionally, regional implementation of industry-centered career development programs such as WoodLINKS and Dream It! Do It! Is also recommended as a means through which to encourage student interest in existing industry career opportunities.

As noted through focus groups and surveys of Virginia Tech students and alumni, there exist many individuals seeking to reside in a rural community. Although it is important to note that many students also expressed a strong concern over the proximity of their place of residence to their place of employment. Considering such, it is recommended that the region further study the availability of quality and affordable housing options in neighborhoods and communities in proximity to major employers.

# **Key Findings and Recommendations**

# Final Considerations: Wood and Wood Products

Overall, the wood and wood products manufacturing sector in the Alleghany Highlands appears to be a very important driver in the regional economy. Although MeadWestvaco and its supporting contractors possess the greatest number of employees, many small wood product manufacturing firms and logging companies contribute to the overall vitality of the industry. Consequently, an examination of existing industry reveals the presence of several small firms, specializing in the production of custom wood products. Examples of such valueadded wood products firms include Union Church Millworks, and the Fincastle Gallery. Although the aforementioned firms do not employ many individuals, their presence reveals the existence of a labor force that possesses an extensive knowledge of custom woodcraft.

Due to recent national and state industry trends, it is important that firms within the region focus on ways through which to address sustainability, as well as increased production mechanization and industrial automation. In efforts to address the matter of sustainability, this report recommends the exploration of ways through which to promote sustainable log harvesting practices. The Blue Ridge Forest Cooperative may provide valuable resources to helping to promote forest landcare services, as well as a means through which to foster and market value-added wood products.

Additionally, to address sustainability and recent industry technological advances, this report highlights the increasing industry demand for individuals trained in advanced manufacturing processes. Thus, in efforts to capitalize upon such growing trends, it is recommended that measures be undertaken to further market and promote the advanced manufacturing curriculum at Dabney S. Lancaster Community College. Promotion of this program is very important to efforts of both training the existing wood products manufacturing labor force, as well as to equipping traditional students with a diverse skills set that will be necessary for a competitive advantage in today's manufacturing economy.

Continued focus on educational and training opportunities for industries supporting the existing wood and wood products industry sector is also important to the overall vitality of existing firms. This report notes that strengths in programs such as Welding at both the vocational and community college level, provides both existing and prospective firms with additional support in the area of logistics. Additional efforts to promote skills training in value-added wood product production is also noted through the new degree program for an Associate in Applied Science in Fine Woodworking program being conducted by Pocahontas Woods through New River Community and Technical College in Lewisburg, WV. Pocahontas Woods provides additional opportunities for promoting training and entrepreneurial activity in the production of hand-crafted furniture. Located in a 3,300 sq. foot workshop in neighboring Marlinton, WV, Pocahontas Woods is a non-profit organization dedicated to training youth and adults in skilled woodworking, as well as to promoting entrepreneurial, business planning, financing, marketing, and quality control education (Pocahontas Woods Website). In addition, Pocahontas Woods also provides numerous specialized courses in techniques such as dovetailing, steam bending a toboggan, and learning to make a turkey call. Enrollment in weekend courses is offered to the general public for a nominal fee of \$35.00 for a one day class (9:00am-3:00pm). Furthermore, Pocahontas Woods is in the process of establishing a "business incubator" type program through which the organization will lease equipment to the public.

Taking into account the information derived from this portion of our report, we present the following considerations:

- Continue efforts to promote relationships for training members of the traditional and emerging workforce in advanced manufacturing techniques, forest technology, and fine woodworking program at the vocational education, community college, and university level. Continue to foster existing relationships with local education and training centers, as well as consider developing additional relationships at the college and university level. Notably, this report recommends further development of relationships and dialogue with the Virginia Tech Department of Wood Science, and the Virginia Tech Department of Chemical Engineering. By fostering relationships with local universities, the region will also be undertaking measures to help address future retirements in the management of local firms.
- Focus efforts towards increasing entrepreneurial activity in the local wood products industry. At present, there exists a great opportunity for marketing value-added wood products and high-end wood craft through the local tourism industry.
- Consider efforts to explore environmental sustainability issues. Notably, this report urges further review of sustainable forestry practices. Organizations such as the Blue Ridge Forest Cooperative may provide value resources for helping to begin a regional dialogue in regard to this matter. Through promotion of sustainable forestry practices, the region will also be helping to ensure that the availability and diversity of local hardwoods will continue to be present.

### Final Considerations: Apparel and Textile Manufacturing

Overall, the textile and apparel manufacturing sector in the Alleghany Highlands appears to be consistent. This consistence is likely attributable to the fact that many firms in the region are textile product mills, and thus able to implement technology advances to maintain industry competitiveness. However, because textile product mills require consistent technological evolution, provision of a workforce able to diversify to address new skills requirements is very important to the overall sustainability of the industry in the Alleghany Highlands region.

Firm evolution is also important, especially for apparel manufacturing firms which possess large numbers of individuals trained in sewing and cutting processes, the most at-risk position for off-shoring. Therefore, in addition to focusing on skills training, localities may benefit from strategic planning measures to explore how at-risk workers may use their previous experiences in related industry.

Encouraging entrepreneurship and start-up cottage industries in the textile and apparel manufacturing sector may be a potential way to help address at-risk employees, as well as to promote the sustainability of this industry within the region. Entrepreneurship has proven successful in this region, as noted through the histories of firms such as The Bacova Guild and Bea Maurer, Inc. Given the availability of land for fleece production in the area, the crafting yarn and homespun products may find a niche in the local tourism market. Furthermore, there are numerous craft shops within the region which may provide retail outlets for local cottage industries.

Bea Maurer, a seamstress once earning \$3.10 an hour, is a classic example of the entrepreneurial spirit in the textile and apparel manufacturing sector. In 1983, Maurer purchased the small tent manufacturing firm of five employees where she was also a seamstress. By 2005, this firm had grown and evolved to become an \$80 million dollar firm specializing in high tech temporary shelters for military use.

How did she do it?

Maurer focused on finding niches. In addition to manufacturing tents, Maurer also began to make laptop cases at a time when computers were first being introduced. She also made efforts to explore new technology advances which may potentially be of value to her operations. Because of her small size and status as a woman-owned firm, Maurer was able to participate in funding Taking into account matters addressed in this report, the Alleghany Highlands may benefit from consideration of the following:

- Formulation of partnerships with local colleges, community colleges, the Jackson River Technical Center, and secondary schools to explore the skills and training needs of textile and apparel manufacturing firms within the region.
- Continue to focus on ways in which local community colleges, the Jackson River Technical Center, and secondary schools may promote and market advanced manufacturing training to both students and members of the traditional workforce.
- Promote entrepreneurial activity the region may benefit from consideration of designing a database of small cottage industries (manufacturing/craft firms employing 1-4 people) which may be incorporated onto local websites. Additionally, links may want to be explored as to how small businesses may benefit from the existing tourism industry

### Final Considerations: Chemical and Chemical Products

Examination of the chemical and chemical products manufacturing industry in the Alleghany Highlands region reveals that existing firms in this sector generally provide goods and services to large regional employers, notably in the wood products industry. Thus, the future sustainability of this industry is likely dependant on the economic prosperity of other regional firms. Consequently, many existing firms in this sector provide the majority of their services to one firm, MeadWestvaco. Subsequently, one may also make the argument that many regional firms also dependent on the local chemical and chemical products manufacturing sector because such firms allow for increased competitiveness, due to cost reductions produced by purchasing chemical goods and services locally.

In efforts to help promote the sustainability of the existing chemical industry in this region, as well as to encourage future growth, local economic development efforts may benefit through promotion of a labor pool equipped with necessary skills and educational training for employment in professional and production occupations in the chemical and chemical products industry. Notably, targeting firms which utilize polymer technologies may be beneficial since many individuals in this region have previous work experience in this field. Consequently, many wood products and textile firms are becoming increasingly dependent on technological advances related to polymers. Noting such, one may also present the case that growth in polymers may contribute to growth and expansion in the existing wood products, and apparel and textile manufacturing sectors due to the fact that polymers are important components for value-added products.

Taking into account the information collected in this report, the following considerations are offered:

- Consideration of efforts to focus on promoting sustainability of existing firms; this is especially important due to the fact that many large regional employers in various other sectors, notably the wood products industry, rely on services provided by local chemical and chemical products manufacturers. Consequently, one may also argue that the chemical and chemical products manufacturing industry is also dependent on other industry sectors to purchase their products.
- Support small business development in this sector. As noted through national industry projections, small and specialized chemical companies will be the most likely to experience future growth and sustainability.
- Consideration of efforts to attract chemical and chemical products manufacturing firms to locate in the Alleghany Highlands region.
   Potentially target firms specializing in providing services to the wood products, and apparel and textile manufacturing industries.
- Market the available labor force possessing qualifications relevant to employment in the professional and production sectors of the chemical and chemical products manufacturing industry. Efforts to establish a local campaign similar to Return to Roots may prove beneficial for identifying qualified individuals seeking employment opportunities in the Alleghany Highlands region. Identification and marketing of a labor pool of young retirees, or members of the traditional workforce possessing experience working in the chemical or chemical products manufacturing may also be helpful for efforts to recruit firms to the region.

# **APPENDICES**

# **APPENDIX II-A: Firm Profiles by Industry**

## Wood and Wood Products

#### Alleghany County

An examination of existing industry in the wood and wood products sector in Alleghany County reveals the presence of several employers. MeadWestvaco Corporation [NAICS 322110, 322121, 322130, 322222], a leading national manufacturer of paper, bleachboard, and fiberboard products, is the largest manufacturer in the wood and wood products sector. At present, MeadWestvaco employees an estimated 1500 individuals within its operations housed in Alleghany County. MeadWestvaco has two facilities in Alleghany County; the largest is the mill in downtown Covington. Subsequently, employment estimates reveal that 1,300 individuals work at the downtown Covington mill. The remaining estimated 200 individuals work at a converting and service facility in Low Moor.

#### Firm Profile: MeadWestvaco

Number of Employees: estimated 1,500

Contact Information:

Phone: 540-969-5000

Fax: 540-969-5577

Address: 104 E. Riverside Dr.

Covington, VA 24426

www.meadwestvaco.com

Public Affairs: Rosalyn (Roz) Durden

Products: Paper (Fiberboard and Bleachboard); Extrusion coating, sheeting, and custom winding of paperboard.

Additional Notes: MeadWestvaco is a Union plant. At present, there exist some issues between local employees and the national union. MeadWestvaco has operated in Covington since 1898.

Source: infoUSA 2008 Edition 2

Bennett Logging & Lumber Inc. [NAICS 321113], a company specializing in lumber and timber production, is the second largest wood-based employer in Alleghany County. Bennett Logging & Lumber is a locally –owned and operated company located in Covington.

# Firm Profile: Bennett Logging & Lumber Inc.

Number of Employees: estimated (45) Contact Information: Phone: 540-862-7621 Fax: 540-862-3375 Address: 6800 Rich Patch Road Covington, VA 24426 President/Plant Manager: Steve Bennett Products: Lumber and Timbers Additional Notes: Locally-owned; Steve Bennett is also the owner of Union Church Millworks.

Source: infoUSA 2008 Edition 2

Union Church Millworks [NAICS 321918], an affiliate of Bennett Logging & Lumber, is a producer of high-quality wood products including flooring, paneling, and decorative moldings, baseboards, and wainscoting. All products produced by Union Church Millworks are made from all-wood, which is hand selected from the trees of a nearby property. According to the Union Church Millworks' website, over 13 varieties of indigenous Appalachian hardwoods are used to produce Union Church products.

Union Church Millworks is able to possess a high standard of quality control in that production processes are all conducted at, or in close proximity of, the firm site. For example, employees can select the type of trees that the product will be constructed from, thus ensuring that a specified grade of wood is utilized. Additionally, because of Union Church's affiliation with Bennett Logging, even the sawmill portion of production is able to be monitored for quality assurance. In essence Union Church's quality control processes help to insure that a value-added product is produced. Union Church Millworks in located adjacent to Bennett Logging in Covington.
#### Firm Profile: Union Church Millworks

Number of Employees: estimated (16) Contact Information:

Phone: 540-862-0767 Fax: 540-862-3375 Address: 6800 Rich Patch Rd. Covington, VA 24426 www.millwork2002.com

President: Steve Bennett

Products: Flooring, Paneling, Wainscotting, Baseboards, Chair-Rails, Crown Moulding, Quarter Moulding, Cove Moulding, interion/exterior log siding Additional Notes: Specializes in V-grooved flooring which is sanded and ready for installation; Markets itself as possessing the highest of quality control in that the product is monitored from the forest through finish

Source: infoUSA 2008 Edition 2

Located in Clifton Forge, Bolivia Lumber Co. [NAICS 321920] is a firm which specializes in the manufacturer of wooden containers and pallets. Additionally, this company also serves as a lumber and wood merchant wholesaler.

#### Firm Profile: Bolivia Lumber Company

Number of Employees: 20-49 Contact Information: Phone: 540-862.5228 Address: 101 Matthews Lane Clifton Forge, VA 24422 General Manager: Jack Gentry Products: Wooden Containers and Pallets Additional Notes: Company also serves as a wholesaler for lumber and wood

Source: infoUSA 2008 Edition 2

Sonoco Products Company [322214, 322299], located in Clifton Forge, is an international firm specializing in packaging products. A search of the Sonoco website reveals that it is likely the Clifton Forge facility serves as an operation center for inventory management, and housing plastic recycling facilities. However, NAICS codes and information from the Virginia Employment Commission reflect that this facility also engages in fiber can, tube, and drum manufacturing. Sonoco has several additional facilities throughout Virginia.

#### Firm Profile: Sonoco Products Company

Number of Employees: 20-49 Contact Information: Phone: 540-862-4134 Address: Hwy 629 Clifton Forge, VA 24422 www.sonoco.com Plant Manager: Ralph Henderson

Products: Fiber can, tube, and drum manufacturing

Source: infoUSA 2008 Edition 2 and www.sonoco.com

Alleghany County also has two small businesses, including Bradley Sawmill and Deeds Brothers Logging. Located in Clifton Forge, Deeds Brothers Logging [NAICS 113310] specializes in the harvesting of timber. Employment estimates obtained from the Virginia Employment Commission reflect that Deeds Brothers employees 5-9 individuals. Bradley Sawmill [NAICS 321113], located in Covington, produces green cut lumber.

#### Firm Profile: Deeds Brothers Logging

Number of Employees: 5-9 Contact Information: Phone: 540-862-0357 Address: 8286 Douthat State Park Rd. Clifton Forge, VA 24422 Products: Timber Source: infoUSA 2008 Edition

#### Firm Profile: Bradley's Sawmill

Number of Employees: 1-4 Owner: J.C. Bradley Contact Information: Phone: 540-962-4446 Address: 4500 Indian Draft Rd. Covington, VA 24426 Products: Green, cut lumber

Source: infoUSA 2008 Edition 2

#### **Bath County**

Located in Millboro, Bluegrass Woods [NAICS 321999] is a company known for its production of the American Classic BACOVA mailbox. Although this firm constructs many products from steel, Bluegrass Woods produces a variety of ice buckets, card tables, and serving trays which are made of wood and then hand laminated with a design of choice. This firm has been in operation since 1965.

#### Firm Profile: Bluegrass Woods

Number of Employees: 1-4

Contact Information:

Phone: 540-997-0174

Address: Rt. 635, Millboro, VA 24460

Products: ice buckets, card tables, and serving trays

Source: infoUSA 2008 Edition 2 and www.bluegrasswoods.com

Augusta Lumber, Inc. [NAICS 321113, 423310], headquartered in Waynesboro, Virginia operates a sawmill operation in Bath County. Timber cut at this facility is transported to a lumber yard in Augusta County where it is either sold directly as lumber or flooring. Augusta Lumber employees over 300 people, 10-19 of which work at the sawmill operations in Bath County. Augusta Lumber is a family-owned company which has been in operation over forty years.

#### Firm Profile: Augusta Lumber Inc.

Number of Employees: 10-19 Contact Information: Phone: 540-839-2641 Address: Rt. 39 W Warm Springs, VA www.augustalumber.com Products: Cut timber used for lumber or flooring

Source: infoUSA 2008 Edition 2 and www.augustalumber.com

#### **Botetourt County**

The Fincastle Gallery [NAICS 337122], located in Fincastle, is an art gallery which sells original handcrafted wooden furniture by artist Jake Cress. The Fincastle Gallery has received much attention nationally for both his traditional, and "animated," furniture. Cress' furniture sells for very high prices; at present his most expensive piece available is a custom carved chair for \$17,000.

#### Firm Profile: The Fincastle Gallery

Number of Employees: 1-4

Contact Information:

Phone: 540-473-2974

Address: 110 N. Roanoke St.

Fincastle, VA 24090

**Owner: Jake Cress** 

Products: Custom Furnitur3

Source: infoUSA 2008 Edition 2 and www.jakecress.com

Thompson Building Supply, Inc. [NAICS 321918] located in Buchanan, is a small firm specializing in "other millwork," which also includes flooring. According to the VEC, this company also serves as a lumber and wood merchant wholesaler and home center. At present, Thompson Building Supply Inc. employees between 1-4 individuals.

#### Firm Profile: Thompson Building Supply Inc.

Number of Employees: 1-4 Contact Information: Phone: 540-254-2637 Address: 120 Parkway Dr. Buchanan, VA 24066 Owner: Judy Thompson Products: Other millwork

Source: infoUSA 2008 Edition 2

#### Highland County

Currently, Hooke Brothers Lumber Company [NAICS 321113] is the largest employer in Highland County specializing in the wood and wood products industry sector. According to the VEC, Hooke Brothers performs sawmilling operations. Employee estimates for this firm reflect a total employment of 10-19 individuals.

#### Firm Profile: Hooke Brothers Lumber Company

Number of Employees: 10-19

Contact Information:

Phone: 540-499-2540

Address: St. Route 84

Monterey, VA

Products: Cut timber used for lumber

Source: infoUSA 2008 Edition 2

In addition to the aforementioned sawmilling operations, Highland County is also home to 3 logging companies: Barney's Logging [NAICS 113310], Moyers Logging [NAICS 113310], and Kelly Farms Inc. [NAICS 113310]. Each of these firms is very small and average between 1-4 employees.

#### Firm Profile: Barney's Logging

Number of Employees: 1-4 Contact Information: Phone: 540-474-5561 Address: HC 2 Box 51 Bluegrass, VA 24413 Owner: Robert Warner Products: Timber

Source: infoUSA 2008 Edition 2

#### Firm Profile: Moyers Logging

Number of Employees: 1-4 Contact Information: Phone: 540-468-2289 Address: HC 2 Box 130 Monterey, VA 24465 Owner: Robert Moyers Products: Timber

Source: infoUSA 2008 Edition 2

#### Firm Profile: Kelly Farms Inc.

Number of Employees: 1-4 Contact Information: Phone: 540-468-3070 Address: 71 Highlands Court Monterey, VA 24465 Owner: Robert Kelly Products: Timber

Source: infoUSA 2008 Edition 2

#### Rockbridge County

Rockbridge County is home to 12 firms specializing in the wood and wood products industry. Three firms, Fitzgerald Lumber and Log, Burke-Parsons-Bowlby Corporation, North Fork Lumber, and Mundent-Hermetitie, Inc. are the larger of the Rockbridge firms. Average employment at these three aforementioned firms ranges from 50-99 individuals.

