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TECHNOLOGY NEEDS ASSESSMENT

PREPARING FOR TECH VALLEY OCCUPATIONS IN THE SCHOOL DISTRICTS OF THE WASHINGTON-SARATOGA-WARREN-HAMILTON-ESSEX BOCES

Prepared for:
Washington-Saratoga-Warren-Hamilton-Essex BOCES

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SUMMARY

The Center for Governmental Research, Inc. (CGR) was engaged by the Washington-Saratoga-Warren-Hamilton-Essex (WSWHE) BOCES on behalf of the Tech Valley Standing Committee of the 31 component districts to help to identify how to assist students prepare for the high tech jobs of the future likely to be coming into the region as a result of the Tech Valley initiatives. Tech Valley, which includes nineteen counties stretching from Clinton in the north to Orange in the south, roughly following the Hudson River valley, is expected to attract high tech industries over the coming years. A primary focus has been to attract nanotechnology firms, however, a number of other high tech industries are expected to move into or expand within the area.

CGR identified seven industry groups that either already have a presence in Tech Valley, or are likely candidates to come into the region based upon current projections. Using U.S. Department of Labor (USDOL) job classifications for companies in these industries, and USDOL projections for the skills and related courses required to work in those jobs, CGR developed a comprehensive list of desired academic courses that are likely to provide the skills needed to work in high technology occupations. CGR then compared the lists of courses currently provided by the districts and BOCES to the comprehensive list of desired academic courses for high tech occupations. This comparison identified a total of 427 high school courses that could be classified as "high tech" courses being offered by districts in the

region, over and above courses required to meet basic New York State standards.

Not all high tech occupations are expected to grow at the same rate, however. Thus, CGR compared the current high tech course offerings by the districts and BOCES with job growth projections for the region. This comparison indicates that the districts and BOCES are doing a good job at meeting the expected needs for many of the growing high tech occupations. However, computer programming and chemistry appear to be two areas where job growth is expected to be above average, but where the districts and BOCES do not offer very many advanced courses. Therefore, districts may want to consider increasing course offerings in these areas, and starting a few course offerings in other high tech occupations such as optics.

The public school system plays an important role in the series of life events, including higher education and on-the-job training, that ultimately link students with jobs. This report provides a framework for the districts and BOCES to identify how best to align curriculum with the needs of industries that are likely to grow in the region as a result of the Tech Valley initiatives. The report focuses primarily on *high tech occupations* that are likely to come into the region. However, the report also provides a methodology for identifying *all* occupations that are likely to come into the region as a result of tech industry growth. Thus, the report can be used to help inform the discussion about how public schools can best direct resources to provide all students with the skills needed to become productive participants in the workplace of tomorrow.

ACKNOWLEDGEMENTS

CGR would like to thank the members of the Tech Valley Standing Committee for their guidance and encouragement during the development of this report. In particular, Thomas Abraham, Superintendent of the Hartford Central School District and chair of the committee, and Dr. John Stoothoff, Dr. Terry Schwartz, Douglas Leavens and Susan Suffolk from the WSWHE BOCES met with CGR several times over the course of the project and offered valuable insights and direction. This report was written by Charles Zettek Jr., Director of Government Management Services for CGR, with primary technical research assistance from Andries Hof, Research Associate.

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SECTION 1 - BACKGROUND

The purpose of this project was to prepare an assessment of the educational programs in the WSWHE BOCES and 31 school districts as they relate to the needs of the region's high-tech industries and outline recommendations for areas of improvement.

CGR's research and interviews identified that many different dimensions need to be considered in this assessment. The key ideas about these dimensions are described below.

Both industry leaders and educators distinguish between *knowledge* sets (specific knowledge, skills and experience needed to perform certain work tasks) and *general skill* sets (a general background of skills that determines whether or not one can be a good employee). A knowledge set would be knowledge of electrical engineering after having completed one or more courses in that subject. General skill sets (sometimes called foundation skills) include basic thinking, interpersonal behavior, work ethic skills and use of technology tools, all of which are part of the general culture of each school system. For purposes of discussion, CGR believes it is useful to consider knowledge sets as "hard" skills, and general skill sets as "soft" skills. Elementary school curricula seem to focus on the soft skill sets. Hard skill sets do not begin to be targeted until around junior high school. Most curricula ramp up opportunities for specific hard skills as students progress through high school.

While this study was initiated by a desire to focus on "high tech" industries, there is no clear distinction among the types of general skill sets required of potential workers in high tech industries and many other industries that will increasingly rely on the high technology workplace. Banking and farming can require high-tech skills, but they are not classified as "high tech" industries. In short, there seems to be a consensus that high-tech industries would like new employees who can: a) use current technology; b) communicate ideas and information effectively, both orally and in

writing; c) work in groups to solve problems; d) solve problems when answers aren't always evident; e) understand how systems work; f) collect, analyze and organize data. However, these skills are likely desired by most employers, regardless of the industry.

A review of the curriculum of "high-tech" high schools across the country – schools specifically designed to prepare students for careers in high tech industries and in a high-tech world - indicates a wide range of approaches and courses. Again – there is no general consensus about one "best" way to prepare students for the workplace of tomorrow – there are many different variations on a theme.

Most of the discussion about "high-tech" industry in the Hudson River "Tech Valley" seems to focus on nanotechnology. This is certainly the focus of the Luther Forest Technology Campus. However, CGR has identified eleven "high-tech" industries in total that have been mentioned in conjunction with Tech Valley.

The distinction between high tech industries, high tech skills and high tech occupations is blurred based on CGR's interviews with the cross-section of educators and business people for this study, and based upon the three short surveys we conducted with committee members. This is consistent with the literature in the field, which is also not very rigorous in terms of definitions, requirements or outcomes.

SECTION 2 - CGR'S APPROACH

In order to develop a practical model for the districts and BOCES to use going forward, CGR created a model approach for identifying the "needs" of high tech industries in the Tech Valley region. Our intent was to develop a methodology that was as rigorous as possible and that could be replicated using existing data and resources that are continuously updated by recognized authorities, rather than having the BOCES go through a periodic sampling process within the region.

While the definition of high-tech is not precise, CGR decided to use a classification developed by the U.S. Bureau of Labor Statistics in 2004, based on the 2002 North American Industry Classification System (NAICS). Every industry across the country is classified by one or more NAICS codes. Therefore, as industries move into and out of the region, they can be uniformly identified. Employment and earnings data is reported annually by the U.S. Dept of Labor (USDOL) for Statistical Metropolitan Areas (SMA's), and this information is available for the Glens Falls SMA as well as the Albany SMA. The NAICS data by SMA is readily available electronically. Further, the New York State Dept. of Labor (NYDOL) uses NAICS codes to report employment and earnings data, and to make regional employment projections by job category. This data can be obtained upon request.