Mundent-Hermetite, Inc. [NAICS 322130, 322121, 322299] located in Buena Vista, is a manufacturer of tipping paper for cigarettes. Additionally, this company produces specialty packaging and promotional products for tobacco companies and food products. Examination of the Mundent-Hermetite Inc. website reveals that this firm produces cigarette tipping papers for both Phillip Morris and RJR Tobacco Companies. Consequently, the Buena Vista facility is centrally between large tobacco manufacturing production facilities in both Richmond, VA, and Winston-Salem, NC.

#### Firm Profile: Mundent-Hermetite Inc

Number of Employees: 50-99

Contact Information:

Phone: 540-261-7435

Address: 21<sup>st</sup> Street

Buena Vista, VA 24416

Plant Manager: John Blackburg

Products: Cigarette tipping paper; specialty packaging and promotional products for tobacco companies and food production

Additional Information: This firm serves large tobacco companies located in Richmond, VA and Winston-Salem, NC. Mundent-Hermetite has 2 operations in Virginia (Buena Vista and Colonial Heights) and operations in Tennessee and Toronto Canada. This firm is headquartered in Richmond.

Source: infoUSA 2008 Edition 2

and www.mundent.com

Burke Parsons Bowlby Corporation [NAICS 321114, 321992, 321999] is a producer of log homes and fencing. Additionally, this firm specializes in the production of pressure treated railroad timbers which are utilized to form crossties, bridge timbers, switch ties, planed bridge decks, tie plugs, and highway grade crossings. According to the Burke Parsons Bowlby Corporation website, the production processes utilized for creating railroad timbers includes:

harvesting and logging timber, sawmill operations, tie production, tie seasoning, and pressure treating the lumber. As noted on this website, most companies contract out sawmilling operations to smaller firms. Burke Parsons Bowlby Corporation has several firms located in the eastern United States. The Rockbridge County facility is located in Goshen.

#### Firm Profile: Burke Parsons Bowlby Corporation

Number of Employees: 50-99

Contact Information:

Phone: 540-997-9251

Address: 9223 Maury River Rd.

Goshen, VA 24439

Products: Pressure treaded railroad timbers; fences; log homes

Source: infoUSA 2008 Edition 2

and www.bpbcorp.com

Fitzgerald Lumber and Log [NAICS 321113, 321912, 423310], located in Fairfield, is a firm specializing in sawmilling operations to produce lumber and veneer logs for wholesale. Additionally, Fitzgerald Lumber and Log also operates a facility in Buena Vista.

#### Firm Profile: Fitzgerald Lumber and Log

Number of Employees: 50-99

Contact Information:

Phone: 540-348-5199

Address: 5459 N. Lee Highway

Fairfield, VA 24435

Human Resource Executive: Carolyn Clark

Products: Lumber and Veneer Logs

Additional Notes: Company began operations in 1973; exports lumber products to Asia and Europe.

Source: infoUSA 2008 Edition 2 and www.fitzgeraldlumber.com North Fork Lumber Company [NAICS 32113], located in Goshen, is a sawmill operation which employees 50-99 individuals.

#### Firm Profile: North Fork Lumber Company

Number of Employees: 50-99 Contact Information: Phone: 540-997-5602 Address: 250 N. Fork Lane Goshen, VA 24439 Human Resource Executive: Mary Beth Harris Products: Cut Timber/Lumber

Source: infoUSA 2008 Edition 2

In addition to possessing several firms with an employee range between 50-99 individuals, Rockbridge County also has numerous firms which employee between 20-49 individuals. These firms include: Taylor-Ramsey Corporation, Shenandoah Hardwood Lumber, George Shumate Inc., and Blue Ridge Lumber Company, L.L.C.

Blue Ridge Lumber Company L.L.C. [NAICS 113310, 321999, 423310] is a Fishersville, Virginia-based firm which operates a concentration yard facility in Goshen. Additionally, Blue Ridge Lumber Company L.L.C. also operates log yards in *Highland County* (Monterey) and *Alleghany County* (Covington). Blue Ridge Lumber Company L.L.C. employees an estimated 20-49 and specializes in graded-rough sawn lumber, and quartered and rift sawn lumber.

#### Firm Profile: Blue Ridge Lumber Company L.L.C.

Number of Employees: 20-49

Contact Information:

Phone: 540-997-5993

Address: Highway 42

Goshen, VA 24439

Manager: Stephen Markum

Products: Graded, rough sawn lumber, and quartered and rift sawn lumber

Source: infoUSA 2008 Edition 2 and www.blueridgelumber.net

Taylor Ramsey Corporation [NAICS 321912, 423310], headquartered in Lynchburg, maintains sawmill and dry kiln operations in Natural Bridge, Virginia. According to the firm's website, the Natural Bridge facility saws, steams, and dries Walnut wood. The firm also saws Poplar wood. Current estimates show that between 20-49 individuals are employed at Taylor Ramsey's operations in Natural Bridge.

#### Firm Profile: Taylor Ramsey Corporation

Number of Employees: 20-49

Contact Information:

Phone: 540-291-2459 Address: 153 Sherwood Lane Natural Bridge, VA 24579 Manager: Frank Holtaling Products: Kiln dried lumber

Source: infoUSA 2008 Edition 2 and <u>www.taylorramsey.com</u>

Shenandoah Hardwood Lumber Company [NAICS 321113] is a sawmill facility located in Buena Vista. This firm specializes in the processing green lumber and kiln dried lumber. Additionally, Shenandoah Hardwood Lumber Company also produces lumber for fencing boards and pallets.

#### Firm Profile: Shenandoah Hardwood Lumber Company

Number of Employees: 20-49

Contact Information:

Phone: 540-261-2171

Address: 302 Piedmont Ave.

Buena Vista, VA 24416

Plant Manager: Roy Zangari

Products: Green cut and kiln dried lumber; fence boards and pallet lumber and cants

Source: infoUSA 2008 Edition 2 and www.shlco.net

George Shumate Inc. [NAICS 321113] is a sawmill operation in Lexington. At present, there are an estimated 20-49 individuals employed at this firm.

#### Firm Profile: George Shumate Inc.

Number of Employees: 20-49 Contact Information: Phone: 540-463-9173 Address: 537 Fredericksburg, RD Lexington, VA 24450 Owner: George Shumate Products: Lumber

Source: infoUSA 2008 Edition 2

An examination of small wood and wood products firms in Rockbridge County shows there exist several entities. Sibold Logging, High Country Forest Products, Value Mart, Alphin Thomas, B&D Trucking, and W.R. Deacon & Sons Timber are all examples of small firms located in Rockbridge County.

Located in the Goshen community, Sibold Logging [NAICS 113310] is a log harvesting company that employees 5-9 individuals.

#### Firm Profile: Sibold Logging

Number of Employees: 5-9

Contact Information:

Phone: 540-997-5331

Address: 1102 Virginia Ave.

Goshen, VA 24439

Products: Timber

Source: infoUSA 2008 Edition 2

High Country Forest Products [NAICS 11310] is another small logging company located in Lexington. Similar to Sibold, this firm also employees 5-9 individuals.

#### Firm Profile: High Country Forest Products

Number of Employees: 5-9 Contact Information: Phone: 540-463-2270 Address: 116 Denmark Way Lexington, VA 24450 Owner: Tim Goodbar Products: Timber

Source: infoUSA 2008 Edition 2

Value Mart [NAICS 337127] is a small institutional furniture manufacturing firm located in Buena Vista. According to the VEC, Value Mart employees an estimated 5-9 individuals. Institutional furniture is often classified as wooden furniture for use in schools and other public institutions.

#### Firm Profile: Value Mart

Number of Employees: 5-9 Contact Information: Phone: 540-261-2544 Address: 2175 Magnolia Ave. Buena Vista, VA 24416 Manager: Bruce Marlatt Products: Institutional Furniture

Source: infoUSA 2008 Edition 2

B&D Trucking [NAICS 321999, 484230, 444220] is a trucking company located in Lexington. However, a search of the VEC database notes that this firm also manufacturers miscellaneous wood products. The nature of this product is unknown.

#### Firm Profile: B&D Trucking

Number of Employees: 5-9 Contact Information: Phone: 540-463-3178 Address: 2970 W. Midland Trail Lexington, VA 24450 President: David Sibold Products: Misc. Wood Product Mfg.

Source: infoUSA 2008 Edition 2

Thomas Alphin [NAICS 113310] is a small logging company located in Goshen. According to VEC estimates, this firm to employee 1-4 individuals.

#### Firm Profile: Thomas Alphin

Number of Employees: 1-4

Contact Information:

Phone: 540-997-5245

Address: 260 Big River Rd.

Goshen, VA 24439

Products: Timber

Source: infoUSA 2008 Edition 2

An internet search for additional wood and wood products firms in Rockbridge County produced an additional sawmill, W.R. Deacon & Sons Timber [NAICS: unknown]. According to the website macraesbluebook.com, this firm produces lumber for use in flooring.

#### Firm Profile: W.R. Deacon & Sons

Number of Employees: unknown

Contact Information:

Phone: 540-463-3832

Address: 209 Sawmill Ln.

Lexington, VA 24450

Products: Lumber

#### Textile and Apparel Manufacturing

#### Alleghany County

An examination of the top fifty largest employers in Alleghany County, Virginia reveals the presence of only one textile and apparel manufacturing firm (NACIS Codes 313-315). The Bacova Guild (NAICS 314), located in Low Moor, is a manufacturer of floor mats, accent rugs, and bath accessories. According to data from the Virginia Employment Commission for the 2<sup>nd</sup> Quarter of 2007, the Bocova Guild employees 337 individuals, thus making it the third largest employer in Alleghany County at present.

During the mid 1990's, Alleghany County did have one additional textile and apparel manufacturing firm, Halmode Apparel (NAICS 315). However, the Halmode operations closed in Alleghany County during 1998. The closing of the Alleghany County Halmode facility was likely the result of off-shoring operations of Halmode Apparel's parent company, Kellwood Corporation. Consequently, the closing of the Alleghany County Halmode facility also follows along national textile industry trends during the late 1990's. Halmode was a manufacturer of women's suits, skirts, and outwear. At its peak, between100-249 individuals were employed at Halmode Apparel-Alleghany County (Virginia Employment Commission).

#### Firm Profile: The Bocova Guild

Number of Employees: 337 (as of June 29, 2005)

Contact Information:

Phone: 540-863-2600 Fax: 540-863-2702

Address: P.O. Box 180

1000 Commerce Center Dr.

Low Moor, VA 24457 (map)

www.bacova.com

General Manager: David Woods

Products: Printed Accent Rugs, Printed Floor Mats, and Bath Ensembles

Additional Notes: The Bocova Guild is a subsidiary of Ronile, Inc.

Headquartered in Rocky Mount, VA, Ronile is a manufacturer of a variety of

yarns and fibers utilized in the carpet, rug, home furnishing, craft, and automobile markets.

Source: <u>www.bacova.com</u>, <u>www.alleghanyhighlands.org</u>, and infoUSA 2008 Edition 2

#### **Bath County**

Bath County is home to one commercial apparel manufacturer, Kool Dri Rainwear (NAICS 315). Located in Millboro, Virginia at the intersection of Route 39 and 42, Kool Dri is a Pennsylvania-based corporation specializing in the manufacture of all-weather rain suites and jackets. Kool Dri targets the outdoor enthusiast, offering primarily camouflage style rainwear for both men and women. Currently, Kool Dri Rainwear in Bath County employees between 10-19 individuals (VEC).

#### Firm Profile: Kool Dri Rainwear

Number of Employees: 10-19

Contact Information:

Phone: 540-997-9241

Address: Intersection of Rt. 39 & 42

Millboro, VA 24460

www.kooldrirainwear.com

General Manager: Sadie Mays

Products: Waterproof Outerwear

Additional Notes: Pennsylvania-based Company - caters to the outdoor

enthusiast.

Source: infoUSA 2008 Edition 2

#### **Botetourt County**

Botetourt County is home to one small textile manufacturing company, Flag Windcrafters Guild (NAICS 314). Located in Troutville, Flag Windcrafters Guild specializes in the manufacture of custom flags and banners. This is a very small firm which employees between 1 and 4 people.

Botetourt County is also home to Blue Ridge Sportswear (NAICS 333). According to the company's website, Blue Ridge Sportswear specializes in commercial and industrial apparel embroidery. However, the NAICS code for this firm also notes that the company is involved in textile machinery manufacturing. Blue Ridge Sportswear, located in Daleville, employees between 10 and 19 individuals.

#### Firm Profile: Flag Windcrafters Guild

Number of Employees: 1-4 Contact Information: Phone: 540-992-5387 Address: 2895 Trinity Rd. Troutville, VA 24175 Owner: Melcom Hart Products: Flags and Banners

Source: infoUSA 2008 Edition 2

#### Firm Profile: Blue Ridge Sportswear

Number of Employees: 10- 19 Contact Information: Phone: 540-992-6631 Address: 210 Roanoke Rd. Daleville, VA 24083 Owner: Kathy Wilson Products: Commercial and Industrial Embroidery; Textile Machinery Manufacturing

Source: infoUSA 2008 Edition 2

#### Rockbridge County

Lees Carpet [NAICS 313111 and 314110], a subsidiary of Mohawk Industries, is the largest textile firm in the Alleghany Highlands region. The Glasgow, Virginia Lees Carpet facility specializes in the production of carpet and carpet components, and employees 1250 individuals. According to the Lees Carpet website, the firm practices the following manufacturing processes:

- Yarn Dyeing
  - Long and Short Space Dye
  - Duracolor (stain resistance process)
- Yarn Manufacturing
  - Knitting of Fiber into Sock
- Heatsetting
- Operation of Tufting Machines
  - Specialized Tufting Process
  - Tri-Ax Multituft
- Finishing Operations
  - FRS (Full Repeat Scroll)
  - Fine Line (Dense, Low-Profile Product)
  - o Thermoplastic Backing System
- Tip-Shearing
- Inspection
- Modular Manufacturing
  - Encycle (non-PVC modular backing)
  - Self-Lock (mastics to back of each module for installation)

This facility also possess physical and color testing facilities, warehouses for both yarn and finished goods, a design resource center, and manufacturing management offices.

#### Firm Profile: Mohawk Industries (Lees Carpet)

Number of Employees: 1250

Contact Information:

Phone: 540-258-2811

Address: 404 Anderson St.

Glasgow, VA 24555

www.leescarpet.com

Contact: David Speight, H.R. Exec.

Products: Carpet and Carpet Components

Additional Notes: Largest Textile Employer in Region; Known regionally as Lees

Carpet (a subsidiary of Mohawk Industries)

Source: infoUSA 2008 Edition 2 II-99

Bea Maurer Inc. (NAICS 339999-All other miscellaneous manufacturing) is another large facility incorporating textile manufacturing processes in the Alleghany Highlands region. Located in Fairfield, Virginia, a community near Lexington, Bea Maurer Inc. is a stand-alone subsidiary of Hunter Defense Technologies, Inc which operates under the name Base-X Expedition Shelters. As of 2005, 120 individuals were employed at the Bea Maurer Inc. (Base-X) facilities in Fairfield. Bea Maurer is a governmental contractor which specializes in the manufacture of rapid deploying tactical shelters for use by the military. Bea Maurer's Base-X Shelter Systems are considered to be some of the most advanced and lightweight shelters available. Notably, Base-X Shelter Systems are resistant to chemical, biological, and radiological weaponry, and also passed military standards for durability, driving rain, blackout, wind and snow load. Base-X Systems are also used for command and control centers, field hospitals, and communications shelters.

#### Firm Profile: Bea Maurer (Base-X Shelters)

Number of Employees: 120

Contact Information:

Address: 6051 North Lee Highway

Fairfield, VA 24435

1-800-969-8527

www.Base-X.com

Products: Lightweight, Rapid Deploying Tactical Shelters

Additional Notes: Bea Maurer Inc. originally began as an outdoor supply

company and later transitioned into governmental contracting. Bea Maurer, the

company owner, began her career as a sewing machine operator in 1981.

Source: infoUSA 2008 Edition 2

Painter Space Print Inc. is a textile and fabric finishing mill located in Buena Vista, VA. Painter Space Print employees between 51-100 individuals and focuses on dying a finishing operations, notably those related to the dying processes of yarn used in the manufacture of carpets and rugs.

#### Firm Profile: Painter Space Print Inc

Number of Employees: 51-100 Contact Information: Phone: 540-261-6119 Address: 1723 Sycamore Ave. Buena Vista, VA 24416 Products: Dyeing Finishing; Carpet Yarn Dyeing

Source: infoUSA 2008 Edition 2

Additional Notes: Largest Textile Employer in Region; Known regionally as Lees

Carpet (a subsidiary of Mohawk Industries)

## Cottage Industries in the Alleghany Highlands Applicable to the Apparel and Textile Sector

#### Bath County

Diamond Triple C. Ranch is a new farm and general store which recently began operations in Bath County. Operating under the trade name of Echo Valley Fruit and Fiber, this company specializes in alpaca products. Although Echo Valley Fruit and Fiber has not began full operations, the company's website states that the firm is hopeful to begin yarn and fiber production processes within the near future.

#### Firm Profile: Diamond Triple C. Ranch (Echo Valley Fruit and Fiber)

Number of Employees: unknown

Contact Information:

Address: HC 3, Box 31 Rt. 625

Millboro, VA 24460

www.diamondtriplecranch.com

#### Contact: Stephen H. Coltrin, Chairman and CEO

Products: Alpaca Products (Fiber and Yarn)

Source:www.diamondtriplecranch.com

#### **Highland County**

Located in the Blue Grass community of Highland County, Mad Maggie's Wool is a locally owned and operated farm producing wool, yarn, and socks for retail consumption. According to the farm's website, the proprietors craft wool from onsite Suffolk and Rambouillet sheep into yarn. This yarn is then sold separately in 200 yard skeins, or is used in the production of socks which are also crafted onsite. Both yarn and socks offered through Mad Maggie's Wool are dyed on-site and treated with natural lanolin oils. The sheep producing the wool used by this firm are organically-raised in a pesticide-free environment.

#### Firm Profile: Mad Maggie's Wool

Number of Employees: unknown

**Contact Information:** 

Phone: 540-474-3860

Address: Mad Maggie's Farm

Blue Grass, VA 24413

www.madmaggiefarm.com

Contact: Maggie@madmaggiefarm.com

Products: Wool, Yarn, and Socks

Source: www.madmaggiefarm.com

#### **Chemical and Chemical Products**

#### Alleghany County

Examination of chemical and chemical products manufacturing facilities located in the Alleghany Highlands reveals a presence of two firms, both of which are located in Alleghany County. To classify chemical and chemical products manufacturers, firms possessing NAICS codes 325-327 were examined. This examination includes all chemical manufacturers, all plastics and rubber product manufacturers, and all nonmetallic mineral product manufacturing. Although nonmetallic mineral product manufacturing (NAICS 327) was included in this study, many aspects of this sector differ significantly from the other industry sectors examined in this report. Therefore, local firms classified in this sector (NAICS 327) will be included as an addendum to this section.

Headquartered in Dayton, Ohio, Chemstation [NAICS 325998] is a national firm providing industrial cleaning and process chemicals to manufacturers. Chemstation in Covington is a branch of the Chemstation franchise. Local

branches of this firm/franchise are responsible for receiving, storing, handling, disposing, and general maintenance of client's Chemstation storage units. Chemstation notes specialized service provision for numerous food, and forest products manufacturing facilities (Chemstation website).

Firm Profile: Chemstation Number of Employees: 5-9 Contact Info: 540.962.6191 Address: 113 E. Fudge St. Covington, VA 24426 Manager: Michael Klaus Products: Industrial Cleaning and Process Chemical Services

Source: infoUSA 2008 Edition 2

General Chemical Corporation [NAICS 325188] is a "manufacturer of valueadded performance chemicals used for a variety of purposes including quality improvement of everything from sports drinks, shrimp, salsa, antiperspirants, and paper" (General Chemical Website). General Chemical's chemical processing products are also utilized in textiles, leather, photographic products, dyes, rubber products, and paints (General Chemical Website). General Chemical in Covington is a small facility, thus likely used as a terminal, or distribution facility, for corporation which is headquartered in New Jersey.

Firm Profile: General Chemical Corporation

Number of Employees: 1-4

Contact Info:

540.962.6444

Address: 607 N. Magazine Ave

Covington, VA 24426

Manager: Mark Hark

Products: Process chemicals serving a variety of purposes

Source: infoUSA 2008 Edition 2

#### Recent Layoffs – Alleghany County, VA

Recently, the region experienced the loss of several major employers in the Plastics and Rubber manufacturing sector (NAICS 326). These employers include Lear Corporation, Acadia Polymers, and Applied Extrusion Technologies. Consequently, the recent closing of these firms produced a significant number of displaced workers possessing skills for working in the field of plastics manufacturing.

Lear Corporation (NAICS 326119), previously located in Covington, was a large manufacturer of interior plastic components for automobiles. According to the MacRAE's Blue Book, products manufactured at Lear Corporation-Covington were composed of polyolefin foam, polyether foam, silicone foam, ethylene propylene terpolymer foam, Neoprene foam, polyvinyl chloride foam, rubber foam, polystyrene foam, resins and resin derivatives. Former employees of this facility also possessed experience in operating equipment utilized for polymer extrusion, and resin molds (MacRAE's Blue Book). Lear Corporation closed their Covington facility in December 2005.

Acadia Polymers (NAICS 326299), a subsidy of Parker Hannifin, employed over 250 individuals (infoUSA. Acadia Polymers specialized in rubber-to-metal and rubber-to-plastic bonding. Additionally, prior to closing this facility, Acadia Polymers possessed a presence in the Virginia Tech Corporate Research Center. The former Acadia Polymers facility is located in the Iron Gate community. Acadia Polymers closed its Alleghany County operation in 2007.

Applied Extrusion Technologies (AET) (NAICS 326112), formally located in Covington, was a manufacturer of plastic films and sheeting utilized in the packaging process. The majority of plastic film produced at this facility was classified as polypropylene film. At the time of closing in March 2008, Applied Extrusion Technologies employed 147 individuals (Alleghany Highlands Economic Development Corporation website).

### **APPENDIX II-B: Supplemental Information**

#### Table 27: Occupational Report from the Bureau of Labor Statistics (Textile and Apparel Manufacturing) 2006<sup>28</sup>

	Tot employ (000	al ment 's)	2006 cha in t Emplo	5-2016 ange total oyment	2006 self- Perce	2006 average annua (00	-2016 al job openings O's)	Percent		Postseconc or traini	Education Cl	Perce age e a	ent of w d 25 to 4 ducatio ttainme	orkers 14, by nal ent
Occupation	2006	2016	#'s	%	employed ıt (%)	Due to growth and total replacement needs	Due to growth and net replacement needs	Part- time workers quartile*	Unemployed workers quartile*	ary-education Ig category	ıl Attainment ıster	High School Or less	Some College	Bachelor's degree or higher
Cutting, punching, and press machine setters, operators, and tenders,										Moderate-term				
metal and plastic	272	231	-40	-14.9	0.5	31	7	VL	VH	on-the-job	HS/SC	76.7	21.6	-
Sewing machine operators	233	170	-63	-27.2	7.6	36	2	L	VH	Moderate-term on-the-job	HS	82.3	13.2	4.5
Cutting and slicing machine setters, operators, and tenders	79	71	-7	-9.3	1.6	4	1	L	VH	Moderate-term on-the-job	HS	80.7	16	3.3
Textile winding, twisting, and drawing out machine setters, operators, and tenders	43	33	-11	-24.3	0	4	1	VL	VH	Moderate-term on-the-job	HS	80.7	18.6	-
Textile knitting and weaving machine setters, operators, and tenders	40	28	-12	-30.9	5.8	2	1	L	VH	Long-term on- the-job	HS	83.9	14	-
Textile, apparel, and furnishings workers, all other	24	21	-4	-14.8	5.2	3	1	L	VH	Short-term on- the-job	HS	75.3	14.5	10.1
Textile cutting machine setters, operators, and tenders	19	14	-5	-27.4	0	2	1	L	Н	Moderate-term on-the-job	HS	83.5	11.8	_
Textile bleaching and dyeing machine operators and tenders	19	14	-6	-30.2	0	2	0	VL	VH	Moderate-term on-the-job training	HS	83.5	11.8	_

<sup>28</sup> Source: Bureau of Labor Statistics Occupation Report, Total Employment – 2006 Matrix

 Table 28: Standard Occupation Classification (SOC) Codes Found in the Wood Products, Textile/Apparel Manufacturing,

 and Chemical/Chemical Products Industry Sectors\*All Shaded Boxes Represent Overlapping Occupations

SOC Major Codes	Wood Products	Textile/Apparel Mfg	Chemical/Chemical Products Mfg
		51-6000: Textile, Apparel, and Furnishing	51:4000: Metal Workers and Plastic
	51-7000: Woodworkers	Workers	Workers
	51-7010: Cabinet Makers & Bench	51-6020: Pressers, Textile, Garmet, and	51:4010: Computer Controlled Machine
	Carpenters	Related Materials	Tool Operators (Metal and Plastic)
			51-4020: Forming Machine Setters,
	51-7020: Furniture Finishers	51-6030: Sewing Machine Operators	Operators, and Tenders (Metal and Plastic)
			51-4021: Extruding and Drawing Machine
	51-7030: Model Makers, Pattern Makers	51-6060: Textile Machine Setters,	Setters, Operators, and Tenders (Metal and
	(Wood)	Operators, and Tenders	Plastic)
	51-7040: Woodworking Machine	51-6061: Textile Bleaching and Dyeing	51-4030: Machine Tool Cutting Setters,
	Setters, Operators, & Tenders	Machine Operators and Tenders	Operators, and Tenders (Metal and Plastic)
	51-7041: Sawing Machine Setters,	51-6062: Textile Cutting Machine Setters,	
	Operators, & Tenders (Wood)	Operators, and Tenders	51-4040: Machinists
		51-6063: Textile Knitting and Weaving	51-4060: Model Makers and Pattern
	51-7090: Miscellaneous Woodworkers	Machine Setters, Operators, and Tenders	Makers (Metal and Plastic)
		51-6064: Textile Winding, Twisting, and	
		Drawing Out Machine Setters, Operators,	51-4070: Molders and Molding Machine
		and Tenders	Setters, Operators, and Tenders
		51-6090: Miscellaneous Textile, Apparel,	51-4120: Welding, Soldering, and Brazing
		and Furnishing Workers	Workers
		51-6091: Extruding and Forming Machine	
		Setters, Operators, and Tenders (Synthetic	51-4190: Miscellaneous Metal Workers and
		& Glass Fibers)	Plastic Workers
		51-6099: Textile, Apparel, and Furnishing	51-4191: Heat Treating Equipment Setters,
		Workers, All Other	Operators, and Tenders
	51-8000: Plant and System Operators	51-8000: Plant and System Operators	51-8000: Plant and System Operators
	51-8099: Plant and System Operators,	51-8099: Plant and System Operators, All	51-8099: Plant and System Operators, All
	All Other	Other	Other
	51-9000: Other Production Occupations	51-9000: Other Production Occupations	51-9000: Other Production Occupations
		51-9060: Inspectors, Testers, Sorters,	51-9010: Chemical Processing Machine
	51-9030: Cutting Workers	Samplers, Weighers	Setters, Operators, and Tenders
	51-9032: Cutting & Slicing Machine	51-9110: Packaging & Filling Machine	51-9011: Chemical Equipment Operators
51-0000: Production	Setters, Operators, and Tenders	Operators and Tenders	and Tenders
Occupations	51-9050: Furnace, Kiln, Oven, Drier, and	51-9120: Painting Workers	51-9012: Seperating, Filtering, Clarifying,

	Kettle Operators		Precipitating and Still Machine Operators
			and Tenders
	51-9060: Inspectors, Testers, Sorters,	51-9121: Coating, Painting, and Spraving	51-9020: Crushing, Grinding, Polishing,
	Samplers, Weighers	Machine Setters, Operators, and Tenders	Mixing, and Blending Workers
	51-9110: Packaging & Filling Machine	51-9123: Painting, Coating, and Decorating	51-9023: Mixing and Blending Machine
	Operators and Tenders	Workers	Setters, Operators, and Tenders
	·		51-9040: Extruding, Forming, Pressing, and
			Compacting Machine Setters, Operators,
	51-9120: Painting Workers		and Tenders
	51-9191: Cementing & Gluing Machine		51-9060: Inspectors, Testers, Sorters,
	Operators and Tenders		Samplers, Weighers
			51-9110: Packaging & Filling Machine
	51-9198: Helpers – Production Workers	51-1000: Supervisors, Production Workers	Operators and Tenders
	51-9191: Cementing & Gluing Machine	51-1010: First-Line Supervisors/Managers of	
	Operators and Tenders	Production & Operating Workers	51-9198: Helpers – Production Workers
	51-9192: Cleaning, Washing, and Metal		
	Pickling Equipment Operators and		
	Tenders		51-9199: Production Workers, All Other
	51-9196: Paper Goods Machine Setters,		
	Operators, and Tenders		51-1000: Supervisors, Production Workers
			51-1010: First-Line Supervisors/Managers
	51-9198: Helpers – Production Workers		of Production & Operating Workers
	51-1000: Supervisors, Production		
	Workers		
	51-1010: First-Line		
	Supervisors/Managers of Production &		
	Operating Workers		
19-0000: Life, Physical, and	19-1000 Life Scientists		
Social Science Occupations	19-1032: Foresters		
	19-2030: Chemists and Materials		
	Scientists	19-2030: Chemists and Materials Scientists	19-2030: Chemists and Materials Scientists
	19-2031: Chemists	19-2031: Chemists	19-2031: Chemists
	19-2032: Material Scientists	19-2032: Material Scientists	19-2032: Material Scientists
	19-4000: Life, Physical, and Social		19-4000: Life, Physical, and Social Science
	Science Technicians		Technicians
	19-4093: Forest and Conservation		
	Technicians		19-4030: Chemical Technicians
17-2000: Engineers	17-2040: Chemical Engineers	17-2040: Chemical Engineers	17-2040: Chemical Engineers

	17-2130: Materials Engineers	17-2130: Materials Engineers	17-2130: Materials Engineers
		17-2190: Miscellaneous Engineers	17-2112: Industrial Engineers
45-0000: Farming, Fishing, and	45-1010: First-Line		
Forestry Occupations	Supervisors/Managers of Farming,		
	Fishing, and Forestry Workers		
	45-4000: Forest, Conservation, and		
	Logging Workers		
	45-4010: Forest and Conservation		
	Workers		
	45-4020: Logging Workers		
	45-4021: Fallers		
	45-4022: Logging Equipment Operators		
	45-4023: Log Graders and Scalers		
	45-4029: Logging Workers (All Other)		
44 0000 14			
11-0000: Management			
Occupations			
13-0000: Business and			
Financial Operations			
Occupations			
37-0000: Building and	-		
Grounds Cleaning and			
Maintenance Occupations			
41-0000: Sales and Related			
Occupations			
43-0000: Office and	Occupations Within Each of Thes	se Major SOC Codes May Be Found In Th	e Three Industries Examined In This
Administrative Support		Cluster Analysis	
Occupations			
49-0000: Installation,			
Maintenance, and Repair			
53-0000: Transportation and			
Material Moving Occupations			

Source: U.S. Bureau of Labor Statistics, BLS, SOC Major Groups. Accessible at <u>www.bls.gov/soc/soc\_major.htm</u> \*Please note that this list is not exhaustive.

## Table 29: Common Production Occupations in the Alleghany Highlands and Related Production Occupations inChemical and Chemical Products Manufacturing

Chemical/Chemical Products	(	Common Productio	n Occupations in the	Alleghany Highlands	
SOC Production Codes					
				Textile Winding,	
	Woodworking	Packaging and	Paper Goods	Twisting, and Drawing	Welding,
	Machine Setters,	Filling Machine	Machine Setters,	Out Machine Setters,	Soldering, and
	Operators and	Operators and	Operators, and	Operators, and	Brazing
	Tenders	Tenders	Tenders	Tenders	Workers
51-4000: Metal Workers and					
Plastic Workers					
51:4010: Computer Controlled					
Machine Tool Operators (Metal and					
Plastic)	✓			✓	✓
51-4020: Forming Machine Setters,					
Operators, and Tenders (Metal and					
Plastic)					
51-4021: Extruding and Drawing					
Machine Setters, Operators, and					
Tenders (Metal and Plastic)					
51-4022: Forging Machine Setters,					
Operators, and Tenders (Metal and					
Plastic)				│ <b>✓</b>	✓

51-4030: Machine Tool Cutting					
Setters, Operators, and Tenders					
(Metal and Plastic)					
51-4031: Cutting, Punching, and					
Press Machine Setters, Operators,	$\checkmark$	✓	✓	✓	~
and Tenders (Metal and Plastic)					
51-4032: Drilling and Boring Machine					
Tool Setters, Operators, and Tenders	$\checkmark$			✓	
(Metal and Plastic)					
51-4033: Grinding, Lapping,					
Polishing, and Buffing Machine Tool				~	
Setters, Operators, and Tenders	•				•
(Metal and Plastic)					
51-4035: Milling and Planing					
Machine Setters, Operators, and			✓		
Tenders (Metal and Plastic)					
51-4040: Machinists					
51-4060: Model Makers and Pattern	<u>_</u>				
Makers (Metal and Plastic)	•			•	
51-4070: Molders and Molding					
Machine Setters, Operators, and					
Tenders					

51-4072: Molding, Coremaking, and					
Casting Machine Setters, Operators,		✓	✓		✓
and Tenders (Metal and Plastic)					
51-4081: Multiple Machine Tool					
Setters, Operators, and Tenders	✓	✓		✓	✓
(Metal and Plastic)					
51-4120: Welding, Soldering, and					
Brazing Workers					•
51-4190: Miscellaneous Metal					
Workers and Plastic Workers					
51-4191: Heat Treating Equipment					
Setters, Operators, and Tenders					•
51-4193: Plating and Coating					
Machine Setters, Operators, and		✓			
Tenders (Metal and Plastic)					
51-9000: Other Production					
Occupations					
51-9010: Chemical Processing					
Machine Setters, Operators, and					
Tenders					
51-9011: Chemical Equipment					
Operators and Tenders					

51-9012: Separating, Filtering,			
Clarifying, Precipitating, and Still			✓
Machine Operators and Tenders			
51-9020: Crushing, Grinding,			
Polishing, Mixing, and Blending			
Workers			
51-9023: Mixing and Blending			
Machine Setters, Operators, and			
51-9040: Extruding, Forming			
Prossing and Compacting Machino			
Pressing, and compacting Machine	•	►	•
Setters, Operators, and Tenders			
51-9060: Inspectors, Testers, Sorters,			
Samplers, Weighers			
51-9110: Packaging & Filling Machine			
Operators and Tenders			
51-9198: Helpers - Production			
51-9198: Helpers - Production Workers			
51-9198: Helpers - Production Workers 51-9199: Production Workers, All			

Source: U.S. Department of Labor, O\*NET – Accessible: http://online.onetcenter.org

### APPENDIX II-C: Report of the Economic Development Studio @ Virginia Tech on Wood Products

# Alleghany Highlands Wood Products Labor Market Survey Preliminary Data and Analysis

The Economic Development Studio @ Virginia Tech, Fall 2007 Prepared for: Roanoke Valley Alleghany Regional Commission Alleghany Highlands Economic Development Corporation

> Researched Conducted and Written by: Binioube Aleyao Vernon Anderson Whitney Bonham Anna Gullickson Patrick O'Brien Jennifer Patterson

Graduate Students in the Urban and Regional Planning, Public Administration and Policy, and Policy, Planning and Governance programs at Virginia Polytechnic Institute and State University

Report edited by: John Provo Mike Potter
## **Table of Contents**

I.		Executive SummaryPage 4
II.		Introduction and OverviewPage 6
	a.	Origin and Purpose of the Survey
		i. Topics of Research and Analysis
		ii. Methodology and Organization
	b.	Applying Theoretical Concepts to the Highlands
		i. Industry Clusters
		ii. Buckets in the Labor Pool
	c.	Characteristics and Trends in the Alleghany Highlands Region
		i. Demographic and Labor Market Characteristics
		ii. Workforce Commuting Patterns
		iii. Educational Attainment
		iv. Income and Employment
III.		Industry TrendsPage 22
	a.	National Trends in the Wood Products Industry
		i. NAICS vs. SIC Classifications
		ii. NAICS Wood Products
		iii. Economic Impacts
	b.	The Wood Products Industry in Virginia
		i. Virginia's Wood Products Manufacturing
		ii. Economic Impact of Wood Products Manufacturing on Virginia's
		Economy
	c.	Perspectives From Alleghany Highlands Wood Products Firms
<b>I</b> V		Intermediaries Page 20
1	0	What are Intermediaries?
	a.	i Intermediary Overview: Alleghany Uighlande
	h	1. Intermetative Overview. Anegnany Fightanus
	υ.	i Virginia Tach Department of Wood Science
		i. Virginia reen Department of wood Science

- 1. VT Department of Wood Science Intermediary Functions
- 2. Focus Group: Junior and Senior Virginia Tech Wood Science Students

	3. Perspectives From Virginia Tech Wood Sciences
	ii. Community College Programs
	1. Dabney S. Lancaster Community College
	2. Skills-Training Based Upon Local Demand-Side Needs
	3. Virginia Packaging Applications Center (VAPAC)
	4. Curriculum Addressing Needs of Local Wood Products Industry
	5. Forest Technology, A.A.S.
	6. Perspectives from Alleghany Highlands Community College
	Intermediaries
	iii. Vocational Education Programs
	1. Jackson River Technical Center
	a. Workforce Development Opportunities: JRTC
	iv. Secondary School Programs
	1. Alleghany County High School and Covington High School
c.	Traditional Public and Private Intermediaries
	i. Virginia Employment Commission
	ii. Manpower-USA
d.	Public Labor Market Negotiators
	i. Alleghany Highlands Economic Development Corporation
	ii. Virginia Department of Business Assistance
	iii. Roanoke Valley-Alleghany Regional Commission
e.	Perspectives from Traditional Intermediaries and Labor Market Negotiators in the
	Alleghany Highlands
V.	Survey RecommendationsPage 43
VI.	Final ConsiderationsPage 45
VII.	ReferencesPage 46
VIII.	AppendixPage 48

#### **Executive Summary**

This study was conducted to provide preliminary research and analysis for a labor market survey the OED will perform for the Roanoke Valley-Alleghany Regional Commission (RVARC). Through consultation with the RVARC, the Office of Economic Development (OED) has chosen to adopt a specific focus for the survey that will address several related goals in the Alleghany Highlands Comprehensive Economic Development Strategy (CEDS) and will encourage economic development in the Alleghany Highlands.