For each *industry* (NAICS code), the USDOL has identified common *occupations* that are generally found in those industries. Each occupation has a Standard Occupation Code (SOC). Thus, for each NAICS code, there are related SOC codes. Many of the same occupations are found in many different types of industries.

The USDOL has classified certain occupations as being "technology-oriented." CGR will distinguish between "***high-tech jobs***" (i.e. technology oriented occupations) versus ***jobs in high-tech industries*** (i.e. all occupations in high tech industries.) This is an important distinction for the districts and BOCES.

For each occupation, the USDOL has developed a written description that includes the nature of the work, working conditions, training and other qualifications, employment, job outlook, earnings and related occupations. While the amount of information in these descriptions varies by occupation, these descriptions do provide the most consistent way to compare specific job skill requirements across occupations.

Thus, it is possible, using NAICS and SOC codes and the written occupation descriptions, to build a framework for identifying

specific course work/knowledge skills desired to meet the needs of high tech industries.

SECTION 3 - PROJECTIONS FOR TECH VALLEY

High tech industries coming into Tech Valley

The USDOL has classified ten industry groups that include what they categorize as leading edge technologies. Based on our interviews, review of newspaper articles and NYSDOL information, CGR believes that the Tech Valley includes, or is likely to include, seven of these ten industry groups:

- Biotechnology
- Life science technologies
- Optoelectronics
- Information and communications
- Electronics
- Flexible manufacturing
- Advanced materials

Within these seven groups, there are 11 NAICS industries. Although there are eleven NAICS industries associated with the seven industry groups targeted for Tech Valley, not all NAICS industries are currently found in Tech Valley. In fact, in the WSWHE area, from 2000 to 2004, only five of the eleven NAICS industries were found in the five county WSWHE area. Also, there was a net decline of approximately 200 jobs in these high tech industries. However, in the *Albany* MSA, there was an increase of almost 3,000 jobs in these high tech industries. Assuming this expansion moves up the valley, these are the industries where job growth can reasonably be predicted to occur over the next five-ten years.

High tech employment changes in the WSWHE BOCES area and the Albany MSA between 2000 and 2004 are shown on TABLE 1. As shown in the lower half of the table, even over the four year period, the number of jobs and number of industries underwent dynamic changes. Average employment in tech jobs increased in the Albany MSA by 29%. Thus, overall, the WSWHE BOCES area can plan for increasing demand for jobs in these industries in the future.

TABLE 1
Total Jobs - Employment Changes by High Tech Industries In Tech Valley, 2000 - 2004
WSWHE BOCES Area Compared to Albany SMA

		Essex, Herkimer, Saratoga, Warren, and Washington	Albany-Schenectady-Troy, NY MSA	Essex, Herkimer, Saratoga, Warren, and Washington	Albany-Schenectady-Troy, NY MSA
NAICS Code	**Industry**	**Average Employment 2000**	**Average Employment 2000**	**Average Employment 2004**	**Average Employment 2004**
3254	Pharmaceutical and Medicine Manufacturing	-	272	-	-
3332	Industrial Machinery Manufacturing	341	-	207	-
3335	Metalworking Machinery Manufacturing	69	253	44	217
3341	Computer and Peripheral Equipment Manufacturing	-	-	-	71
3342	Communications Equipment Manufacturing	-	-	-	-
3344	Semiconductor and Other Electronic Component Manufacturing	-	-	-	-
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing	197	791	172	-
3346	Manufacturing and Reproducing Magnetic and Optical Media	-	-	-	-
5112	Software Publishers	29	-	74	492
5415	Computer Systems Design and Related Services	491	-	407	2,750
5417	Scientific Research and Development Services	-	8,508	-	9,154
	Total Jobs in High Tech Industries in Tech Valley	**1,127**	**9,824**	**904**	**12,684**
				CHANGE in EMPLOYMENT	
NAICS					
3254	Pharmaceutical and Medicine Manufacturing				DROPPED
3332	Industrial Machinery Manufacturing			-39.3%	
3335	Metalworking Machinery Manufacturing			-36.2%	-14.2%
3341	Computer and Peripheral Equipment Manufacturing				NEW
3342	Communications Equipment Manufacturing				
3344	Semiconductor and Other Electronic Component Manufacturing				
3345	Navigational, Measuring, Electromedical, and Control Instruments Manufacturing			-12.7%	DROPPED
3346	Manufacturing and Reproducing Magnetic and Optical Media				
5112	Software Publishers			155.2%	NEW
5415	Computer Systems Design and Related Services			-17.1%	NEW
5417	Scientific Research and Development Services				7.6%
	Total Jobs in High Tech Industries in Tech Valley			**-19.8%**	**29.1%**

Source: NY State Dept of Labor Statistics

Jobs (Occupations) in high tech industries in Tech Valley

Regional data about the types of occupations required for the Tech Valley high-tech industries is not directly available. However, reasonable inferences can be drawn from national data and New York State Department of Labor (NYDOL) projections for the region for 2012.

TABLE 2 shows the top 20 ***high tech jobs (occupations)*** within the eleven industries targeted for Tech Valley, using national statistics. The top 20 occupations listed represent 89% of the total of high tech jobs in the eleven industries. TABLE 2 indicates, for example, across the nation, that computer software applications engineers represent 14.5% of the high tech jobs in those eleven industries.