This document was created to increase local officials' understanding of business and employee needs within the wood industry cluster and help determine the feasibility of creating a partnership between the Alleghany Highlands' educational institutions and the VT Wood Science program.

The analysis in this document focuses on information specifically related to employers of the wood products industry cluster and was created to provide the basis for our recommendations for designing and implementing a labor market survey. The analysis of the wood industry cluster has two main components: a discussion of research findings about the wood products industry in general and a discussion of research findings about the wood products industry cluster in the Alleghany Highlands. The document further organizes the Highlands labor market by the supply side of the labor market, the demand side of the labor market, and labor market intermediaries that serve to broker between and provide needed services for these two afore mentioned clients.

Completing this analysis involved several related tasks. First, an understanding of relevant theories in economic development helped to identify the issues and institutions that would be vital subjects of the subsequent research. In conducting research, the team compiled statistical data on the Alleghany Highlands from local, state and national data collection agencies. These figures informed our understanding of the nature of the Highlands region and its economy. With this broad conception of relevant issues and trends, the next step was a search to identify relevant Highlands organizations and stakeholders. The research compiled information on these stakeholders from available secondary sources and online resources, as well as personal contacts and interviews with representatives of these key institutions. Finally, creating the report involved synthesizing the results of this research process. The main goal of this synthesis is to offer a depiction of the economic situation and wood products industry in the Highlands, as well as identifying relevant observations and recommendations for conducting the proposed labor market survey.

Results of this study reveal that the wood products industry in the United States has been steadily decreasing throughout the decade. However, despite decline in the national industry, the wood products industry remains a primary driver of the Alleghany Highlands regional economy. Notably, MeadWestvaco, a fiberboard and bleach board packaging manufacturing firm, is the region's largest employer.

Given the region's dependency on trends in the national wood products industry, results of this report reflect numerous opportunities for further developing, or diversifying the existing cluster. Notably, economic diversification efforts may benefit through workforce development efforts seeking to train members of the labor pool in advanced manufacturing skills. Local intermediaries, such as Dabney S. Lancaster Community College, provide effective programs for providing advanced skills training based upon macro labor market trends.

For the Alleghany Highlands labor survey, we recommend that the questions be directed to current wood products industry employees and indentify those who are nearing retirement. A subsection should be written to specifically target these employees to attempt to gain further information about their perceptions of the positive and negative aspects of their employment experiences. The survey should also determine how long they have been working in the industry and how long they have been with their current employer to identify the type of occupation they currently have and the benefits and salary they currently receive. Information regarding the benefits they would require continuing working past their age of retirement should be gathered, as well. This section should also identify if they have moved up within the company or industry and whether or not they are a member of a union or other industry-related group. It would also be helpful for this survey to determine how long these employees have lived within the Alleghany Highlands. The survey should additionally identify recent retirees from the Virginia Employment Commission or industry pension records to identify an additional pool of survey respondents.

The survey should ensure that some attempt has been made to contact those people who have an advanced degree in wood-industry related occupations. This could be done through contacting students or graduates of the Virginia Tech Wood Sciences program so that information could be gathered regarding their ideal and expected occupations, short- and long-term career goals, expected salary and benefits, perceptions of employment within the industry, and most importantly to the Alleghany Highlands, the perceptions these students have about living and working in this area. This could be done to determine what needs to be done to entice these students to move to the Highlands for employment.

Some effort should be made to inquire into the current employees in the industry to determine which of those have and advanced degree, and from which institution they obtained said degree, to determine what other institutions are sending workers into the Highlands. Information should be gathered about how current employees obtained their present jobs within the industry. The survey could be administered through job placement and training services, such as those offered through the VEC and Manpower, whether or not those seeking placement want jobs in the wood products industry. This could determine attitudes about the industry and current levels of skill and experience.

Those administering the survey should conduct it within organizations similar to the VEC and Manpower in neighboring counties in West Virginia to determine the available labor pool there. Finally, questions about the place of residence for workers should be included to see from where the labor pool comes to determine if they come from inside or outside the Alleghany Highlands. For further considerations, see the "Final Considerations" section located on page

## **Introduction and Overview**

### Introduction

This document is the product of students in the fall 2007 Economic Development Studio, a graduate level course in the Urban Affairs and Planning program at Virginia Tech. The studio course is conducted by faculty from the Office of Economic Development (OED), a Virginia Tech outreach organization that provides clients in government and business with technical assistance, training, research, and other services related to economic development.

This student studio project provides preliminary research and analysis for a labor market survey the OED will conduct for one such client, the Roanoke Valley-Alleghany Regional Commission (RVARC). The remainder of the introduction describes the nature of the survey project, and discusses the relevant subjects of research and analysis that comprise the main section of this document.

### Origin and Purpose of the Survey

The RVARC is one of twenty-one planning district commissions (PDC) within the Commonwealth of Virginia. PDCs are regional political subdivisions that provide various technical and program services to local government members within their district. The PDC's purpose is to encourage and

facilitate local government cooperation within the region, and ensure recognition and analysis of regional issues ("Roanoke Valley Alleghany Regional Commission").

An important function of the PDC is to create strategic plans for their region with the cooperation of the local governments they serve. To this end, the RVARC has produced the Alleghany **Highlands Comprehensive Economic Development Strategy** (CEDS) in 2006. A CEDS is an ongoing planning process that provides "a regional strategy which reflects local economic development needs and priorities, and recommends a regional approach to achieving sustainable economic development" (A.H. CEDS, 2). The Highlands CEDS process involved close collaboration between the RVARC and local governments and civic organizations in the Highlands region, especially the Alleghany Highlands Economic Development Corporation (AHEDC).

The Alleghany Highlands CEDS has identified a labor market survey as a desirable short-term project for furthering economic development goals in the region. The survey data is needed to "shed more light on the underemployment situation and will provide important clues as to how to 'tap into' the important human resources available within the region" (CEDS, 123). To achieve this goal, the RVARC has contracted the services of Virginia Tech's OED to construct and implement this survey instrument. Through consultation with the RVARC, the OED has chosen to adopt a specific focus for the survey (described below) that will address several related goals in the CEDS and will encourage economic development in the Alleghany Highlands.

### **Topics of Research and Analysis**

Addressing these CEDS goals, and consequently tailoring the survey instrument to gather the relevant labor market information about the Alleghany Highlands, has dictated the vital subjects of research and analysis that this document considers.

The CEDS proposes "building on previous economic analysis done for the region in the original Industry Cluster Analysis of the NewVA region" by conducting a study that "looks at the results of the Alleghany Highlands in more detail. Details such as workforce requirements...will be considered in choosing appropriate target clusters" (CEDS 118).

To this end, the RVARC has requested that this document (and the subsequent survey) focus on information particular to the <u>wood products industry cluster</u>, which is an important source of employment within the region. This information will serve to increase local officials' understanding of business and employee needs within the wood industry cluster, and therefore improve the ability of local organizations to address these needs. Another CEDS project related to the wood product industry is to assess the possibility of establishing a connection with the School of Forestry at a fouryear institution. This project seeks to create a distance-learning or credit transfer program with local education and training programs to meet wood products industry skills needs (CEDS, 123). To this end, this document (and the survey) provides analysis and information about the Wood Science program at Virginia Tech and Alleghany Highlands educational institutions. In part, the analysis will provide information to help determine the feasibility of creating a partnership between Alleghany Highlands' institutions and the VT Wood Science program.

The analysis in this document focuses mainly on information specifically related to employers and employees of the wood products industry cluster. This analysis provides the basis for our recommendations for designing and implementing the labor market survey. The analysis of the wood industry cluster in this document has two main components:

 A discussion of research findings about the wood products industry in general, describing the relationships and structure of firms within this cluster based on national trends. Of special interest is the occupational structure of wood industry firms-- and by extension, the labor force skills necessary to perform these jobs.  A discussion of research findings about the wood products industry cluster in the Alleghany Highlands, analyzing the nature of the cluster using secondary economic data and primary sources (interviews). This section analyzes current workforce trends and existing strengths/weaknesses in the Highlands economy.

#### This document further organizes the Highlands labor market analysis and resulting survey conclusions according to the following three categories:

1) The supply side of the labor market, meaning the individuals in the workforce. such as current or prospective employees of wood products firms. This includes analysis of data of industry employees, their training and skills, and the characteristics of individuals enrolled in training/degree programs that are useful to wood products firms. This analysis will inform suggestions for survey questions that will gather desired information about the needs, opinions and characteristics of the "supply side" of the wood product labor market.

2) The demand side of the labor

**market,** meaning the employers who need to hire from the Highlands workforce, especially firms/industries in wood product-related operations. This includes analysis of the structure/nature of local firms, their training and skill needs and their current efforts to train or obtain workers. This analysis will inform suggestions for survey questions that will gather desired information about the needs, opinions and characteristics of the "demand side" of the wood product labor market.

3) Labor market intermediaries that serve to broker between and provide needed services for these two clients, meaning the public or private organizations in the Highlands that provide training, technical assistance or other programs that benefit workers and firms in general, and in the wood product industry cluster specifically. This includes analysis of the characteristics of such education, government and civic organizations, and will inform suggestions regarding the organizations that are well-placed to support the wood products cluster through their services, or are wellplaced to serve as conduits for administering the labor market survey.

### Methodology and Organization

In order to gather the necessary information to conduct the analysis described above, the authors of this document have engaged in several research efforts. First, a review of scholarly literature and theory provided a working knowledge of the topic and the important issues to address in this document. The students reviewed relevant literature related to the concepts described above, such as supply and demand factors, intermediaries, clusters, etc. These constructs and assumptions are described in a subsequent section, and provide the framework by which we structured this analysis.

Using this framework, the data for the analysis of the wood products industry cluster has been collected from several sources. The sources for this information are cited as they appear in the document, and can be accessed through the information in the bibliography at the end of the document.

#### These data sources include:

- Secondary sources for Alleghany Highlands aggregate economic data, such as census and Virginia Economic Development Partnership (VEDP) reports, and reports from various other data collection agencies, such as the Virginia Employment Commission (VEC), Bureau of Economic Analysis (BEA), etc.
- Secondary sources providing descriptions and information about programs and organizations in the Highlands, such as government/organization websites, previous economic development studies about the Highlands, and other reports providing descriptive information on issues relevant to this study.
- Primary sources, such as interviews with Highlands stakeholders and technical advice from survey design and wood industry experts. Over the course of the semester, students identified and contacted individuals from several important wood product firms and workforce service providers in the Alleghany Highlands and Virginia Tech. These interviews seek to assess the perspectives of local experts to ensure the accuracy of analyses and conclusions based on secondary and theoretical sources.

The remainder of the document synthesizes and discusses the results of this research process, using the collected data to present analysis and justify our findings and conclusions.

#### The document is organized as follows:

- General description and demographic portrayal of the Alleghany Highlands region. This description provides the background data for a discussion of the role of the wood products industry cluster in the region.
- General description of the characteristics of the wood products industry cluster. This description provides basic information about this cluster as context for analysis of the cluster's role in the Highlands region.
- Analysis of local workforce intermediaries that will serve the wood industry cluster. This analysis identifies government, education, civic and private organizations that are useful for promoting retention and growth in the wood products cluster, and may also identify organizations that may serve as mediums through which to conduct the labor market survey.
- Conclusions summarized the important points of the above analyses, and the resulting recommendations for survey design, including the desirable candidate for answering the survey, as well as the most desirable information that the survey should try to collect from these respondents.

### Applying Theoretical Concepts to the Highlands

Several theoretical concepts framed the research and analysis of this document. These concepts provided useful ideas for thinking about the structure and functioning of labor markets and economic development institutions. As these concepts are referenced throughout the remaining text, this section offers a brief description of the main concepts in order to clarify and inform the analysis that follows.

Applying these concepts to the Alleghany Highlands will focus the discussion on several important issues that will be relevant in constructing the labor market survey.

## The main concepts that frame this research are:

- Industry clusters
- "Buckets" in the labor pool
- Labor market intermediaries

Following is a more detailed explanation of the ideas involved in the industry cluster and bucket concepts. Information on labor market intermediaries will be offered in subsequent sections of this report.

### **Industry Clusters**

The theory of industry clusters is a relatively well documented and accepted theory about the structure of local economies. The central concept of industry clusters is that numerous firms involved in production of similar goods and services "cluster" in a certain area. These clusters serve as specialized centers of production for a specific type of product, which are distributed nationally or globally.

Industry clusters form for many reasons. The supply needs of the core firms attract specialized supplier firms that provide industry-specific support services and input goods. Firms producing competing or complementary goods are attracted to the cluster to take advantage of the close proximity of suppliers and a local labor force with relevant industry skills. The specialized workers and experts co-located in the area contribute to economies of scale that can increase efficiency for all firms in the cluster. In addition, clusters allow firms to create networks for exchanging information and ideas that may spawn new innovations not possible for an individual firm working alone.

Classic examples of industry clusters are the computer chip and information technology cluster in Silicon Valley, California, and the automotive manufacturing cluster in Detroit. Closer to home, the VEDP's cluster studies have identified several industry clusters in Virginia. For instance, the Lynchburg area has a cluster of firms involved in the production of civilian nuclear technologies. Of course, this document is the result of the identification of a wood products cluster in the Alleghany Highlands region.

The firms in a cluster have complex relationships with one another, involving competition and collaboration as well as various positions in the chain of production. To simplify the nature of these relationships, cluster theory identifies **three basic types of firms that make up a functioning cluster**. These are:

- **Core firms**, which produce the finished products mainly associated with the cluster. In the Highlands wood product cluster, the obvious example of a core firm is MeadWestvaco, which produces paper products for use in food packaging. Another example would be a firm producing wood furniture.
- Supplier firms, which provide raw materials, support services and other inputs for the production of goods in the core firms. In the Highlands, this category includes the timber harvesters and sawmills that produce the lumber and sawdust for Mead-- but also machine tool manufacturers and other firms that support the functioning of the core industries.
- **Customer firms,** which purchase the products of the core industries, either as retailers or in order to use in production of their own goods.

In the Highlands, this includes the firms buying Mead's fiberboard to package their food products, or furniture stores purchasing finished wood products to sell to consumers.

The following diagram depicts the relationships between the firms in an industry cluster, and between these firms and the labor market.



In the Highlands, firms in the wood products cluster are mostly supplier and core firms, with customer firms located outside the region purchasing Highlands wood products for shipment to their various locations. This structure has implications for the types of industries which will be hiring workers from the Highlands labor pool, and therefore further implications for the types of workers that firms in the cluster will need.

This basic depiction of industry clusters neglects the level of detail devoted to the subject in scholarly literature, but is sufficient to allow understanding of what will follow in this document. However, a few points are worth elaborating on because they have important implications for the nature of wood products cluster in the Highlands.

• The relationship between cluster theory and export

This theory posits that local economies have two basic types of industries, export (primary) industries and support (secondary) industries. Export industries produce goods locally that are sold outside the local area, and therefore bring additional wealth to a community from outside areas. Much of this wealth pays workers in export industry jobs, who then spend this money locally on the goods and services. The support industries supply these goods and services, and the revenues they collect pays these workers. The result is a "multiplier effect." In essence, additional jobs in an export industry will create more business and hence more jobs in the support industries as well. For example, 100 new jobs in the export industry may create 50 new support industry jobs, for a total of 150 new jobs for the region (a multiplier of 1.5). This is important in the Highlands, where the wood products industry is a clear example of an export industry. Supporting the growth of the cluster will have benefits beyond creating jobs in wood products by providing added employment in support industries as well, thereby strengthening the overall economy.

• Defining the extent of the "region" in which the cluster operates- one of the basic

qualities of an industry cluster is that the interacting firms of a cluster are co-located in a specific region. Though this seems straightforward, defining the extent of the cluster's region presents complications. The identification of a cluster is based largely on the relationships between firms, regardless of political boundaries that may separate firms within the cluster. In the case of the Alleghany Highlands wood products cluster, for example, it is arguable that the cluster extends beyond Covington and Alleghany County itself and includes other Virginia counties as well as areas of West Virginia. This will complicate the efforts of local and regional institutions to influence the development of the cluster, as many components of the overall cluster are firms and workers outside their own jurisdiction.

• The diversity of goods that fall under the heading of "wood products"- As subsequent sections will discuss in detail, wood products encompass a broad spectrum of goods, ranging from raw timber, finished furniture and crafts, paper products and many others. These various products differ substantially in many respects, including the methods and inputs required for production and the potential customers for the products among others. Of particular interest for this project are the different types of skilled workers required in producing different types of wood products. The vast differences between the needs of different types of wood products firms entails that efforts to strengthen the cluster should not become too focused on promoting one type of wood product at the expense of others with potentially different supply and labor needs.

### Buckets in the Labor Pool

The phrase "buckets in the labor pool" is a metaphor to describe the concept that specific subsets of the population may represent untapped or underutilized sources of workers. Accordingly, employers (and labor market surveyors) may wish to focus their attention on these groups in order to identify new sources of potential workers, especially when the broader labor market is tight or otherwise unable to fulfill demand for workers.

Another benefit of this construct is that, by selecting groups of interest to consider as a "bucket," certain general characteristics applying to all group members can be identified. These characteristics help to frame research and analysis about the observed or predicted behavior of group members in the labor force. Though no group is entirely uniform, the similar characteristics of individuals in a bucket can allows employers and economic developers to pursue policies that focus their efforts on attracting these types of workers.

This abstract definition will become much clearer by giving examples of what constitutes a bucket in the labor pool. The research and analysis in this document considers three different buckets: retirees, recent graduates, and workers using traditional workforce channels to employment. The following brief descriptions of each group provide examples of how the "bucket" concept allows identification and speculation of the characteristics that may be attributed to group members. Of course, a labor market survey targeting members of each group will greatly expand knowledge of the composition and features of each group in the Alleghany Highlands.

> **Traditional workforce-** This bucket includes local workers using common, mainstream methods of obtaining employment, such as VEC or Manpower job-placement services, references through social networks, transferring from other employment, etc. For the purpose of this report, this group excludes those who are members of the other two buckets. As members of the labor force, this group has several distinguishing characteristics. **Strengths/opportunities** include:

> > Constant and readily available supply of new workers- members of this group are already located in the region, and have an expressed interest in obtaining

employment. This makes them easy to locate, and the information gathered by labor placement firms and submitted applications means firms can choose those with the strongest qualifications.

 Potentially long-term hires- because these workers already live and have ties in the region, they have more motivation to stay in the area. The opportunities for advancement and training gives further motivation to commit to remaining employed in the area.

Weaknesses/threats include:

- Potential skills mismatch or retraining costs- at any given time, the candidates for employment through the traditional workforce may or may not have the relevant experience or training for the jobs available, requiring employers to absorb the costs of retraining these new hires.
- Competition for these workers with other types of industries- since these potential workers are not quite as specialized for work in the specific industry as the other two groups, they may be more open to seeking employment in unrelated fields if other industries

offer more advantageous opportunities.

**Recent graduates-** This bucket includes those entering the workforce with advanced degrees in industryrelated fields. Most of these graduates are assumed to be young adults, though this is not necessarily always the case. As members of the labor force, this group has several distinguishing characteristics.

**Strengths/opportunities** of this group include:

- Highly specialized skill-setby virtue of their degree credentials, employers have foreknowledge about the types of skills these individuals possess and can choose those that best suit their needs, with minimal need for retraining
- *Potentially* long-term hires (see below)- as new workers just beginning their careers, recent graduates will be members of the workforce for decades to come, and have great capacities for further advancement within the field

Weaknesses/threats include:

 High mobility increases competition for these workers- generally speaking, members of this group are much more willing to move in search of better employment opportunities, making retention more difficult without offering significant premiums  Limited ties to local area- in relation to the above point, these workers will usually be coming from institutions and families outside the area. Thus they have few connections to the region that might encourage them to remain in the area for the long-term.

**Retirees-** This bucket includes recently retired workers and those nearing retirement. As members of the labor force, this group has several distinguishing characteristics.

**Strengths/opportunities** of this group include:

- Extensive experience in the field, implying minimal discrepancies between the employers needed skill set and retirees' skills, and also a source of knowledge for training newer workers.
- Limited mobility, in the sense that older workers are less likely to be willing to uproot themselves in pursuit of advantageous employment

Weaknesses/threats include:

 Limited future tenureretirees may be enticed into staying in the workforce for some additional length of time, but by definition will not provide long-term employees for a firm.

Demands for greater benefits- as highly experienced and senior members of the workforce, retirees may demand higher pay or benefits packages as compensation for remaining in the workforce The above description of the traits of workers in these three buckets is largely abstract and speculative, and also is not exhaustive of all the characteristics that could be attributed to these groups. Nonetheless, the discussion provides some idea of how the concept of buckets allows analysis into the traits of these groups, and consequently development of potential strategies for economic development institutions to maximize the participation of these groups in the desired ways.

### Characteristics and Trends in the Alleghany Highlands Region

The Alleghany Highlands Region consists of Alleghany County, the City of Covington, and the Towns of Clifton Forge and Iron Gate in west-central Virginia. It has a land area of 445 square miles and is characterized by mountainous, heavily forested terrain with steep slopes and flat river valleys. Fifty-percent of the forested areas of the Alleghany Highlands are within National Forest lands (Alleghany County Comp Plan p. 5). The area is serviced by Interstate Highway 64 which joins I-81 to the east and intersects I-77 to the west. Elevations in the area range from 1,000 to 4,000 feet above sea level. The 2000 Census combined population for the Alleghany Highlands area is 23,518.

#### **General Location Map**



Source: Alleghany Highlands Magazine The Alleghany Highlands extended labor market area includes Bath, Rockbridge, Botetourt, Craig, and Roanoke counties in Virginia and Greenbrier and Monroe Counties in West Virginia. The extended labor market also includes the towns of Lexington, Buena Vista, and the cities of Salem and Roanoke.



Source: VEDP

### Demographic and Labor Market Characteristics

As background for the more detailed, industry-specific information in subsequent sections, the following discussion of demographic and economic data attempt to characterize economic and labor market conditions in the Highlands. The following subjects are considered:

- Commuting patterns
- Educational attainment levels
- Comparative statistics on income and employment

### Workforce Commuting Patterns



The majority of the Alleghany Highlands workforce (60%) lives and works in the region. In addition, a slightly greater proportion of the workforce commutes from homes outside the region into the Highlands than the proportion that leave the Highlands region for employment elsewhere. This suggests a relatively strong home-grown workforce in the region. At the same time, commuters entering and leaving the region form a substantial part of the workforce, suggesting that the Highlands region has a strong interdependence with surrounding areas. The Highlands supplies workers to other regions, and depends on workers coming from other industries as well.

These trends are further visible in a visual representation of the labor shed and commute shed for the Highlands region. These maps were created using

the U.S. Census Bureau's Local Employment Dynamics (LED) 'On the Map' tool, available online at <u>http://lehd.did.census.gov/led/datatools/o</u> <u>nthemap2.html</u>. This tool allows users to specify an area, and then displays maps associating census data with spatial locations. The following maps display:

- The "labor shed" of the Alleghany Highlands, which shows where people working in the Highlands region live (i.e., where they commute from to Highlands jobs).
- The "commute shed" for the Alleghany Highlands, which shows where people who live in the Highlands work (i.e., where Highlands residents commute to for their jobs).





As noted above, these maps also confirm that most Highlands residents both live

and work in the region. Additional features are visible on this map that do not show up in the percentages, however, and are worth noting here.

- Most of the Highlands residences commuting out of the area have jobs in the Roanoke area (commute shed map).
- Few, if any residents, of the Highlands commute to West Virginia for employment (commute shed map). Conversely, many West Virginia residents travel to the Highlands for employment (labor shed map).
- The Highlands draws workers from many surrounding counties, notably Bath and Rockbridge Counties, but also from as far away as the Charlottesville area (labor shed map).

### **Educational** Attainment

The following table shows comparative data on educational attainment for the Highlands, Virginia generally, and West Virginia. As the table illustrates, Alleghany County lags behind the statewide totals for both Virginia and West Virginia for the percentage of the population with at least a high school diploma, as well as those with bachelor's degrees or higher. The proportion of residents with advanced degrees is not too dissimilar between the Highlands and West Virginia, however, especially when compared with the much greater proportion in Virginia as a whole.

Populatio n age 25+ (%)	Alleghany Highland s	Virginia statewid e	West Virgini a
High school diploma or higher	75.5%	85.4%	81.0%
Bachelor's degree or higher	11.2%	32.7%	16.5%

Source: Highlands data: VEDP Community Profile (2005) State level data: American Community Survey (ACS 2005)

Recent figures (from 2005 VEDP Community Profile) show that educational institutions within the Highlands contribute to improving the educational attainment of local residents. Approximately 85% of the 2005 high school class in Alleghany Highlands schools graduated. This proportion is above the average of the older population (shown above), suggesting that this proportion may increase in future. Of course, this assumes graduates will stay in the area, or at least will not be replaced by those without diplomas.

In addition, 1,316 people were enrolled in two-year degree programs at Highlands higher education institutions, with nearly 200 students graduating with two-year degrees in 2005. In addition, 266 people graduated from "other colleges and universities" in the region. (Although the VEDP report does not specify, this likely refers to Hollins University.)

These graduates and degree holders continually add valuable skills and training which enrich the local community and labor market. These degrees provide valuable information to employers. In essence, the degree is proof that these individuals have obtained proficiency in a given subject, with recognized standards for the level of skills and understanding needed to graduate and obtain the degree. As such, the educational institutions provide a valuable service for Highlands residents and firms, allowing individuals to advance their careers and obtain better employment, and allowing firms to be confident that the degree holders they hire will possess the desired skills.

### Income and Employment

The following chart displays comparative data on average income and unemployment figures in the Alleghany Highlands, Virginia as a whole, and West Virginia. (Note: QWI=Quarterly Workforce Indicators; GB=Greenbrier County, WV).

	Alleghany Highlands	Virginia Statewide	West Virginia
Average monthly earnings (QWI, 2007)	\$2,477	\$3,707	\$2,780 GB=\$2,4 31
Per capita income (ACS, 2005)	\$25,585	\$29,148	\$19,214
Unemployment rate (VEDP/ACS,200 6)	4.27%	3.17%	6.80%

This data indicates that average monthly earning in the Highlands are slightly below those in West Virginia and well below those in the rest of Virginia. The figure for Greenbrier County, WV, however, indicates that this bordering area has average earning slightly below those in the Highlands. These figures may explain in part the trend noted above, with workers commuting from Greenbrier to the Highlands, but few Highlands residents commuting to West Virginia. The other figures in the table further augment these arguments, showing higher per capita income in the Highlands compared to West Virginia, and lower unemployment rates.

Similar to the monthly earnings figures, however, the Highlands has a lower per capita income than Virginia and higher unemployment rates. The discrepancy between the Highlands and the rest of Virginia may also be somewhat misleading, as the large metropolitan areas near Washington, DC and Richmond will likely serve to pull these averages up. More in-depth research may show that average income and unemployment in the Highlands region is in line with trends for surrounding areas in western regions of Virginia, which share the same mountainous terrain, rural character, and smaller proportions of highly-skilled professional occupations. Even without more detailed comparative figures of these statistics, however, some indication of these trends can be seen in the following charts. The two charts show the proportional of individuals working in various industry sector and occupational categories. By way of distinction: the industry sector chart shows the proportion of employees in each type of industry category, regardless of what their occupation may be. The occupational chart shows the proportion of employees in each occupational category, regardless of what type of industry the people employs them.





Both of these charts illustrate the dominance of manufacturing employment in the Alleghany Highlands. In the industry chart, both Virginia and West Virginia are roughly similar in the proportion of workers in each industrial category. The Highlands data is similar in many categories, but shows significantly greater proportions of employees in manufacturing and public sector jobs. The Highlands also have significantly smaller proportions of workers in the 'services' category, which encompasses everything from educational, professional and technical industries.

In the occupational data, these trends are reinforced, showing that the Highlands have significantly greater proportions in production/transportation occupations, and significantly smaller proportions in managerial/professional occupations. The very high proportion of managerial/professional occupations also backs up the speculation mentioned above that the large metropolitan areas have greater proportions of these highly skilled jobs.

In other occupational categories, the Highlands is similar to the statewide trends, however it is interesting to note the very small proportion of workers in the farming/forestry category. This suggests that although the wood products cluster is a significant employer in the region, most of these jobs are in factories as opposed to timber harvesting operations.

One further economic indicator about the size of firms provides telling information about the nature of employment in the Highlands. The following charts show a breakdown of the proportion of firms and employment that fall into various ranges of number of employees. The first chart shows the proportion of *firms* with employees numbering within various ranges. The second chart shows the proportion of







These data show that the proportions of workers employed in firms of various sizes is broadly similar between the Alleghany Highlands and Virginia as a whole. The Highlands have a slightly higher proportion of both firms and workers in small-sized firms (from 1 to 20 employees), suggesting that small firms are an important source of employment for the region. The second chart (showing employment) indicates that a slightly smaller proportion of Highlands workers are employed by large scale firms than in the state as a whole.

This measure is slightly misleading as to the importance of these large firms in the Highlands, however. The 2007 VEC Community Profile from which this data was obtained (different than the VEDP community profile referenced above) indicates that only five firms in the Highlands have employees in the categories from 250 employees and above. However, these firms account for **2.646 jobs** in the Highlands, which is nearly 30% of entire employment in the region. The dependence of a substantial part of the workforce on these five firms could create significant negative economic impacts on the Highlands if one or more of these firms ceased operations. This relates directly to the subject of this report, as the VEDP

community profile indicates that Mead-Westvaco alone employs over 1,500 workers.

## **Industry Trends**

### National Trends in the Wood Products Industry

With a large forest resource and high production and consumption of wood products, the United States continues to play an important role in world forest product markets. The U.S. had the world's highest consumption of paper and paperboard, roughly 80 million metric tons in 2002, which is mostly supplied by domestic production and imports from Canada. The U.S. forest products industry annually harvests more than 467 million cubic meters of softwood and hardwood timber and 25 million cubic meters of structural panel products in 2002. (Howard, 2004, p. 2)

New housing construction accounts for more than a third of U.S. annual consumption of softwood-sawn wood and structural panels and for substantial volumes of other softwood and hardwood products. New housing construction remained high through 2002 and into the first half of 2003, but has been declining recently due to the recent instability of the housing market due to the subprime lending crisis.

### NAICS vs. SIC Classifications

The North American Industry Classification System (NAICS) was developed in cooperation with Canada and Mexico, using a production-oriented conceptual framework. It is used to group establishments into industries based on the activity in which they are primarily engaged. NAICS provides a new tool that ensures that economic statistics reflect the nation's changing economy. For the past sixty years, the Standard Industrial Classification (SIC) system served as the structure for the collection, aggregation, presentation, and analysis of the U.S. economy. SIC was developed in the 1930s and had been criticized about its inability to handle rapid changes in the U.S. economy, for the increasing economic growth in information services, new forms of healthcare provision, expansion of services, and high tech manufacturing which could not be studied under the SIC system. The new six digit hierarchical structure of NAICS allows greater coding flexibility than the fourdigit structure of SIC. Lastly, NAICS allows for the identification of 1,170 industries compared to the 1,004 included in the SIC system. (U.S. Census, 2000)

### NAICS Wood Products

According to the 2007 U.S. Census, lumber and wood products (NAICS code 321) are characterized as industries that manufacture wood products such as lumber, plywood, veneers, wood containers, wood flooring, wood trusses, manufactured homes, and prefabricated wood buildings. The production process of the wood products industries include sawing, planning, shaping, laminating, and assembling of wood products starting from logs that are cut into various sizes. The lumber or transformed shapes might then be planed or smoothed, and assembled into finished products. The wood product manufacturing subsector includes establishments that make wood products from logs and bolts that are sawed and shaped, and establishments that purchase sawed lumber and make wood products. With the exception of sawmills and wood preservation establishments, the establishments are grouped into industries mainly based on the specific product manufacture. The largest changes to the industry definitions are that logging is now in the natural resources and mining sector and company headquarters have moved to the business services sector. These structural changes make the data for these industries after 2001 not easily comparable to previous years. (http://olmis.emp.state.or.us/olmisi/ArticleReader?itemid=00 002411&segmentid=0002&tour=0&p\_date=1)

The paper and allied products manufacturing subsector (NAICS code

322) makes pulp, paper, or converted paper products. These products are grouped together because they constitute a series of vertically connected processes. More than one is often carried out in a single establishment. There are essentially three activities involved in paper manufacturing: the manufacturing of pulp involves separating the cellulose fibers from other impurities in wood or used paper, paper manufacturing involves matting these fibers into a sheet, then converted paper products are made from paper and other materials by various cutting techniques. The paper-manufacturing subsector is divided into two industry groups, manufacturing of pulp and paper and the manufacturing of converted paper products.

Operatives and laborers dominate the labor force in the lumber and wood products sector. Common lumber and wood products occupations include wood machinists, machine operators and feeders, cabinetmakers, assemblers, millwrights, industrial truck operators, truck drivers, and general laborers. Forestry occupations also play a large role in the lumber and wood products industry due to the inclusion of logging activities. Occupations within forestry include fallers and buckers, choke setters, log handling, equipment operators, and logging tractor operators.



### **Economic Impacts**

The wood products industry makes a large contribution to the national economy. The industry employed 1.1 million people in 2001, with an average hourly production wage of \$17.68 in the pulp and paper sector and \$12.30 in the lumber and wood products sector. Both industries are highly cyclical since they are dependent on commodity prices and strong consumer markets. Following an economic recession in the early 1990s, there was significant downsizing and industry restructuring.

The Department of Commerce (DOC) reported the value of shipments of the wood products industry as \$243.1 billion in 2001, a result of strong production gains of the late 1990s. Also according to the DOC, production in both industries has continued, and most likely will continue to decline. The total primary U.S. paper and paperboard production is about 97 million tons per year, with a 5 percent annual increase in labor productivity of pulp and paper workers over the last decade. In the 2002, there were 17,202 reported wood product manufacturing establishments located in the United States. Compared to 1997 economic census data, there has been a 0.6 percent decrease in

establishments over the last five years in wood products manufacturing. For paper manufacturing, there was a 6.4 percent decrease in establishments between 1997 and 2002. (See Table B) Between those years, there was a 4.7 percent decrease of paid employees for the wood products industry and a 14.8 percent decrease of paid employees for the paper manufacturing industry. (See Table A) According to the U.S. Census between 1997 and 2002, the woods products industry's annual payroll increased roughly 12.7 percent, while the paper industry decreased by roughly 4.2 percent.

The top woods products producers in the nation are found in Oregon, Washington, Wisconsin, Georgia, Texas, and Pennsylvania.

## Virginia Industry Trends

### The Wood Products Industry in Virginia

In 2006, Virginia's forests provided more than \$29.44 billion in benefits annually to the Commonwealth. More than \$25.2 billion is generated from harvesting, processing and marketing of forest products annually for the state. Virginia has nearly16 million acres of forestland, of which 15.3 million acres are classified as commercial forest. Non-industrial private landowners held 77 percent of Virginia forestland, forest industry owned 4.9 percent, and federal, state, and local governments in 2006 owned the remaining 17.5 percent. Landowners received more than \$267 million in stumpage for their timber annually, which is an increase of \$71 million from 1993. For every \$1 landowners received for their timber generated \$41.82 of value-added to Virginia's economy in 2006 which was a decrease compared to every \$1 dollar received by landowners generated \$48.64 total value added in 1993. Specialty and non-timber forest products contributed more than \$60 million to the economy of the state and timber harvesting contributed more than \$927 million annually. In 1993, these specialty and non-timber forest products contributed \$35.2 million in value added to Virginia's economy.

(http://www.fw.vt.edu/forestupdate/newsletters/Volume13/13 .4.1.htm) Although Virginia's forest products industry provides a vital source of

income and jobs to many rural areas and smaller cities, the growing population is placing greater demands on the remaining forestlands and the benefits they can provide. The harvesting, processing and marketing of forest products accounts for 183,898 jobs, and for each manufacturing job, an additional two service jobs are created. (http://www.fw.vt.edu/forestupdate/newsletters/Volume13/13 .4.1.htm)

Opportunities for growth in the forest products industry still exist, especially in the areas of value-added products, as well as non-timber utilization of Virginia's forests according to the Virginia Department of Forestry.

In 1997, roughly 3.1 million acres of forest land- more than 12 percent of the land in the state of Virginia, is considered "non-rural" and "unsuitable for timber production" because it is so densely population that it "is likely to become unavailable for timber production through residential or other development, at least by the time the existing forest reaches economic maturity."

(http://www.fw.vt.edu/forestupdate/newsletters/Volume13/13 .4.1.htm)

Five percent of the land in Virginia was classified as unsuitable for commercial timber production because it occupies parcels less than five acres in size, 2.7 million acres is classified as unsuitable for commercial timber production due to the slope or "spatial arrangement." (http://www.fw.vt.edu/forestupdate/newsletters/Volume13/13 <u>.4.1.htm</u>) In 1997, 17 percent of Virginia's land base, 4.3 million areas of forestland, will be converted from forest to residential, commercial, and other more intensive uses in the next few decades. Lastly, 12 percent of all land in the state and 24 percent of the state's rural forestland is in parcels smaller than 20 acres, which is below the accepted parcel size suitable for commercial timber production. These threshold requirements can be found in Virginia state law in the requirement that landowners have 20 forest acres to qualify for the forestall class of land usevalue taxation (Code of Virginia 1950 58.1-3233).

(http://www.fw.vt.edu/forestupdate/newsletters/ Volume13/13.4.1.htm)

### Virginia's Wood Products Manufacturing

Virginia's forests have five major timber types: Upland hardwood, Lowland hardwood, Oak-Pine, Natural Pine, and Pine Plantation. According to the Virginia Department of Forestry (VDOF) in 1940, Virginia's timber resource could only build two million homes compared to six million homes in 2000. Nearly every county in Virginia has wood-using industry, and timber ranked second behind poultry and eggs when compared to market values of Virginia's agricultural crops according to VDOF in 2000.