TABLE 2
High Tech Jobs (Occupations) in High Tech Industries Targeted for Tech Valley

		U.S. 2004 Employment	% of All High Tech Jobs of US Total		US Job Outlook	Regional Job Outlook
	Total Employment in U.S.	**134,259,460**				
	Total of All High Tech Jobs in U.S. in the Eleven High-Tech NAICS Industries in Tech Valley	**1,565,290**		Cum. %		
SOC Code	**Technical Occupations - Description**					
15-1031	Computer software engineers, applications	226,960	14.5%	14.5%	++	++
15-1032	Computer software engineers, systems software	169,970	10.9%	25.4%	++	++
15-1021	Computer programmers	144,030	9.2%	34.6%	-	++
15-1041	Computer support specialists	123,190	7.9%	42.4%	+	++
15-1051	Computer systems analysts	117,760	7.5%	50.0%	++	++
11-3021	Computer and information systems managers	61,000	3.9%	53.9%	+	++
17-3023	Electrical and electronic engineering technicians	54,560	3.5%	57.3%	0	0
15-1071	Network and computer systems administrators	54,010	3.5%	60.8%	++	++
17-2061	Computer hardware engineers	51,110	3.3%	64.1%	0	+
17-2071	Electrical engineers	47,330	3.0%	67.1%	0	--
11-9041	Engineering managers	46,410	3.0%	70.0%	0	*
17-2072	Electronics engineers, except computer	45,520	2.9%	72.9%	0	+
17-2112	Industrial engineers	44,880	2.9%	75.8%	0	0
17-2141	Mechanical engineers	41,700	2.7%	78.5%	0	--
15-1081	Network systems and data communications analysts	40,430	2.6%	81.1%	++	++
19-1042	Medical scientists, except epidemiologists	32,210	2.1%	83.1%	++	*
19-2031	Chemists	26,620	1.7%	84.8%	-	+
19-4021	Biological technicians	24,830	1.6%	86.4%	0	+
15-1061	Database administrators	22,720	1.5%	87.9%	++	+
17-3026	Industrial engineering technicians	20,760	1.3%	89.2%	0	--
	Top 20 from Total of All High Tech Jobs in U.S.	***1,396,000***				

Sources: U.S. Dept. of Labor, New York State Dept. of Labor

Job Outlook Symbol Key

++ Much faster than average

+ Faster than average

0 Average

- Slower than Average

-- Much slower than average

** Included in other NY DOL categories*

TABLE 2 also indicates the current job national and regional growth outlook as projected by the USDOL and NYDOL for the next ten years. These are based on projected rates of change in growth, and are good indicators of estimates for future demand for those jobs.

TABLE 2A shows the NYDOL projections for the region for employment in 2012 for all high tech occupations, not just the top 20 high tech occupations. Taken together, TABLE 2 and TABLE 2A can be used by the districts and BOCES to prioritize what hard skills to include in their programs, based upon the likely job outlooks for various occupations.

Table 2A: Hi-Tech Jobs: Capital and North Country Region

		Employment in the 11 hi-tech industries				Employment in all industries			Share of employment in hi-tech industries, 2002
SOC Code	Description	2002	2012 projection	Change 2002-2012	Outlook	2002	2012 projection	Change 2002-2012	
	Total of these SOC codes	*6,449*	*7,479*	*1,030*		*24,760*	*28,260*	*3,500*	*26%*
15-1031	Computer Software Engineers, Applications	1,652	2,028	377	++	3,200	3,930	730	52%
15-1021	Computer Programmers	1,000	1,054	55	++	2,750	2,900	150	36%
15-1041	Computer Support Specialists	499	581	83	++	1,990	2,320	330	25%
15-1051	Computer Systems Analysts	481	571	90	++	2,030	2,410	380	24%
11-3021	Computer and Information Systems Managers	349	429	81	++	1,510	1,860	350	23%
15-1032	Computer Software Engineers, Systems Software	254	355	101	++	480	670	190	53%
15-1081	Network Systems and Data Communications	226	297	71	++	990	1,300	310	23%
19-2031	Chemists	214	224	10	+	630	660	30	34%
15-1071	Network and Computer Systems Administrators	205	259	53	++	1,000	1,260	260	21%
17-2141	Mechanical Engineers	166	160	-6	--	870	840	-30	19%
15-1061	Database Administrators	163	210	48	+	720	930	210	23%
19-4021	Biological Technicians	150	167	16	+	370	410	40	41%
17-3023	Electrical and Electronic Engineering Technicians	148	151	3	0	470	480	10	31%
17-2071	Electrical Engineers	138	135	-3	--	430	420	-10	32%
17-2112	Industrial Engineers	124	126	2	0	510	520	10	24%
17-2061	Computer Hardware Engineers	90	109	19	+	140	170	30	64%
17-2072	Electronics Engineers, Except Computer	89	96	7	+	260	280	20	34%
19-4031	Chemical Technicians	87	89	2	0	420	430	10	21%
11-9121	Natural Sciences Managers	63	66	3	0	200	210	10	31%
17-2041	Chemical Engineers	55	55	0	-	310	310	0	18%
17-3026	Industrial Engineering Technicians	50	44	-6	--	180	160	-20	28%
17-2081	Environmental Engineers	42	52	10	+	670	830	160	6%
17-3012	Electrical and Electronics Drafters	39	43	4	+	200	220	20	20%
17-3013	Mechanical Drafters	31	34	3	0	250	270	20	13%
17-3027	Mechanical Engineering Technicians	28	28	0	-	110	110	0	26%
15-2041	Statisticians	23	23	0	-	120	120	0	19%
19-2041	Environmental Scientists and Specialists, Including	23	26	4	+	560	650	90	4%
17-2051	Civil Engineers	17	18	1	0	1,840	1,920	80	1%
17-2111	Health and Safety Engineers, Except Mining Safety	14	14	1	0	190	200	10	7%
17-3025	Environmental Engineering Technicians	13	15	2	0	120	140	20	10%
19-1023	Zoologists and Wildlife Biologists	8	8	0	-	50	50	0	17%
17-2131	Materials Engineers	5	5	0	-	20	20	0	24%
17-3031	Surveying and Mapping Technicians	2	2	0	-	350	390	40	1%
19-4091	Environmental Science and Protection Technicians,	1	1	0	-	50	50	0	2%
17-3022	Civil Engineering Technicians	0	0	0	-	220	240	20	0%
19-1031	Conservation Scientists	0	0	0	-	70	80	10	0%
17-3011	Architectural and Civil Drafters	0	0	0	-	480	500	20	0%

Source: NYDOL

TABLE 3 shows the top 20 ***jobs (occupations) in high tech industries*** targeted for Tech Valley, using national statistics. The top 20 jobs listed represent 46% of all jobs in the eleven industries. Some of the occupations duplicate those in TABLE 2. However, the important difference is that TABLE 3 shows that there are many occupations that will come into Tech Valley that are associated with high tech industries, but that are not actually high tech occupations. For example, electrical and electronic equipment assemblers (SOC code 51-2022) are not classified as being in a high tech occupation, however, there are over 109,000 electrical and electronic equipment assembler jobs across the county.