The primary manufacturing process for the wood products industry in Virginia converts raw materials into lumber, veneer, railroad ties, poles, posts, barrel staves, handles, wood pulp, paper, particleboard, fiberboard, oriented strand board, laminated veneer lumber, laminated strand lumber, chemicals and other products. Hardwood sawmill production in Virginia has surpassed pine production every year since 1970. According to VDOF, the direct economic impact from primary forest products manufacturing in 2003 was more than \$4.1 billion, while the total value-added from primary forest products manufacturing of timber in 2003 was more than \$3.4 billion.

The secondary manufacturing industries in Virginia processes lumber, pulp, paper, particle boar and other primary products into other components or final products such as boxes, cartons and other packing materials, furniture, cabinets, component parts, flooring, paneling, molding, pallets, and many more. Although there have been multiple closings of several well-known furniture manufacturing plants in Virginia, the state continues to be one of the larger producers of wood furniture in the United States. The direct impacts according to VDOF from secondary manufacturing, including construction, contributed more than \$5.9 billion to the state's economy in 2003 with a total impact of more than \$15.2 billion. The total value-added from the secondary forest products manufacturing was more than \$6.9 billion in 2003.

### Economic Impact of Wood Products Manufacturing on Virginia's Economy

Forest products manufacturing is a major contributor to the manufacturing sector of Virginia's economy. As a group, the forest products industry ranks first in manufacturing jobs, accounting for one in every six manufacturing employees, and first in salaries and wages with \$1 out of every \$7 paid out to employees. Total all wood manufacturing in the state employs 51,193 people.

According to the U.S. 2002 Economic Census, between 1997 and 2002 the wood products industry lost 8.9 percent of establishments in the state of Virginia but had a gain in paid employees of 11.7 percent. (See Table D) Compared to manufacturing as a whole in Virginia between 1993 and 2002, the manufacturing industry lost 1.3 percent of establishments and 16.1 percent of paid employees. In Virginia, there are 530 wood products establishments and 108 paper products establishments in 2002.

Employees are predominantly male and between the ages of 35 and 44. (See

Table D) There are very high retention rates for those employed in the wood products industry in Virginia, although on average new employees make roughly \$500 less than existing employees. (See Charts D & E)

### Perspectives from Alleghany Highlands Wood Products Firms

#### **Small Wood Products Firms**

We had the privilege of talking to some small wood products firms in the Alleghany Highlands: Bennett Logging and Lumber – producers of lumber; Union Church Millworks - producers of custom flooring, trims and interiors; Sonoco Products – producers of paper cores for MeadWestvaco; and Bolivia Lumber – producers of pallets for MeadWestvaco. In the course of interviewing these small wood products firms, it was found that they offered competitive benefits packages to MeadWestvaco and were more likely to hire people based on attitude than skills. Steve Bennett, owner of Bennett Logging and Lumber and Union Church Millworks, said that he would rather hire people who are willing to learn (Personal communication, November 2007). He realizes that it is very difficult to teach "soft skills" to people, but if those skills are in place then it is easier to teach them the job.

A resounding response from these smaller firms is that most of the skills needed for these jobs are not taught in the classroom. Skills like grading lumber have to be done on the job, and someone wanting to learn this skill needs to be involved in it on a daily basis to really grasp the concept. Bennett's companies have implemented policies regarding attendance to work—those who attend work every day get rewarded, while those who habitually miss are penalized.

Training at Sonoco Products is done internally, and is usually mandated by the larger corporation (R. Henderson, personal communication, November 2007). The only people who go outside the company are salaried workers who go elsewhere for training. At Bolivia Lumber, though, training is not necessary. It is a manual-labor intensive job, and if someone can do the work, then they are hired (Personal communication, November 2007). This type of work, according to Bennett, is hard, but needs to be done because the product is needed.

Three of these four companies are not looking to expand in the next two to 5 years. Union Church Millworks will be expanding in the next year due to the launch of a new website that will allow for internet sales of their products. This will lead to the hiring of new employees to fill in the gaps.

These firms are surviving and thriving in the Alleghany Highlands, even in the presence of a large corporation. They are able to stay open doing work that supports the larger corporation or the community at large.

#### **Large Wood Products Firms**

MeadWestvaco is the large wood products firm in the Alleghany Highlands. They employ over 1000 people and are part of a much larger worldwide corporation. They recruit engineers from Virginia Tech to come to their Covington plant, and offer compensation packages to encourage retention. The people who are most likely to stay with MeadWestvaco in Covington are those who are from the area and who have families. It is difficult for MeadWestvaco to recruit people into the area who have not previously lived there because the area is very rural and does not have the amenities that most people want. They want to hire college graduates with general engineering skills that want to accept a leadership position and ambition. They also recruit from West Virginia Tech and North Carolina State (D. Sales, personal communication, December 5, 2007).

## Intermediaries

# What are Intermediaries?

According to Garmise (2006), intermediaries play an important role to examining workforce issues because such play an important role as "information brokers that match supply and demand in the marketplace" (p. 47). Intermediaries may be classified into three categories: traditional, customized, and labor-market negotiators (Garmise, 2006, p.47). Garmise (2006) describes traditional intermediaries as those entities such as Manpower USA and the Virginia Employment Commission, that focus on matching jobseekers to available employment opportunities within an area, based on the jobseekers skills set (p. 48).

Customized intermediaries differ from traditional intermediaries in that this form of intermediary has more interaction with both the jobseeker and employer. The focus of this form of intermediary is to worker with local employers to "identify specific skill requirements and industry trends" (Garmise, 2006, p.48). After disseminating such, the customized intermediary works with jobseekers to recruit and train such individuals in skills necessary for entry into the local labor market. (Garmise, 2006, p. 49). Examples of customized intermediaries include universities, community colleges, vocational training centers, and secondary schools.

The third type of intermediary, labor-market negotiator, are very similar to customized intermediaries. However, the labor-market negotiators have a greater degree of interaction with employer firms, thus adopting a more policy-based approach to addressing overall labor market demands. Examples of labor-market negotiators include local and regional economic development organizations, as well as local government stakeholders (Garmise, 2006, pg. 48).

Visualization of how intermediaries serve both the supply-side (jobseeker buckets) and the demand-side (employer/firms).



### Intermediary Overview: Alleghany Highlands

Examination of intermediaries servicing the wood products industry in the Alleghany Highlands region reveals a presence of each of the three previously mentioned types of intermediaries: traditional, customized, and labor-market negotiators. For purposes of this report, only those intermediaries servicing the wood products industry will be examined. Additionally, distinctions will be made between publicly funded intermediaries, and those which operate through the private sector. Our report begins by offering an examination of public sector intermediaries, noting an emphasis towards educational institutions as important intermediaries servicing the wood products industry in the Alleghany Highlands. College and Graduate Programs, Community Colleges, Vocational Training Centers, and Secondary Schools serving the region were examined. Additionally, this report will consider the role of local and state governmental agencies functioning towards the provision of public intermediary services in the Alleghany Highlands region. Finally, this report will also identify private intermediaries in the Alleghany Highlands region which service the wood products industry.

Public Intermediaries	Traditional Intermediary	Customizethtermediary	Labo <del>r</del> Market Negotiator
College/GraduateProgram: Virginia Tech Department of Wood Science	X	X	
Community College:Dabney S. Lancaster	Х	x	x
Vocational Training: Jackson River Technical Center		X	
Secondary Schools: Alleghany High School & Covington High School		x	
Virginia Employment Commission	X		
Other State and Local Government Agencies			X
Private Intermediaries			
Manpower, USA	x		

This table shows how regional intermediaries were classified for this report

## **College and Graduate Programs**

### Virginia Tech Department of Wood Science

Located less than 100 miles from the Alleghany Highlands, the Department of Wood Science at Virginia Tech, is a nationally ranked wood science program which specializes in advanced skills training in the wood products industry.

#### Focusing on addressing the skills-training

of both undergraduate and graduate students, the Virginia Tech Department of Wood Science curriculum offers six degree options that allow the student to receive focused training in a specific sector of the wood products industry. Additionally, the Virginia Tech Department of Wood Science has numerous partnerships with both small and large firms throughout the United States, thus exposing students to internship and networking opportunities in the professional sector.

In addition to skills-training, the Virginia Tech Department of Wood Science also conducts research through several department-based research institutions including the Brooks Forest Products Center, the Wood-Based Composites Center, the Center for Unit Load Design, and the Center for Forest Products and Marketing. **Through this research, the Virginia Tech Department of Wood Science is further developing demand-side relationships**, as well as offering their students exposure to cutting edge technological developments in the national, and international, wood products industry.



**Figure 3.3** – Description of degree options and future career tracks. Positions most relevant to employment in the Alleghany Highlands are shaded

Degree Option	Future Career Track
Adhesion Science	Adhesive Development Chemist, Process Technician, Researcher, Technical Service Representative
Forest Products Marketing and Management	International Forest Products Specialist, Marketing Manager, Production Manager, Sales Representative, Supply Chain Manager
Manufacturing Systems	Inventory Control Manager, Process Automation Engineer, Process Supervisor, Production Manager, Quelity Control/Process Engineer
Packaging Science	Packaging Engineer, Process Engineer, Packaging Research Scientist
Wood Structures & Materials	Research Scientist/Materials Scientist
Non-Timber Forest Products	International Consultant, Field Advisor, Research Coordinator

\*All data for this section is accessible at www.woodscience.vt.edu

### VT Department of Wood Science Intermediary Functions

A focus group session with Virginia Tech Junior and Senior Wood Science students reveals that many students within the department participate in available research and internship opportunities. Through such opportunities, the students gain exposure to a variety of firms, both large and small in size. Additionally, the students note that the department itself served a great source of obtaining career and job placement counseling. Furthermore, students have additional intermediary services through the College of Natural Resources Career Services, as well as Virginia Tech Career Services. Many students feel confident that they will be able to secure employment upon program completion.

### Focus Group: Junior and Senior Virginia Tech Wood Science Students

When asked about factors influencing their career decisions, many students believed that quality of life should be a top consideration. Of the students participating in our focus group, many believe that the location and work environment of a firm are more important factors than salary and benefits packages. Furthermore, students cite opportunities for advancement to also be important considerations when evaluating employment opportunities.

Of the students we talked too, many individuals would consider firms located

both in rural or urban areas. However, a notable factor in addressing place issues is that preferred locations would offer outdoor recreational opportunities for hunting, fishing, and hiking. Many also expressed willingness to commute up to a distance of one hour.

Concerning work environments, students also desired firms in which other young people worked, so as to help them construct social networks in a locality. Additionally, students prefer employment opportunities in firms that have low occupational hazard rates. Furthermore, students hope for a work environment in which they will have good working relationships with both other employees and supervisors.

Noting that the majority of students enrolled in the Virginia Tech Department of Wood Science possess skills training for future managerial employment tracks, many students desire employment opportunities that will allow for future career advancement. Students believe that working 5-10 years with a firm upon graduation is very important in helping them to develop professional experience that will allow them to then transition to firms where they hope to spend the remainder of their career in upper management positions. Interestingly, when asked if anyone foresaw themselves as entrepreneurs in the wood products industry, many replied that such is difficult given that many firms in the industry are either very large, or very small. One student noted that it was not cost-effective to start a small wood products business from the ground-up; rather the student felt that such entrepreneurship is best explored as a retirement hobby.

\*Focus Group Conducted on Dec. 5, 2007

### Perspectives from Virginia Tech Wood Sciences

An interview was conducted with Paul Winistorfer, professor and department head in the wood sciences and forest products department of Virginia Tech. He said that wood products, as an industry, is moving from smaller "mom and pop" firms to larger firms. This seems, in his estimation, to be especially true in Southwest Virginia. Many firms here cannot afford to hire college grads—the starting salary is approximately \$44,000, but firms in Southwest Virginia want to pay approximately \$28,000 (Personal communication, December 5, 2007).

Virginia Tech's Wood Sciences program, which stresses innovation, creativity and entrepreneurship, is striving to create a grander vision and create a regional center of excellence in Southside Virginia. They are working in Southside to create a partnership for degree pathways. This has invoked the national WoodLINKS model, which is an industry/education partnership that encourages students to enter the wood industry and provide industry-certified entry level employees through training in high schools (Smith, 2007). Because of this model, there are approximately 144 schools in advanced manufacturing, primarily at the secondary level. None exist in Virginia right now. When this pathway exists and it is seamless, there is a great engine for workforce capital to develop.

There is also another resource within Virginia Tech's wood sciences program that could be invaluable to the wood products industry. The Wood Enterprises Institute is a student-run entrepreneurial venture that is managed by students with the support of the wood sciences department. It introduced a wood product as a "concept-to-market" business project during the 2007 spring and summer semesters, which were the inaugural semesters of the Institute. They say that a partnership must exist between the Institute and the forest and wood products industry to ensure their future success. The industry's involvement is invaluable because of the donation of time and resources, as well as provision of practical advice ("Wood Enterprises Institute," 2007). The Institute could be an incubator for new wood products ventures, as students there work together to design packaging.

Winistorfer also said that there is limited involvement between Virginia Tech and the Alleghany Highlands. There is limited involvement with MeadWestvaco, even though Virginia Tech has a new packaging sciences program that has MeadWestvaco's interests. There is also little involvement between Virginia Tech and Dabney S. Lancaster Community College. DSLCC used to invite professors from Virginia Tech to their campus, but this does not occur as much now. There is also a matriculation agreement in existence between DSLCC and Virginia Tech to bring in the graduates from DSLCC's associate's degree programs to get further education. To this date, however, there has not been a DSLCC graduate come to Virginia Tech.

Virginia Tech's wood science program is working to move wood products in Southwest and Southside Virginia into the 21<sup>st</sup> century by creating necessary partnerships and enticing bright young individuals into the industry. These actions will continue to boost the industry and spark innovation and creativity to expand the industry into new ventures.

## **Community College Programs**

### Dabney S. Lancaster Community College

Located in Clifton Forge, VA -Dabney S. Lancaster Community College (DSLCC) is community college servicing the majority of the Alleghany Highlands Region

Of the intermediaries examined in this report, Dabney S. Lancaster Community College functions in the most comprehensive manner through which to address the skills-training of the supply-side, engage demand-side interaction, and serve as a facilitator for organizing regional stakeholders in the local wood products industry. Consequently, one may assume that in such capacity, DSLCC functions as both a customized intermediary, and a labormarket negotiator.

### Skills-Training Based Upon Local Demand-Side Needs

The curriculum at DSLCC is very structured towards addressing local workforce needs. DSLCC possess a rich tradition for facilitating dialogue with local employers, so as to design curriculum to best address their labor market needs. To facilitate this dialogue, DSLCC relies on the services of its Division of Continuing Education and Workforce Services Program (CEWS). CEWS provides a variety of services including customized training for employers, as well as assessment and training opportunities for jobseekers. Furthermore, this office also provides services such as the career readiness certificate. The career readiness certificate is specifically designed to equip program participants with a necessary skills-set to be qualified to work at MeadWestvaco, the region's largest wood products employer. http://www.dslcc.edu/PRESIDENT/continuing\_ed/index.html

### Virginia Packaging Applications Center (VAPAC)

In efforts to address a general wood products industry demand for employees skilled in advanced-manufacturing techniques, Dabney S. Lancaster Community College recently opened the Virginia Packaging Applications Center (VAPAC). Operating through the Continuing Education and Workforce Services Program (CEWS), VAPAC serves to both address supply-side skills training, and demand-side workforce development services.

Students enrolled in the Advanced Manufacturing and Packaging Technology curriculum will have access to new laboratory facilities, offering hands-on machinery training. Local firms seeking to form partnerships with VAPAC will also have access to individuals receiving customized training, designed to meet their firm's unique needs. Furthermore, partnering firms will be granted access to VAPAC's research facilities and consultant. http://www.dslcc.edu/PRESIDENT/continuing\_ed/AMPT/VAPAC /packaging5.html

### Curriculum Addressing Needs of Local Wood Products Industry

Dabney S. Lancaster Community College offers three types of degree options most applicable to the wood products industry in the Alleghany Highlands region. These programs include A.A.S. in Forest Technology, Technical Studies in Advanced Manufacturing and Packaging Technology, and Technical Studies in Welding. Certificates are also available in each of these programs for members of the traditional workforce, or retirees seeking to pursue continuing education opportunities.

Figure 3.4 – Description of Degree Options
and Potential Future Career Tracks

Major	Future Career Track/ Skills Base
Forest Technology	Forestry, Urban Tree Care, Forest Products
Technical Studies in Advanced Manufacturing and Packaging Technology Technical Studies in Welding	Ergonomics, Robotics, Machine Technology, Packaging, Distribution Oxyfuel Welding/Cutting, Shielded Metal Arc Welding, Inert Gas Welding, Welding Metallurgy

Of the aforementioned degree tracks, Welding is the most distantly related to the wood products industry; however, it appears to be a necessary skill in sectors supporting the wood products industry, such as product logistics. Advanced Manufacturing and Packaging Technology is important to the wood products industry in the Alleghany Highlands region because the largest regional employer uses wood products as the raw material construct of bleach board and fiberboard packaging material. However, of the three aforementioned majors, Forest Technology addresses wood and wood products the most intensely.

### Forest Technology, A.A.S.

The Alleghany Highlands is fortunate to have the only community college program in forest technology in the Commonwealth of Virginia. Marketed as an intensive training in wood science basics and forestry, this program is designed to both equip students with necessary skills for pursuing a career path in forestry, urban tree care, or forest products. Furthermore, this program also seeks to prepare students planning to pursue further their training at the college or university level.

On average, the Forest Technology program graduates fourteen students annually. This is an important statistic to note given that it presents an opportunity for the region to capitalize on a specially trained labor pool that express a general desire to remain in the region. This is important for addressing projected mid and upper level management shortages during the coming decade.

Information in this section accessible at http://www.dslcc.edu/documents/DSLCC\_2006-2008\_Catalog1c.pdf Perspectives from Alleghany Highlands Community College Intermediaries

Gary Keener is the Vice President of Continuing Education and Workforce Services (CEWS) and Dean of Occupational, Technical and Allied Health Programs at Dabney S. Lancaster Community College (Personal communication, November 2007). He was interviewed about the CEWS program and its involvement in the Alleghany Highlands. CEWS covers all customized training and all technical programs at DSLCC, which are very popular to students. The program teaches skills in interpersonal communication, supervisory and front-line training skills, as well as teamwork and computer skills. The program's largest partner is MeadWestvaco, but other smaller firms in the area come to them for safety and other types of training. MeadWestvaco was the reason for some of the programs that were developed at DSLCC, and the college does all the pre-employment training for the company. CEWS is also partnered with Workforce Development Services to run apprenticeships, teach general skills classes, and to provide customized training. They also partner with local economic development groups to provide training or retraining for industries that are looking to relocate in the Alleghany Highlands. Resources are put into the areas that are most needed and are very important to the success of the area.

CEWS addresses soft skills by talking about appropriate work ethic. They talk about the economic impact that missing work has on a company, as most workers believe that if they do not show up and are not paid; there is no effect on the company. CEWS tells workers that even though there is no paycheck issued to them on the day they are not there, there is an impact on the productivity of the company.

As far as retention, Keener says that this is not an issue—the issue lies in the fact that there are not enough jobs in the Highlands for the people who want them. When someone has a job, they know they need to stay there because of the number of jobs being lost.