TABLE 3
All Jobs in the U.S. in High Tech Industries Targeted for Tech Valley

		Total Jobs in High Tech Industries	% of All Jobs in High Tech Industries		Total Jobs in All Industries	% of Total Jobs in High Tech Industries	U.S. Job Outlook
	Total Jobs in the U.S. in All Industries				**134,259,460**		
	Total Jobs in the Eleven High-Tech NAICS Industries in Tech Valley	**3,739,310**		Cum. %			
SOC Code	**Occupations - Description**						
51-2022	Electrical and electronic equipment assemblers	109,940	2.9%	23.9%	207,050	53%	-
11-1021	General and operations managers	77,010	2.1%	25.9%	1,704,110	5%	0
51-2092	Team assemblers	75,660	2.0%	27.9%	1,237,700	6%	-
43-6011	Executive secretaries and administrative assistants	70,390	1.9%	29.8%	1,420,170	5%	-
41-4011	Sales representatives, wholesale and manufacturing, technical and scientific products	64,640	1.7%	31.5%	382,520	17%	0
43-4051	Customer service representatives	58,950	1.6%	34.8%	2,036,090	3%	+
43-9061	Office clerks, general	58,620	1.6%	36.3%	2,943,750	2%	-
51-9061	Inspectors, testers, sorters, samplers, and weighers	51,090	1.4%	42.0%	505,100	10%	-
51-1011	First-line supervisors/managers of production and operating workers	50,970	1.4%	43.3%	685,510	7%	-
13-1199	Business operations specialists, all other	48,070	1.3%	44.6%	880,960	5%	++
51-4041	Machinists	48,050	1.3%	45.9%	364,130	13%	-
	TOTAL - Top 20	1,715,980			15,293,290	11%	

Source: U.S. Dept. of Labor

Job Outlook Symbol Key

++ Much faster than average
+ Faster than average
0 Average
- Slower than Average
-- Much slower than average

Highlighted jobs are defined as high tech occupations

TABLE 3 also shows that the jobs in each occupation are not all going to be found in high tech industries. For example, 117,760 computer analysts jobs are found across the country in the eleven high tech industries. However, a total of 497,100 computer analysts jobs are found in all industries. Thus, the number of computer analysts jobs in high tech industries only represents 21% of all computer analysts jobs in all industries.

If BOCES and the districts want to prepare their students for the *entire* range of jobs likely to be found in Tech Valley as a result of the specific initiatives to bring in high tech industries, TABLE 3 offers the key data to indicate what occupations and related skills are required. TABLE 3 only shows national projections, however, the same growth trends can be inferred for Tech Valley to give a quick-and-dirty assessment, or a more detailed assessment could be made similar to that made for high tech jobs in this report.

SECTION 4 - TECH RELATED COURSES – CURRENT OFFERINGS

This project was intended to identify how well districts and the BOCES are providing courses and training to prepare students for future Tech Valley occupations. Thus, CGR focused on identifying development of hard skills for high tech occupations. This approach necessarily limited the study to high tech occupations (as identified in TABLE 2), rather than occupations in high tech industries (as identified in TABLE 3). The districts and BOCES may wish to expand the scope of their inquiry to cover all occupations in high tech industries as a follow-up to this study.

In order to provide a consistent methodological approach for identifying and cataloging current courses and training offered by the districts and BOCES, CGR developed TABLE 4 (because it is so large, TABLE 4 and other large tables – 4A, 5, 5A, 6 and 8 – are presented in the Appendix). TABLE 4 lists all high tech

occupations, as defined by the USDOL, and highlights those occupations that are associated with the 11 high tech industries targeted for Tech Valley. CGR also reviewed the USDOL Occupational Outlook Handbook, which contains descriptions and other information about each occupation. Where specific courses and/or skills were identified in the information provided for each occupation, CGR recorded the course and/or skill, along with the minimum degree identified in the description. This basic information was compiled into TABLE 4.

TABLE 4 was then re-sorted to create TABLE 4A (in the Appendix), which lists all the courses alphabetically that were identified for high tech occupations. TABLE 4A provides the comprehensive listing of specific courses that were identified by CGR for all the high tech occupations targeted for Tech Valley.

In order to identify what courses are currently being offered by the districts and BOCES that specifically relate to the courses identified in TABLE 4A, CGR reviewed the course listing or course handbook for the most current year, including any course descriptions provided, for the 30 districts that have high schools and BOCES. CGR, with the approval of the project oversight committee, elected to only count in the inventory those courses which CGR identified as being over and above standard New York State curriculum requirements for courses that provide core high tech training. For example, CGR did not include in the inventory standard math series courses or basic level courses that are part of a standard curriculum. However, CGR did include all courses in business, science, math and technology that we judged to be outside a standard curriculum or were clearly advanced level courses, such as calculus, pre-calculus and advanced math courses, where the descriptions correlated with the courses listed in TABLE 4A.

Although CGR's selection process necessarily required some judgment calls about whether or not to include a course in the inventory, we attempted to be as consistent as possible in evaluating the information provided by the districts and

categorizing that information with the basic course information summarized in TABLE 4A. CGR also made a judgment call to include Forensic Science or Forensic courses in our list of tech courses, even though it was not possible to find a direct correlation with the USDOL listings (probably because forensic science can cut across many disciplines).

CGR identified 427 courses that provide training for high tech occupations in the 30 districts and the BOCES who offer courses for Grades 9 through 12. NOTE – "courses" refers to specific course offerings, not the *number* of *classes* offered within the districts. This list is snapshot of a point-in-time for the courses offered, therefore, it may not include courses that some districts offer periodically but that were not listed in the information provided to CGR for this time period. In addition, this list does not quantify the number of students enrolled in district-only courses or BOCES courses offered in or through the districts.

CGR's database includes the following fields:

- District Name
- Grade Level of the Course
- Discipline (as defined by each district course listing)
- Course Title
- Course I.D. (a CGR identifier tied to USDOL course types)
- Potential Advanced Credit comments (including the accrediting institution(s))
- Other Comments

TABLE 5 (in the Appendix) lists the 427 courses sorted by district, showing grade level, discipline and course title. The complete database will be provided along with this report so that it can be sorted as desired by the districts and BOCES. CGR created a course I.D. number to help group courses into course

types, which could then be cross referenced with USDOL course types. This cross-referencing was necessary because of variations in naming courses between the districts and the USDOL. We found this grouping more helpful than sorting by course title, as districts sometimes used different titles for similar courses. TABLE 5A (in the Appendix) shows the courses sorted by CGR I.D. grouping. We have also included TABLE 6 (in the Appendix), which gives the CGR I.D. number and shows the cross reference between district courses and USDOL courses.

SECTION 5 - OBSERVATIONS ABOUT THE CURRENT COURSE LISTINGS

The high tech courses database will provide the districts and BOCES with a solid starting point from which to determine what changes in curriculum and/or course offerings will best meet the needs of students as Tech Valley evolves. Our initial observations about the data may prove useful to the districts and BOCES.

- Every district offered at least four high tech courses, with two districts offering as many as 25 courses. TABLE 7 below lists the districts, including the number of school buildings and the number of students, sorted by the number of high tech courses offered.

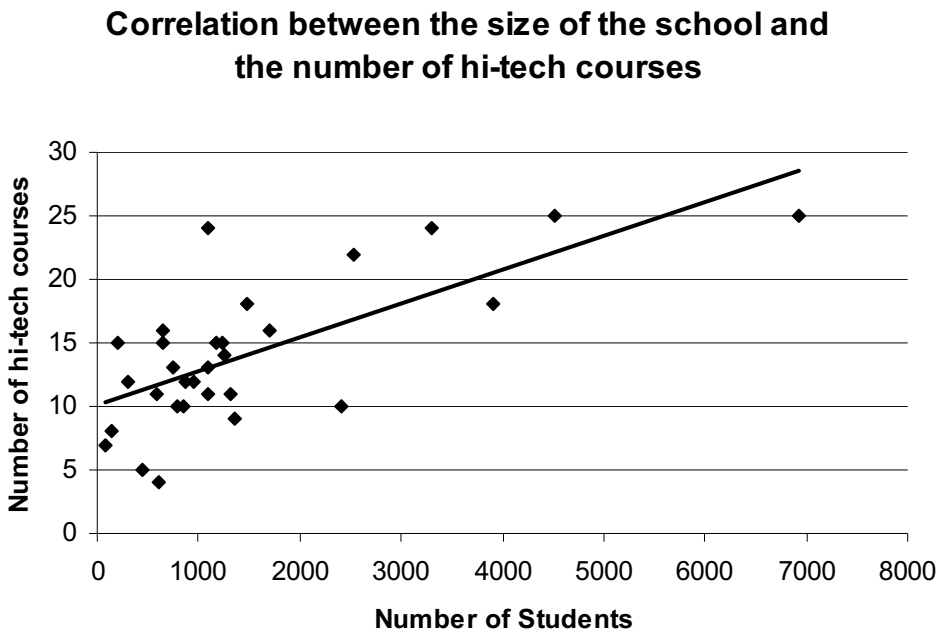
TABLE 7			
Number of High Tech Courses Offered in High School Per District			
School District	**Schools**	**Students**	**Hi-tech courses**
Hartford	1	603	4
Johnsburg	1	441	5
Newcomb	1	76	7
Minerva	1	143	8
Mechanicville	3	1,347	9
Hudson Falls	5	2,418	10
Salem	2	782	10
Whitehall	2	856	10
Stillwater	1	1,315	11
Fort Edward	1	590	11
Cambridge	2	1,096	11
Bolton	1	295	12
Warrensburg	2	961	12
Waterford-Halfmoon	1	877	12
Hadley-Luzerne	3	1,085	13
Argyle	2	740	13
Corinth	3	1,254	14
Galway	3	1,178	15
Indian Lake	1	206	15
Greenwich	2	1,241	15
North Warren	1	640	15
Fort Ann	3	646	16
Schuylerville	2	1,693	16
Granville	3	1,475	18
Queensbury	4	3,906	18
Glens Falls	6	2,522	22
South Glens Falls	7	3,292	24
Lake George	2	1,096	24
Saratoga Springs	9	6,922	25
Ballston Spa	5	4,521	25
WSWHE BOCES			7
Total	**80**	**44,217**	**427**

Note - Glens Falls Common not included because it is only grades K-6

Source: Schools and Students - NCES 2003-04 data

- The number of high tech courses offered is not solely dependent on size. Many smaller districts offer more tech courses than larger districts. GRAPH 1 plots the data given in TABLE 7 to illustrate that some smaller districts offer a proportionately higher number of courses than larger districts.

GRAPH 1



SECTION 6 - RELATING CURRENT COURSES TO TECH VALLEY OCCUPATION DEMAND

CGR was asked to identify the relationship of high tech courses offered and the demand for the skills taught in those courses. As discussed in previous sections of this report, the linkages between courses, job skills and the needs of high tech occupations are somewhat tenuous. However, following the logic that CGR has used to identify likely high tech occupations coming into Tech Valley, it is possible to make reasonable assumptions about how the current high tech offerings relate to the demand in high tech occupations. We note, however, that it is also important to keep in perspective that the districts and BOCES play only a part, albeit an important one, in a series of life events, including higher education and on-the job training, which ultimately link a student to a job.

CGR's approach to understanding whether or not there are gaps between current course offerings and high tech job skills was to relate district and BOCES course offerings to training and other qualifications for high tech occupations identified in TABLE 4 and TABLE 4A. To demonstrate the linkage, CGR created TABLE 8 (in the Appendix), which essentially merges the course information grouped as shown in TABLE 5A with courses required for high tech occupations shown in TABLE 4A.

TABLE 8 indicates the number of courses and the number of districts offering those courses, by groups. For example, 10 districts offer 10 courses in the subjects of Algebra/ Geometry/Probability/Statistics (Group 2). These courses were identified by the USDOL as being desired for the high tech occupations shown – for example, aerospace engineers, computer hardware engineers, electrical engineers, etc. The highlighted occupations are those that have been identified as likely to be in or coming to Tech Valley.

CGR then summarized TABLE 8 into TABLE 9, and added the last column showing the relative expected job growth through 2012 (as projected by NYDOL) by the related industries in Tech Valley. Thus, TABLE 9 shows that for Group 1 courses (Accounting) there are 10 courses offered by 10 districts, but these courses are not included in the types of courses needed by the top 20 high tech occupations predicted to come into Tech Valley. As stated in the footnote, this does not mean that there will be no demand for jobs requiring accounting skills. But it does mean that accounting skills were not identified as being desired for the top 20 high tech jobs coming into Tech Valley.