CEWS focuses their programs on the areas of need in the Highlands. Employees can train part-time and work part-time so that they can gain the necessary skill sets to obtain full-time employment. This helps address the problem of underemployment in the Alleghany Highlands. There is no need at this time to offer the program in multiple languages, although Keener recognizes that this could become an issue in the future, and they are preparing for when it becomes an issue.

The Virginia Packaging Applications Center was also contacted regarding its role. Earl Dodrill, coordinator of Continuing Education and Workforce Services at DSLCC, was asked about the aspects VAPAC and its impact on the Alleghany Highlands (Personal communication, November 27, 2007). The skills they are taught include specialized skills and electronics, as well as interpersonal skills and teamwork and team building skills. VAPAC partners with about 5 businesses locally, but has many others statewide. They mirror CEWS in the way they address soft skills and work ethic, and also use the 21<sup>st</sup> Century skills set as a model in their curriculum. Retention, according to Dodrill, is good, and people will stay at a job if they enjoy it and if it is feasible. VAPAC provides people in the Alleghany Highlands an opportunity to increase their technical skills. The program works with people so that they can recognize their skills and possibly test out of areas they already have experience in. This is done through a portfolio review to determine what skill sets they already possess and to determine where people would best fit for further training.

VAPAC is a new program that started in the fall of 2007. There are seven students in the inaugural class who are test-driving the curriculum to see how it is going to work. They are hoping for a class of 15 in the fall of 2008. The idea of VAPAC is to attract new business and support existing business. They would like for people to come in from outside the Alleghany Highlands region to receive training and then take it home. Dodrill sees that a workforce is essential to the community. The ability of DSLCC to provide a continuous supply of technically skilled workers is vital for the stability and growth of the workforce. DSLCC, VAPAC, and CEWS want to continue to provide training and education to those who want and need it.
## **Vocational Education Programs**

### Jackson River Technical Center

The Jackson River Technical Center is the primary provider of vocational educational services in the Alleghany Highlands region. The Jackson River Technical Center (JRTC) functions primarily as a provider of skills training for the supply-side. At present, JRTC wood products-related curriculum provides hands-on training in basic carpentry, building trades, and welding. Secondary school students compose of the majority of individuals enrolled in coursework; however, the JRTC also offers courses to members of the traditional workforce, as well as retirees, seeking to diversify their skill sets.

In addition to serving as a provider of skills education, the JRTC also helps its students to learn soft skills often critical to success in the vocational trade sector. Examples of potential soft skills training at JRTC includes learn the value of teamwork, professionalism, and a healthy attitude. In efforts to help further promote the development of soft skills, JRTC offers its students opportunities to participate in a variety of state and national vocational skills competitions. Furthermore, JRTC also offers students opportunities to complete apprenticeships in fields related to their vocational coursework.

According to survey results collected in 2007 by the Virginia Tech Center for Assessment, Evaluation, and Educational Programming, JRTC possess a high job placement rate, upon completion of their portion of the training program. Results show that over 95% of graduates are able to transition to full-time employment, pursue military careers, or enter into higher education institutions. Of the surveyed respondents who attain full-time employment in their training area upon graduation, 100% report possessing satisfaction in their employment and career field. Furthermore, of the respondents surveyed, over 61% were able to find fulltime employment in the field related to their skills training at JRTC. (Center for Assessment, Evaluation, and Educational Programming at Virginia Tech, 2007, p. 1).

### Workforce Development Opportunities: JRTC

Given JRTC's high job placement rates proceeding graduation, this report believes JRTC has potential to serve as an effective labor market intermediary in the wood products sector. Although JRTC does not offer extensive training directly correlated to the wood products industry, local firms may still benefit from employment of JRTC graduates due to the fact many bring desirable soft-skills.

## **Secondary School Programs**

## Alleghany County High School and Covington High School

Both Alleghany County High School (AHS) and Covington High School (CHS) offer intermediary services through their Guidance Departments. Within these departments, students are provided career consultation and exposed to existing job opportunities within their individual areas of interest. Additionally, both Guidance Departments engage in dialogue with local employers to better understand how the secondary schools may undertake efforts to promote local employment opportunities.

Furthermore, both AHS and CHS are participants in the Tech Prep program. Designed to help students develop career awareness at an early age, Tech Prep establishes a career path for students seeking to enter the workforce upon high school commencement, or continue their education at the community college level. Dabney S. Lancaster Community College is an active participant in the Tech Prep program at both Alleghany County High School and Covington High School. In partnership with DSLCC, the secondary schools are able to construct curriculum to provide students with competitive skills in the local labor market. The Tech Prep program is unique in that it affords students the opportunity to engage through the utilization of hands-on teaching methods, and applied learning techniques. Furthermore, the program allows students to pursue options for workbased learning. Students may also

participate in workshops specifically structured towards providing an understanding of both the wood products industry, as well as advanced manufacturing. http://www.dslcc.edu/PRESIDENT/continuing\_ed/techprep/index. htm

Students at both Alleghany County High School and Covington High School are able to take course work at the Jackson River Technical Center. Statistics compiled by the Alleghany County High School Guidance Department show that over 60% of the high schools 900 students take at least once course through Jackson River Technical Center during their secondary school experience.

In addition to providing vocational training opportunities through Jackson River Technical Center, AHS also possess a Vocation Tech Education curriculum through their high school. Notably, this AHS program offers students the opportunity to pursue coursework in two subjects applicable to the wood products industry in the Alleghany Highlands region. These two subjects include a materials and processes class, and a manufacturing technology class. According to course outlines for these two classes, each focuses on promoting an understanding of processing skills, and basic machinery operations.

#### http://www.alleghany.k12.va.us/AlleghanyHigh/IMAGES/school %20prOFILE.doc and

http://www.covington.k12.va.us/CHS/CHSprofile.doc

2006- 2007	Enrollment	Graduates Planning to Attend 4 Yr. College or University	Graduates Planning to Attend a Community College	Graduates Entering Workforce Immediately After Graduation
AHS	900	30%	47%	15%
CHS	347	45%	38%	11%

## **Traditional Public and Private Intermediaries**

### Virginia Employment Commission

The Virginia Employment Commission (VEC) serves as the primary traditional public intermediary serving the Alleghany Highlands region. Located in Covington, the VEC is committed towards helping localities match jobseekers to available employment opportunities. The VEC provides jobseekers with job placement assistance, transition or training services, and temporary income support. To achieve these goals, the VEC routinely undertakes efforts to ensure that its own practices and procedures are being implemented in a manner so as to best address local workforce development issues (VEC Website, 2007, About the VEC).

### Manpower – USA

At present, Manpower USA is the only traditional private intermediary with a presence in the Alleghany Highlands region. An international staffing agency headquartered in Milwaukee, WI, Manpower USA has over 4,400 offices worldwide. Manpower USA has a regional office located in Covington which seeks to address employment needs in Covington, Clifton Forge, Hot Springs, Lexington, Fincastle, Lewisburg, WV, and White Sulpher Springs, WV. The Manpower USA office in Covington has a heavy focus on addressing staffing needs at MeadWestvaco. Consequently, the Manpower USA website lists a point of corporate contact as "Covington-MeadWestvaco" (Manpower USA-Covington Website, 2007).

Manpower USA provides Human Resource services to both jobseekers and employers. Examples of such Human Resource services include assessment services, behavioral interviewing, and outplacement services. Additionally, Manpower USA offers employers on-site management services such as coordinating interview processes (Manpower USA-Covington Website, 2007).

The Covington office of Manpower USA provides specialty placement services in the administrative and light industrial sectors. Most relevant to their role as intermediaries in the wood products sector, Manpower USA provides local wood products manufacturing firms with individuals possessing desirable light industrial skills. Manufacturing positions often requiring this skills set include electronics assemblers, inventory workers, material handlers, mechanical assemblers, packaging workers, production line workers, quality control inspectors, shipping/receiving clerks, and stockpickers/packers (Manpower USA-Covington Website, 2007).

## **Public Labor Market Negotiators**

## Alleghany Highlands Economic Development Corporation

Formed in 2002, the Alleghany Highlands **Economic Development Corporation** (AHEDC) is a collaborative partnership amongst the City of Covington, Alleghany County, and the Towns of Clifton Forge and Iron Gate. Located on the campus of Dabney S. Lancaster Community College, this organization is comprised of public and private stakeholders from each of the partnering localities. Through the use of both public funds provided by the localities, as well as the Commonwealth Virginia, this organization is an important driver for shaping economic development policy in the Alleghany Highlands region (AHEDC Website, 2007).

The AHEDC focuses economic development efforts around the promotion of five objectives:

- 1. Marketing and Business/ Industry Recruitment
- 2. Business/Industry Retention and Expansion
- 3. Small Business and Entrepreneurial Development
- 4. Workforce Development
- 5. Travel and Tourism

Noting a desire to engage in efforts to promote economic diversification, the AHEDC possess great potential for serving as an important labor market negotiator capable of using an awareness of industry and local economic trends in efforts to shape future economic policy efforts (AHEDC Website 2007).

## Virginia Department of Business Assistance

The Virginia Department of Business Assistance (VDBA) is a state agency seeking to assist communities throughout the Commonwealth in creating economic climates conducive to promoting business growth and investment. To help facilitate growth in local labor markets, the VDBA provides localities with information such as ways to access fiscal capital. Additionally, the VDBA also provides workforce training, and small businesses counseling.

The VDBA is important to the Alleghany Highlands wood products industry because of the agency's ability to assist in workforce training programs. This assistance may be especially applicable to helping train and retrain workers in skills such as advanced manufacturing techniques. Furthermore, the VDBA may also serve as a driver for industry diversification in through the agency's efforts to foster entrepreneurship.

## Roanoke Valley-Alleghany Regional Commission

The Roanoke Valley-Alleghany Regional Commission (RVARC) plays an important role as a labor market negotiator in the Alleghany Highlands region. Through its role as a planning commission, the RVARC serves as an important intermediary serving as a lesion between local and state government. Furthermore, the RVARC is a key facilitator of regional strategic planning efforts.

Perspectives from Traditional Intermediaries and Labor Market Negotiators in the Alleghany Highlands

To get a sense of what the traditional workforce consists of in the Alleghany Highlands, interviews were conducted with Dave Kleppinger, Sandy Ratliff, and Katherine Holcomb. Kleppinger is the executive director of the Alleghany **Highlands Economic Development** Corporation; Ratliff is the Business Services Manager of the Virginia Department of Business Assistance office in Abingdon; and Holcomb is office manager of the Virginia **Employment Commission's Covington** Workforce Center (Personal communication, November 20, 2007; personal communication, November 21, 2007; personal communication, December 11, 2007).

All three were asked about the wood products industry, and they said that the industry is a driving force behind economic and workforce development in the area. MeadWestvaco is the dominant firm because of its size and influence, and it results in the formation of auxiliary businesses to supply products to them. It is a blessing to the workforce in that it drives programs in both the community college and the secondary schools in the area. While

#### there are departures from the needs of MeadWestvaco in the training, the core programs are influenced by what MeadWestvaco needs. Their requirements are expansive, so other companies can find employees that received training at DSLCC to fit into what that particular company may need. Wood products firms in the Alleghany Highlands drive how a program for workforce development is put together.

The Virginia Department of Business Assistance provides training assistance for a variety of industries, which is described as any place that is creating basic employment in for-profit industries. They provide a lot of assistance in consulting, funding assistance, organizational development and electronic media through programs that are targeted to businesses of certain sizes and amount of capital investment. The VEC Covington Workforce Center provides a matching system between applicants and businesses that place job orders with the VEC. The office administers programs that assist displaced workers, which can lead into further training or retraining. They also provide a place to conduct orientation and drug testing, and according to Holcomb, there has not been a request from a business that she has not been able to fill.

The interviewees agree that a workforce is pre-trained and highly skilled will make a company more productive, and this can spur competition for workers between existing businesses and businesses that may choose to relocate into the Alleghany Highlands.

## **Survey Recommendations**

Upon completion of this report, the following factors were identified as potentially useful constructs and recommendations for creating the labor market survey.

- Ensure that questions directed to current wood product industry employees in the Highlands identify those employees who are nearing retirement. For instance, if respondents identify themselves as 50+ or retiring within 5 years, etc., a subsection of the survey specifically for this group could attempt to gain further information about the following. These questions may also applicable to other supply-side buckets and industry employees:
  - their perceptions of positive and negative aspects of their employment in the industry; how long they have been working in the industry; how long they have been with their present employer; how long they have lived in the Highlands area; the type of occupation they currently have; whether they started at a lower/different position before obtaining their current job; their current salary/benefits; the benefits they would require to continue working past retirement; whether they are a member of a union or other industry-related group; etc.
  - Similarly, identifying recent retirees from wood industry firms through VEC or industry pension records could identify an additional pool of respondents for the above questions.
- Ensure that some attempt is made to survey respondents with advanced degrees related to wood-industry occupations. As discussed in subsequent sections, an appropriate and readily accessible source of such respondents would be currently enrolled students or graduates from the wood science program at Virginia Tech. The survey should gather information from these respondents about:
  - ideal vs. acceptable/expected types of occupation, both short-term and long-term career advancement goals; ideal vs. acceptable locations (either specific places *or* general characteristics they would require of a place); ideal vs. acceptable salary/benefits; their perceptions of the benefits and drawbacks of employment conditions in the industry; current knowledge and perceptions about the Alleghany Highlands region, including willingness to live in the area and perhaps what inducements would be necessary for them to choose employment in the Highlands, etc.
  - Another approach may be to inquire of current industry employees with advanced degrees to identify the institution from which they obtained their education, which could identify other sources of graduates besides VT that play a role in the Highlands.

- To identify the nature in which the traditional workforce system supplies workers to the wood products industry, surveys directed to current industry employees should be sure to include questions about the manner in which these workers obtained their job, i.e. through placement services, word-of-mouth, advertisements/recruitment drives, etc.
- Consider administering the survey to all workers using the services of job placement and training services such as VEC and Manpower, regardless of whether they are seeking employment in the wood products industry. This could provide information about: these prospective workers perceptions of the wood-products industry; their current skill levels and work experience; the type of work and salary level they would be willing to accept in various wood product firms; how long they have been in the Highlands region; how far they would be willing to travel for work; etc.
- Consider identifying organizations similar to the VEC or Manpower in West Virginia (esp. bordering Greenbrier County) to attempt to gather data about prospective labor force candidates from this area.
- Questions about the residence of industry workers should be included to determine the proportion of the wood-products labor force lives in the Highlands versus those who commute from outside the region, and from where

## **Final Considerations**

In closing, this report urges consideration of the following factors when adopting new economic development strategies:

• Consider options for economic diversification

- Other types of emerging industries
  - Pre-fabricated metal products
  - Tourism/ Eco-tourism
- Promote small business opportunities and development within wood products and forestry
  - Buy local:
    - Does MeadWestvaco purchase raw materials from Virginia?
- Continue efforts to engage supply-side and demand-side interaction though educational intermediaries
  - Training opportunities for existing labor pool
    - Dabney S. Lancaster Community College
      - Promotion of the Virginia Packaging Applications Center
  - o Engage Virginia Tech Wood Science Department
    - Important opportunities to recruit mid- and senior- level management
- Consider inter-regional influences and opportunities for strengthening the economic vitality of the Alleghany Highlands

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# Chart C: Local Workforce Breakdown



#### Chart D: Local Workforce Breakdown Employee Average Monthly Earnings by Age and Sex In Virginia Wood Products Manufacturing



#### Chart E: Local Workforce Breakdown New Employee Average Monthly Earnings by Age and Sex Wood Product Manufacturing

Table CStatewide Virginia: Report for Industry 321 Wood ProductManufacturing

Rank	Industry	Average Quarterly Employment	Growth in Employment %	Hiring Growth	Hiring Growth %	Hiring (2006Q2)	Hiring (2005Q2)	Average Quarterly New Hire Employme nt	Average Quarterl y Job Change	Average Monthly Earnings	Earnin g Growt h	Averag e EarnIn g Growth	New Hire Earnings
40	321 Wood Product Manufacturing	20,764	4.50%	153	9.10%	1,741	1,588	1,755	605	\$2,853	\$93	3.30%	\$2,095

#### Table D

2002 Economic Census: Comparative Statistics for Virginia Manufacturing

1997 NAICS Code	1997 NAICS Description	Establishments			Value of Shipments			Annua	Paid Employees				
224	Wood Product Mfg	2002	1997	% Change	2002	1997	% Change	2002	1997	% Change	2002	1997	% Change
321		530	582	-8.9	3,033,45 5	2,774,48 7	9.3	52.544	470.353	11.7	18.234	19.612	-7.0

#### Table E

2002 Economic Census: Comparative Statistics for Virginia Manufacturing

1997 NAICS Code	1997 NAICS Description	E	Establishments		Val	ue of Shipmo	ents	Annua	l Payroll (\$1	,000)	Pa	Paid Employees		
322	Paper Mfg	2002	% 1997 Change		2002	1997	% Change	2002	1997	% Change	2002	1997	% Change	

											171	
107	105	1.9	4,166,81 0	4,212,21 4	-1.1	601,313	636,939	-5.6	12,361	15,970	-21.1	

Table F2002 Economic Census: Comparative Statistics for VirginiaManufacturing

1997 NAICS Code	1997 NAICS Description	Establishments			Value of	Value of Shipments (\$1,000)			Annual payroll (\$1,000)				Paid employees		
31-33	Manufacturing	2002	1997	% Change	2002	1997	% Change	2002	1997	% Change	2002	1997	% Change		
		5,907	5,986	-1.3	83,999,8 17	83,814,0 09	0.2	11,607,046	11,557,7 93	0.4	310,97 1	370,59 5	-16.1		

#### **INTERVIEW NOTES**

#### **INDUSTRY SECTOR (DEMAND SIDE)**

## BENNETT LUMBER AND LOGGING / UNION CHURCH MILLWORKS – Steve Bennett

- 1. How many total employees work for your firm?
  - a. Several different companies. Bennett Logging 30 employees. Union Church—25 employees
- 2. How much difficulty has your firm experienced finding employees with the necessary basic skills? In that same vein, how much difficulty has your firm experienced finding employees with other necessary "soft" skills, like work ethic, integrity and other interpersonal skills, when they meet the basic requirements of the job?
  - a. Not hired by skills, just by attitude. Skills not taught anywhere. In house training. Constant problem finding soft skills. "Die hards" 50% been there 15 years. Lots of turnover because of drugs. Used to put up with the excuses, but not in the last few years. Random drug testing implemented. Policies implemented—employee must have a good reason for missing. Need to be fair to the ones that do show up every day.
  - b. MeadWestvaco: drawn off employees, but no blame. Better employees come to Bennett because of other benefits: flexible scheduling, etc. Competitive benefit package: health insurance is better than Mead if there for 5 years or more. Logging/lumber—worker's comp. For employee to have clear money to pay health insurance, have to gross more for tax purposes. Pay heavy with benefits—get more money in your pocket that doesn't go to benefits.
  - c. VT: not a lot of recruitment from there. Specialized.
- 3. If you had difficulty finding qualified applicants, how did the firm respond?
  - a. Hire people who are willing to learn! Can teach the hard skills, not the soft. If they have a good attitude they can be taught.
- 4. We are trying to establish information on estimated growth in the wood products industry; with that, how many new employees does your firm expect to hire in the next two to five years?
  - a. Bennett is at a good size. Union Church expanding by internet sales. When it comes online, will jump in sales and then hire new people.
- 5. Do training programs exist for jobs in your firm? If they exist, do you feel that these programs are beneficial to employees in their jobs? Do you feel that applicants for positions in your firm are sufficiently prepared by these programs?
  - a. No answer

## 6. Where do the majority of your employees get their initial training/education?

a. No answer

#### 7. Further Thoughts:

a. Tough work, hard work, no one wants to do it. Future—people have to get dirty and be willing to work! Have to have product. Mead is not forcing out small businesses.