TABLE 9			
Course Offerings & Regional Job Growth Expectation for High Tech Jobs*			
Courses	**# courses**	**# districts**	**Expected Job Growth**
Group ID 1. WSWHE Districts Offerings: Accounting	10	10	(Note 1)
Group ID 2. WSWHE Districts Offerings: Algebra/Geometry/Statistics	10	10	+
Group ID 3. WSWHE Districts Offerings: Animal Breeding/Entomology/Taxonomy/Plant Physiology	8	6	(Note 1)
Group ID 4. WSWHE Districts Offerings: Architecture	10	10	(Note 1)
Group ID 5. WSWHE Districts Offerings: Atmospheric Science	3	3	(Note 1)
Group ID 6. WSWHE Districts Offerings: Biochemistry	1	1	(Note 1)
Group ID 7. WSWHE Districts Offerings: Biology	17	14	+
Group ID 8. WSWHE Districts Offerings: Business	65	26	(Note 1)
Group ID 9. WSWHE Districts Offerings: Programming	5	4	++
Group ID 10. WSWHE Districts Offerings: Calculus	68	30	+
Group ID 11. WSWHE Districts Offerings: Chemistry	6	5	+
Group ID 12. WSWHE Districts Offerings: Computer Graphics	60	27	(Note 1)
Group ID 13. WSWHE Districts Offerings: Computer Science	36	23	++
Group ID 14. WSWHE Districts Offerings: Digital Electronics	8	7	0
Group ID 15. WSWHE Districts Offerings: Environmental Science	4	4	(Note 1)
Group ID 16. WSWHE Districts Offerings: Economics	4	4	(Note 1)
Group ID 17. WSWHE Districts Offerings: Engineering	57	25	++
Group ID 18. WSWHE Districts Offerings: Finance/Financial Math	16	14	(Note 1)
Group ID 19. WSWHE Districts Offerings: Food Scientists	2	2	(Note 1)
Group ID 20. WSWHE Districts Offerings: Geology	4	4	(Note 1)
Group ID 21. WSWHE Districts Offerings: Surveying	0	0	(Note 1)
Group ID 22. WSWHE Districts Offerings: Meteorology	2	2	(Note 1)
Group ID 23. WSWHE Districts Offerings: Optics	0	0	(Note 1)
Group ID 24. WSWHE Districts Offerings: Physics	10	7	+
Group ID 25. WSWHE Districts Offerings: Political Science	0	0	(Note 1)
Group ID 26. WSWHE Districts Offerings: Psychology	0	0	(Note 1)
Group ID 27. WSWHE Districts Offerings: Remote Sensing	0	0	(Note 1)
Group ID 28. WSWHE Districts Offerings: Sociology	0	0	(Note 1)
Group ID 29. WSWHE Districts Offerings: Forensic Science	13	12	(Note 1)
Group ID 30. WSWHE Districts Offerings: Science Research	8	6	(Note 1)

** See Table 2 for Job Growth Symbols*

(Note 1): Does not occur in courses useful for the top 20 High Tech occupations, although there may be high demand for other occupations

While it is not possible to draw too many conclusions from TABLE 9 relative to demand for many of the courses offered by the districts, because so many of the Groups do not relate to courses in the Top 20 tech occupations, TABLE 9 does provide the basis for a high level overview of the relationship between job skill demands and the courses that are being offered. The following areas stand out:

- Computer Science skills (Group 13) and Engineering skills (Group 17) are likely to be in high demand, and the districts and BOCES are doing a very good job anticipating that demand,

- Group 9 – Programming, has high expected job growth, but a low level of course offerings,

- Group 11 – Chemistry, has relatively high expected job growth, but a low level of course offerings.

For a number of Groups, most notably Business and Computer Graphics courses, there is no indicated demand for these skills in the Top 20 high tech occupations likely to come into Tech Valley. However, this does not mean there is not demand from other occupations for the skills taught in these courses, it simply means that there is not a strong link specifically between these courses and high tech occupations.

SECTION 7 - CONCLUSION

The methodology employed by CGR to develop a systematic methodology for relating the courses offered by the districts and BOCES to potential demand for occupational skills has identified some key findings that could be used to drive public education strategies in the region.

First, as shown in TABLE 2 and TABLE 3, there is a substantial demand for high tech occupations across the county. Thus, although there may not necessarily be sufficient high tech jobs in Tech Valley to absorb all students who take courses that provide the foundations for high-tech career paths, national statistics show that there is a substantial demand for these jobs. Thus, districts who prepare their students for the high tech future are doing their students a service, even if some of those students ultimately follow jobs away from Tech Valley.

Second, the districts and BOCES may want to consider developing programs that provide training for the entire range of jobs likely to

be found in high tech industries, as shown in TABLE 3, and not just for high tech occupations as shown in TABLE 2. Expanding the job growth analysis in this way would help meet the entire range of skills needed by tech industries coming into Tech Valley, and not just high tech skills.

Third, this analysis represents a point-in-time view of what is likely to happen. However, it is clear that the future of Tech Valley is going to be dynamic and constantly changing. For example, between the time CGR started this project and wrote this report, the AMD plant in the Luther Forest Technology Campus was announced. The findings of this report could and should be augmented by having discussions with AMD management about what specific jobs are planned for that plant, and what related skills are required. In short, the districts and BOCES should plan to periodically update projected job skill requirements through a combination of interviews with companies actually coming into the region, and update future projections with new USDOL and NYDOL projections as they are released.

To conclude, this report provides a template for the districts and BOCES to use for developing a way to link course offerings with demand for future occupational skills needed by employees to thrive in the new industries coming into Tech Valley. We hope that this will help inform the discussion about how the public education system in the region can best meet the needs of its citizens both now and in the future.

APPENDIX – TABLES 4, 4A, 5, 5A, 6, 8

TABLE 4

Training and Other Qualifications for High Tech Occupations. Highlighted are those Occupations in High Tech Industries Targeted for Tech Valley

Occupation	Courses	Skills	Min. degree
Actuaries	Economics	Spreadsheets	Bachelor
	Finance	Databases	
	Accounting	Statistical software	
	Calculus	Programming	
	Probability		
	Statistics		
Animal scientists	Economics	Communication	Bachelor
	Animal Breeding	Computer skills	Master
	Muscle Biology	Basic statistics	
Food scientists and technologists	Economics	Communication	Bachelor
	Business	Computer skills	Master
	Food chemistry	Basic statistics	
	Food microbiology		
	Food engineering		
Soil and plant scientists	Economics	Communication	Bachelor
	Soil chemistry	Computer skills	Master
	Entomology	Basic statistics	
	Plant physiology		
	Biochemistry		
Atmospheric and space scientists	Statistics	Communication	Bachelor
	Chemistry		
	Meteorology		
	Computer science		
	Remote Sensing		
Zoologists and wildlife biologists	Chemistry	Communication	Master
	Biology		
	Computer science		
	Physics		
	Engineering		

TABLE 4 (continued)

Conservation Scientists	Resource management	Communication	Bachelor
	Statistics		
	Ecology		
	Economics		
	Hydrology		
	Computer science		
Foresters	Biology	Public policy	Bachelor
	Taxonomy	GPS Technology	
	Ecology	GIS	
	Remote Sensing		
	Land surveying		
	Statistics		
Architectural drafters	Engineering	Mechanical drawing	Associate
	Architecture	CADD	
	Computer graphics	Communication	
Electrical and electronic drafters	Engineering	Mechanical drawing	Associate
	Architecture	CADD	
	Computer graphics	Communication	
Engineering manager	Engineering	Administrative	Bachelor
		Communication	
Aerospace engineering and operations technicians		Communication	Associate
		CADD	
Civil engineering technicians	Engineering	Communication	Associate
		CADD	

TABLE 4 (continued)

Electro-mechanical technicians	Engineering	Communication	Associate
		CADD	
Environmental engineering technicians	Environmental regulations	Communication	Associate
	Engineering	CADD	
Aerospace engineers	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		
Biomedical engineers	Engineering	MRI	Bachelor
	Algebra	Communication	
	Calculus	Analytical	
	Geometry		
	Biology		
	Chemistry		
	Physics		
Chemical engineers	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		
Civil engineers	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		
Environmental engineers	Engineering	Waste management	Bachelor
	Algebra	Analytical	
	Calculus	Pollution control	
	Geometry	Communication	
	Biology		
	Chemistry		
	Physics		
Health and safety engineers, except mining safety engineers and inspectors	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		
Materials engineers	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		

TABLE 4 (continued)

Mining and geological engineers, including mining safety engineers	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		
Nuclear engineers	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		
Petroleum engineers	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		
[redacted]			
[redacted]			
[redacted]			
[redacted]			
[redacted]			

TABLE 4 (continued)

Environmental scientists and specialists, including health	Geophysics	Conservation	Master
	Chemistry	Recycling	Bachelor
	Atmospheric science	Data analysis	
	Geology	GIS	
	Biology	GPS	
Hydrologists	Geophysics	Remote Sensing	Master
	Chemistry	Computer skills	Bachelor
	Atmospheric science	GIS	
	Geology	GPS	
	Hydrology		
Geoscientists, except hydrologists and geographers	Mineralogy	Remote Sensing	Master
	Petrology	Computer skills	Bachelor
	Paleontology	GIS	
	Geology	GPS	
	Stratigraphy		
Mathematicians	Calculus	Programming	PhD
	Differential equations	Communication	Master
	Algebra		
Epidemiologists	Chemistry		Master
	Computer science		
Operations research analysts	Computer science	Communication	Master
		Programming	
		Databases	
Physicists	Optics	Analytical	PhD
	Thermodynamics	Communication	
	Quantum mechanics		
Astronomers	Optics	Analytical	PhD
	Thermodynamics	Communication	
	Quantum mechanics		
Mathematical technicians	Chemistry	Computer modeling	Master
	Physics	Communication	
Agricultural and food science technicians	Chemistry	Computer modeling	Associate
	Physics	Communication	
Environmental science and protection technicians, including health	Chemistry	Computer modeling	Associate
	Physics	Communication	
Forensic science technicians	Chemistry	Computer modeling	Associate
	Physics	Communication	
Forest and conservation technicians	Chemistry	Computer modeling	Associate
	Physics	Communication	

TABLE 4 (continued)

Geological and petroleum technicians	Chemistry	Computer modeling	Associate
	Physics	Communication	
Nuclear technicians	Chemistry	Computer modeling	Associate
	Physics	Communication	
Statisticians	Statistics	Communication	Master
	Calculus	Computer skills	Bachelor
	Differential equations		
	Probability theory		
Surveying and mapping technicians	Algebra	Mechanical drawing	Bachelor
	Geometry	GIS	
	Computer science		
Marine engineers and naval architects	Engineering	Communication	Bachelor
	Algebra	Analytical	
	Calculus		
	Geometry		
	Biology		
	Chemistry		
	Physics		

Source: U.S. Dept. of Labor Occupation Outlook Handbook

TABLE 4 A	
Courses for High Tech Occupations. Highlighted are those Occupations in High Tech Industries Targeted for Tech Valley	
Courses	**Occupation**
Accounting	Actuaries
Algebra	Aerospace engineers
Algebra	Biomedical engineers
Algebra	Chemical engineers
Algebra	Civil engineers
Algebra	Environmental engineers
Algebra	Health and safety engineers, except mining safety engineers and inspectors
Algebra	Marine engineers and naval architects
Algebra	Materials engineers
Algebra	Mathematicians
Algebra	Mining and geological engineers, including mining safety engineers
Algebra	Nuclear engineers
Algebra	Petroleum engineers
Algebra	Surveying and mapping technicians
Animal Breeding	Animal scientists
Architecture	Architectural drafters
Architecture	Electrical and electronic drafters
Atmospheric science	Environmental scientists and specialists, including health
Atmospheric science	Hydrologists
Biochemistry	Soil and plant scientists
Biology	Aerospace engineers
Biology	Biomedical engineers
Biology	Chemical engineers
Biology	Civil engineers
Biology	Environmental engineers
Biology	Environmental scientists and specialists, including health
Biology	Foresters
Biology	Health and safety engineers, except mining safety engineers and inspectors
Biology	Marine engineers and naval architects
Biology	Materials engineers
Biology	Mining and geological engineers, including mining safety engineers
Biology	Nuclear engineers
Biology	Petroleum engineers
Biology	Zoologists and wildlife biologists
Business	Food scientists and technologists
Calculus	Actuaries

TABLE 4A (continued)