#### SONOCO PRODUCTS – Rock Henderson

- 1. How many total employees work for your firm? a. 28
- 2. How much difficulty has your firm experienced finding employees with the necessary basic skills? In that same vein, how much difficulty has your firm experienced finding employees with other necessary "soft" skills, like work ethic, integrity and other interpersonal skills, when they meet the basic requirements of the job?
  - a. No problems, but only searching for 1 to 2 per year.
  - b. Average, gets down to how good job is done on front end. Area has good and bad. In tune with most rural VA areas. If a business has a lot of young people then issues may arise
- If you had difficulty finding qualified applicants, how did the firm respond?
   a. Open 20 years. No problem
- 4. We are trying to establish information on estimated growth in the [WOOD PRODUCTS/ PRE FAB METAL] industry; with that, how many new employees does your firm expect to hire in the next two to five years?
  - a. No expansion anticipated. Basic core in Clifton Forge. Without MeadWestvaco, they wouldn't exist. Other places are better suited to development.
  - Mead blessing and a curse. Curse pollute county, steal better employees, big and get first dibs on new employees. Blessing – created jobs for smaller businesses, support economy. Support community.
- 5. Do training programs exist for jobs in your firm? If they exist, do you feel that these programs are beneficial to employees in their jobs? Do you feel that applicants for positions in your firm are sufficiently prepared by these programs?
  - a. All jobs in plant have a specific set of duties run by company—internally. Keys to excellence in manufacturing—companies who do it well will do better than competitors. Attention to details.
  - b. Outside training enhancements: Salaried people do. Hourly wages—go to other plants, safety audits, quality audits, maintenance.

- 6. Where do the majority of your employees get their initial training/education?
  - a. Salaried people get outside training.

#### **BOLIVIA LUMBER – Office Manager**

- 1. How many total employees work for your firm?
  - a. 14
  - b. They are a feeder company for MeadWestvaco—they make pallets that are sent directly to Mead
- 2. How much difficulty has your firm experienced finding employees with the necessary basic skills? In that same vein, how much difficulty has your firm experienced finding employees with other necessary "soft" skills, like work ethic, integrity and other interpersonal skills, when they meet the basic requirements of the job?
  - a. Basic manual labor, no training needed. Go through the VEC when new employees are needed
- 3. If you had difficulty finding qualified applicants, how did the firm respond? a. No answer
- 4. We are trying to establish information on estimated growth in the [WOOD] **PRODUCTS/ PRE FAB METAL] industry; with that, how many new** employees does your firm expect to hire in the next two to five years? a. Static workforce—only hire when someone leaves.
- 5. Do training programs exist for jobs in your firm? If they exist, do you feel that these programs are beneficial to employees in their jobs? Do you feel that applicants for positions in your firm are sufficiently prepared by these programs?

a. No training needed in this job.

- 6. Where do the majority of your employees get their initial training/education?
  - a. No training

### PUBLIC INTERMEDIARIES – EDUCATION (COMMUNITY COLLEGE)

#### Earl Dodrill, VPAC:

- 1. What skills are most in demand by local employers?
  - a. Electronics, electrical controls, instrumentation, industrial mechanics, machine operation maintenance.
- 2. On average, how many employer partnerships do you have within the following sectors: wood science/products and metal fabrication?
  - a. VAPAC-5 locally.
  - b. Mead is a tremendous influence but doesn't drive everything
- 3. How does this program seek to address equipping students with soft skills?
  - a. 21<sup>st</sup> century skills set is a model. Done same as CEWS. Students will do oral and written work same as normal classroom, but also traditional stand-alone courses. Interpersonal, team building skills.
- 4. Is employee retention an issue in Allegheny County? If so, has this department examined any particular factors that contribute towards people leaving the workforce?
  - a. Not as prevalent as in Martinsville. Retention is good—people stick with their jobs. Generally, people who like it there will stay there if at all possible.

#### 5. How does this program address the local underemployed?

- a. Provides opportunity for them to increase skills in technical areas. Work with people to recognize their experiences to test out of areas. Do a portfolio review to see the skill sets they have.
- 6. Does this department offer programming in multiple languages, or is this of relevance?
  - a. Not an issue yet. Eventually will, but not right now.

#### 7. Enrollment in VPAC/program?

a. 7 students after launch this fall—test driving curriculum. Hoping for a class of 15 this fall. Idea to attract business, support business.
 Expectation—individuals to come in from outside of area to take classes and go home with training.

#### 8. Further Thoughts:

a. Essential to community is workforce—for us to be able to provide a continuous supply of tech is vital to its stability and growth. Continue to provide education to those who need it.

#### Gary Keener, CEWS:

- 1. What skills are most in demand by local employers?
  - a. Supervisory skills, front-line training, team building, teamwork training, communications training, computer skills, right now, a lot technician level skills training in manufacturing environments.
- 2. On average, how many employer partnerships do you have within the following sectors: wood science/products and metal fabrication?
  - a. Mead is largest partner, some sawmills (Bennett), and local loggers get safety training.
- 3. How does this program seek to address equipping students with soft skills?
  - a. Try to address this problem, address work ethic, talk about economic impact it has on company when employees do not show up. Give more of an economic standpoint in training.
- 4. Is employee retention an issue in Allegheny County? If so, has this department examined any particular factors that contribute towards people leaving the workforce?
  - a. Overall, no, because a lot of jobs have been lost recently. People know they need to stay there. Lack of jobs is problem, not retention.
- 5. How does this program address the local underemployed?
  - Focus programs on areas of need in area—employees can come to training part time, so they are given training to move up to full time. Address through education and training
- 6. Does this department offer programming in multiple languages, or is this of relevance?
  - a. Only offered in English, not an issue at this point. Not seen in highlands yet.
- 7. Enrollment in VPAC/program?
  - a. CEWS covers customized training, and all tech programs at DSLCC.

 Further Thoughts: Technical programs—very popular. Programs—some of them were because of MeadWestvaco. Manufacturing. Do all pre-employment training at Mead. Workforce Development Services—run apprenticeships, general skills classes, customized training, local economic development groups to provide training/retraining for industries looking to relocate in the area. Resources are put into what is needed. Very important.

#### PUBLIC & PRIVATE INTERMEDIARIES – TRADITIONAL WORKFORCE AND RETIREES

#### **DAVID KLEPPINGER – AHEDC**

- 1. To what extent do you perceive that the wood industry/metal fabrication industries to be a driving factor in economic/workforce development in the region?
  - a. Mere existence of Mead is absolute dominant force in economic development in the Highlands. Size of company. Workforce blessing high school and DSLCC have geared programming toward Mead's needs. Have been departures from that, but core programming is influenced by needs of Mead. Since needs are expansive, other companies can easily find workforce training for prospective employees at DSLCC.
- 2. Do any of your programs offer services directly (or indirectly) related to these industry groups? Please explain.
  - a. The Economic Development Corporation has no workforce programs only a facilitator. When a need is perceived, it is sent to service providers and they will provide the service. Just help identify need and facilitate process to fill need. Wood sector—still new, no direct role in influencing workforce delivery to sector. GPS technology will soon be integrated into already strong wood science/forestry program at DSLCC.
  - b. Workforce important part of selection process—anything that will help a company become more profitable and productive. Enhanced workforce product to come in the door. Whatever that can be done to pre-train the workforce to maximize productivity. With wood sector—more work being done to try to work with employees already in place. Efforts to retain businesses already there.

- 3. Do you believe your organization has the resources (contacts/funds/capacities, etc.) to offer any new programs tailored to strengthening employment skills in the target clusters? Why or why not? Please detail where you see these strengths or shortcomings.
  - a. No money, but don't deliver service. Just provide connectivity. DSLCC's approach—will find money somewhere; fill need if it needs filling. Enough outside resources for connectivity—if there is a shortcoming in the system, it's at the instructor level. DLCC—only 8 full time professors, everyone is adjunct. Bring in people from private sector, and then qualify them to be able to teach. Creates pressure on rural community colleges to access resources for training they would like to have for companies that request it. Programs in place are able to secure funds to have training equipment they need to have, but finding instructors.
- 4. Besides your own organization, which in your opinion would be the most able/ best placed to implement programs related to the target clusters? What is your relationship to them?
  - a. VDBA Workforce training section (bring reimbursable training allowance money, provide conduit for state level), community college system. Trade organizations. Virginia Manufacturing Association.
  - b. Thematic trail—wood products theme? North Carolina (Asheville and north)—community college has a wood products incubator. Looking at creating that in the Alleghany Highlands. Most prized hardwoods there. Mead—tour or exhibit there to talk about their history and process. There is a story to be told! Union Church website is also a new part of this process. Connections between TOURISM and wood products. Reinforce significance of wood products to the area—helps economy in many ways—basic industry and tourism-supporting process. 1920s Rayon manufacturer. Cellulose used came from wood. That is why company located there! MeadWestvaco located there for the wood. Just because the wood is so prized that is exported throughout the world, certainly an affluent population locating in rural areas. Want fine things to build their homes, think that cottage industry sector—right now Mead is such a huge part of economy and is taken for granted.
  - c. Conscious effort to have all players on board.

- 5. What are the most common economic development or employment services your organization performs? What is the most desired service by your clients? Has this changed in recent years? How does this relate to the clusters (if at all)?
  - a. Prospective industry wants confidence that the information you provide is correct and you have their best interests in mind. "When a prospect views me as a resource rather than a salesman, I have value to him and established a connection." Can't be self-serving—need to be viewed as a resource up front! Gain trust. DSLCC needs to feel that they aren't wasting their time. Friction that exists between industry (new and existing)—competing for workforce!

#### **KATHeRINE HOLCOMB – VEC COVINGTON**

- 1. To what extent do you perceive the wood industry to be a driving factor in economic/workforce development in the region?
  - a. Obviously Mead—very important because of auxiliary businesses. Would like to see smaller crafting industry. Huge impact on area.
- 2. Do any of your programs offer services directly (or indirectly) related to these industry groups? Please explain.
  - a. Job orders from businesses. Try to recruit from applicant pool the type of workers needed. MeadWestvaco—VEC generally has someone to go out to the pre-employment training at DSLCC to fill out Mead applications fairly extensive. Workers also call the VEC office every year to keep their applications active for another 12 months.
- 3. What proportion of your clients (workers or businesses) are members of these industries?
  - a. Unsure of number
- 4. Do you believe your organization has the resources (contacts/funds/capacities, etc.) to offer any new programs tailored to strengthening employment skills in the target clusters? Why or why not? Please detail where you see these strengths or shortcomings.
  - a. VEC doesn't provide any skills training. Covington Office administers trade act and displaced workers through which people enter retraining. That's how they get into training, which is possible through these programs.

- 5. Besides your own organization, which in your opinion would be the most able/ best placed to implement programs related to the target clusters? What is your relationship to them?
  - a. DSLCC is a good organization to implement these programs. Employers themselves need to sponsor apprenticeships or on the job training to further the cluster.
- 6. What are the most common economic development or employment services your organization performs? What is the most desired service by your clients? Has this changed in recent years? How does this relate to the clusters (if at all)?
  - a. Employer recruitment through job order system—work for both sides to make good matches. Can be narrow or broad. Orientation and drug testing; open to whatever employers need. Hasn't had a request that hasn't been filled. Job order system and recruitment is the most desired service offered by the VEC Covington office. Unemployment claim services not as great because of online resources. Tremendous change—everything is online. Employers can submit own job orders and review resumes of applicants. Online services intimidating—people eligible for benefits may never file because of lack of knowledge or intimidation. Area not acclimated to computers and online services, so some people may be missing out on some services because the human element has been removed from the process. Guessing that providing services online agency is meeting DOL standards goals.

#### SANDY RATLIFF – VIRGINIA DEPARTMENT OF BUSINESS ASSISTANCE

- 1. To what extent do you perceive that the wood industry/metal fabrication industries to be a driving factor in economic/workforce development in the region?
  - a. Dominant industry sectors to the region. Driving force to how a program is put together. \*\*Spent 15 yrs in ED in SWVA in region dominated by coal industry\*\*
- 2. Do any of your programs offer services directly (or indirectly) related to these industry groups? Please explain.
  - a. State agency—provides training assistance for variety of industries—any place that is creating basic employment in for-profit industries. 3 major programs—New Jobs Programs (minimum creation of 25 jobs, capital investment of \$1 million, \$10 per hour as a pay rate): provide training for consulting, electronic media, funding assistance to help during training

period. Small business jobs program—employer with less than 250 employees, 5 new jobs in 12 months, \$100,000 investment, \$10 per hour pay rate. Provide assistance in consulting, organizational development, etc. Retraining—for large businesses to upgrade skills to meet demands of production. 3 program areas—business information, financial services, Virginia Jobs Investment Program.

- 3. What proportion of your clients (workers or businesses) are members of these industries?
  - a. Not a recruitment agency—support. Role is as matchmaker. Match with available resources.
- 4. Do you believe your organization has the resources (contacts/funds/capacities, etc.) to offer any new programs tailored to strengthening employment skills in the target clusters? Why or why not? Please detail where you see these strengths or shortcomings.
  - a. Yes. Has one of the oldest running incentive programs in the country. WE ARE STATE FUNDED—based on what legislative delegation approves each year. Been pretty good catering a program to a specific industry or industry sector if it's needed. Also work with other partners that provide training in the area.
    - i. WIB, DSLCC Look at community and entrepreneurship development along with industry development
- 5. Besides your own organization, which in your opinion would be the most able/ best placed to implement programs related to the target clusters? What is your relationship to them?
  - a. Community college best able. Reevaluate resources at times.
- 6. What are the most common economic development or employment services your organization performs? What is the most desired service by your clients? Has this changed in recent years? How does this relate to the clusters (if at all)?
  - Consultation on providing money and basics of recruitment and retention, supervisory training for management, how to develop a job description and want ads. Try to identify needs, then bring all partners together. Partnerships produce results.

#### **ACTION AGENDA**

After completing the quantitative and qualitative analysis for the Alleghany Highlands Cluster/Target Analysis, it was clear that a concise summary of recommendations and an action agenda needed to be developed to facilitate implementation of the findings of this effort. It was also clear that this information should be organized sequentially if possible. In other words, this agenda should differentiate between tasks that can be pursued in the short-term and tasks that may require significant resources and/or additional planning and should perhaps be considered longer term recommendations.

It is important to note that several of the recommendations share common themes including those related to entrepreneurial and small business development as well as tourism. These are some of the important connections between many of the ongoing projects that should be stressed to achieve key economic development synergies. The Small Business Resource Center, the Virginia's Western Highlands regional tourism initiative, and other related small business and entrepreneurial assistance projects all contribute towards a new strategy for regional economic development, one that builds off of existing community assets and empowers local residents to determine their own destiny. By focusing on value-added activities and niche activities, the region can build off of its traditional manufacturing past but also diversify into tourism and small business development. The following recommendations seek to achieve this new vision for regional economic development.

#### **Short-Term Recommendations**

Perhaps the most important of short-term recommendations is that regarding communication. The findings of this study effort should be shared with a large number of organizations and regional stakeholders including not only the Alleghany Highlands Economic Development Corporation and the Alleghany Foundation but also the Alleghany Highlands Chamber of Commerce, the Western Virginia Workforce Development Board, the Roanoke Valley Economic Development Partnership, and perhaps most importantly the Roanoke Valley- Alleghany Regional Comprehensive Economic Development Strategy Committee.

A number of the items in this Action Agenda are suitable for programming in the Roanoke Valley – Alleghany Regional Comprehensive Economic Development Strategy which is being developed currently and will supersede the Alleghany Highlands Comprehensive Economic Development Strategy. The United States Economic Development Administration, which funds the Roanoke Valley – Alleghany Regional Comprehensive Economic Development Strategy, can serve as a vital partner in implementing many of the action items recommended in this section.

The report should also be made available to a number of federal and state grant funding agencies in addition to the US Economic Development Administration which funded the strategy. The Virginia Department of Housing and Community Development, the Appalachian Regional Commission, and the USDA Rural Development should receive a copy of the report's recommendations.

The following is a list of recommendations that are derived from the findings in the report. These recommendations are also considered short-term recommendations to be pursued in the near term.

Recommendations to Pursue within 1-2 Years

- Encourage regional investment in the Virginia's Western Highlands regional tourism initiative. The initial planning work behind the Virginia's Western Highlands brand and marketing plan are now concluding and a working group is now looking at local funding options to implement the regional tourism initiative. This regional tourism initiative should serve as a springboard for promotion of regional cottage industries in woods products, textiles, and other craft industries in addition to the outdoor recreational opportunities which will serve as the backbone of the brand.
- Develop artisan listings and networks through the Virginia's Western Highlands initiative and promote through a variety of media but with a priority on internet promotion.
- The Alleghany Highlands Economic Development Corporation should use specific data points in this report to build specific marketing materials relevant to the target clusters including cluster specific web pages. These specific and practical marketing materials will assist in marketing to key target industries.
- Convene a local working group through the auspices of the Alleghany Highlands Economic Development Corporation to help market and promote existing training programs in advanced manufacturing, entrepreneurial and business skills, and other relevant topics available in the region to area residents. This group should include representation from Dabney S. Lancaster Community College (DSLCC), the Jackson River Technical Center, and the region's school districts and should also assist these training institutions in securing state and local funds for additional training programs in advanced manufacturing and other relevant

training opportunities. This group should consider application of the Wood LINKS program.

- Make application to the US Economic Development Administration Public Works and Economic Development program for the construction of infrastructure necessary to provide natural gas to the Alleghany Regional Commerce Center. The availability of natural gas is often crucial to the development of plastics industries as a chief industry target in the chemicals and chemical-based cluster.
- Continue planning activities and support related to the Regional Business Resource Center concept currently being studied. Entrepreneurial growth in value-added niches can unlock tremendous growth potential in the three primary industry clusters.
- Market the available labor force possessing qualifications relevant to employment in the professional and production sectors of the plastics industries in the chemical and chemical-based products cluster through regional economic development web sites and other regional marketing tools for economic development.

#### Long-Term Recommendations

Recommendations that should be pursued in 3-5 years.

The following are longer term recommendations that should be pursued. Some of these activities require additional planning (both financial and physical). Relevant planning activities could be pursued in the shorter term.

- Consider establishment of a local campaign similar to 'Return to Roots' whereby qualified individuals seeking to return or to move to the Alleghany Highlands are identified as are relevant local employment opportunities. Highly qualified individuals who wish to return to the region or otherwise wish to move to the region are matched with relevant employment opportunities. Such a program will help reverse population decline, help to maintain the viability of local industry, and may also help to recruit firms to the region.
- Develop appropriate quality of life infrastructure possibly in conjunction with the Virginia's Western Highlands regional tourism initiative. Such infrastructure is both appealing to tourists and to potential residents. Such infrastructure is a necessity to attract recent graduates and professionals interested in technical and management positions available in the region.