Calculus	Aerospace engineers
Calculus	Biomedical engineers
Calculus	Chemical engineers
Calculus	Civil engineers
Calculus	Environmental engineers
Calculus	Health and safety engineers, except mining safety engineers and inspectors
Calculus	Marine engineers and naval architects
Calculus	Materials engineers
Calculus	Mathematicians
Calculus	Mining and geological engineers, including mining safety engineers
Calculus	Nuclear engineers
Calculus	Petroleum engineers
Calculus	Statisticians
Chemistry	Aerospace engineers
Chemistry	Agricultural and food science technicians
Chemistry	Atmospheric and space scientists
Chemistry	Biomedical engineers
Chemistry	Chemical engineers
Chemistry	Civil engineers
Chemistry	Environmental engineers
Chemistry	Environmental science and protection technicians, including health
Chemistry	Environmental scientists and specialists, including health
Chemistry	Forensic science technicians
Chemistry	Forest and conservation technicians
Chemistry	Geological and petroleum technicians
Chemistry	Health and safety engineers, except mining safety engineers and inspectors
Chemistry	Hydrologists
Chemistry	Marine engineers and naval architects
Chemistry	Materials engineers
Chemistry	Mathematical technicians
Chemistry	Mining and geological engineers, including mining safety engineers
Chemistry	Nuclear engineers
Chemistry	Nuclear technicians
Chemistry	Petroleum engineers
Chemistry	Zoologists and wildlife biologists
Chemistry	Epidemiologists
Computer graphics	Architectural drafters
Computer graphics	Electrical and electronic drafters
Computer science	Atmospheric and space scientists

TABLE 4A (continued)

Computer science	Conservation Scientists
Computer science	Epidemiologists
Computer science	Operations research analysts
Computer science	Surveying and mapping technicians
Computer science	Zoologists and wildlife biologists
Differential equations	Mathematicians
Differential equations	Statisticians
Ecology	Conservation Scientists
Ecology	Foresters
Economics	Actuaries
Economics	Animal scientists
Economics	Conservation Scientists
Economics	Food scientists and technologists
Economics	Soil and plant scientists
Engineering	Aerospace engineers
Engineering	Architectural drafters
Engineering	Biomedical engineers
Engineering	Chemical engineers
Engineering	Civil engineering technicians
Engineering	Civil engineers
Engineering	Electrical and electronic drafters
Engineering	Electro-mechanical technicians
Engineering	Engineering manager
Engineering	Environmental engineering technicians
Engineering	Environmental engineers
Engineering	Health and safety engineers, except mining safety engineers and inspectors
Engineering	Marine engineers and naval architects
Engineering	Materials engineers
Engineering	Mining and geological engineers, including mining safety engineers
Engineering	Nuclear engineers
Engineering	Petroleum engineers
Engineering	Zoologists and wildlife biologists
Entomology	Soil and plant scientists
Environmental regulations	Environmental engineering technicians
Finance	Actuaries

TABLE 4A (continued)

Food chemistry	Food scientists and technologists
Food engineering	Food scientists and technologists
Food microbiology	Food scientists and technologists
Geology	Environmental scientists and specialists, including health
Geology	Geoscientists, except hydrologists and geographers
Geology	Hydrologists
Geometry	Aerospace engineers
Geometry	Biomedical engineers
Geometry	Chemical engineers
Geometry	Civil engineers
Geometry	Environmental engineers
Geometry	Health and safety engineers, except mining safety engineers and inspectors
Geometry	Marine engineers and naval architects
Geometry	Materials engineers
Geometry	Mining and geological engineers, including mining safety engineers
Geometry	Nuclear engineers
Geometry	Petroleum engineers
Geometry	Surveying and mapping technicians
Geophysics	Environmental scientists and specialists, including health
Geophysics	Hydrologists
Hydrology	Conservation Scientists
Hydrology	Hydrologists
Land surveying	Foresters
Meteorology	Atmospheric and space scientists
Mineralogy	Geoscientists, except hydrologists and geographers
Muscle Biology	Animal scientists
Optics	Astronomers
Optics	Physicists
Paleontology	Geoscientists, except hydrologists and geographers
Petrology	Geoscientists, except hydrologists and geographers
Physics	Aerospace engineers
Physics	Agricultural and food science technicians
Physics	Biomedical engineers
Physics	Chemical engineers
Physics	Civil engineers
Physics	Environmental engineers
Physics	Environmental science and protection technicians, including health
Physics	Forensic science technicians
Physics	Forest and conservation technicians
Physics	Geological and petroleum technicians
Physics	Health and safety engineers, except mining safety engineers and inspectors
Physics	Marine engineers and naval architects
Physics	Materials engineers
Physics	Mathematical technicians

TABLE 4A (continued)

Physics	Mining and geological engineers, including mining safety engineers
Physics	Nuclear engineers
Physics	Nuclear technicians
Physics	Petroleum engineers
Physics	Zoologists and wildlife biologists
Plant physiology	Soil and plant scientists
Probability	Actuaries
Probability theory	Statisticians
Quantum mechanics	Astronomers
Quantum mechanics	Physicists
Remote Sensing	Atmospheric and space scientists
Remote Sensing	Foresters
Resource management	Conservation Scientists
Soil chemistry	Soil and plant scientists
Statistics	Actuaries
Statistics	Atmospheric and space scientists
Statistics	Conservation Scientists
Statistics	Foresters
Statistics	Statisticians
Stratigraphy	Geoscientists, except hydrologists and geographers
Taxonomy	Foresters
Thermodynamics	Astronomers
Thermodynamics	Physicists
	Source: U.S. Dept. of Labor Occupation Outlook Handbook

TABLE 5		
2005-06 or 2006-07 High School Course Offerings		
District	**Discipline**	**Course Title**
Argyle	Business	Business Law
Argyle	Business	Computer Applications
Argyle	Mathematics	Calculus
Argyle	Mathematics	Pre-Calculus
Argyle	Science	Animal Science
Argyle	Science	Forensic Science
Argyle	Science	Physics 111
Argyle	Science	Physics 112
Argyle	Technology	Design and Drafting for Production I&II
Argyle	Technology	Energy Systems
Argyle	Technology	Engineering Concepts
Argyle	Technology	Materials Processing
Argyle	Technology	Production Systems
Ballston Spa	Business	Accounting 2
Ballston Spa	Business	Business Law
Ballston Spa	Business	Business Management
Ballston Spa	Business	Communications in Business
Ballston Spa	Business	Computer Applications, principles of
Ballston Spa	Business	E-Commerce
Ballston Spa	Business	Math for Business
Ballston Spa	Business	Math for Business Finance
Ballston Spa	Mathematics	Calculus AP
Ballston Spa	Mathematics	Pre-Calculus 11
Ballston Spa	Mathematics	Pre-Calculus 12
Ballston Spa	Mathematics	Statistics College
Ballston Spa	Mathematics	Visual Basic
Ballston Spa	Science	Biology AP
Ballston Spa	Science	Chemistry AP
Ballston Spa	Science	Forensic Science
Ballston Spa	Science	Physical Geology
Ballston Spa	Science	Physics AP
Ballston Spa	Science	Science Research
Ballston Spa	Technology	Civil Engineering
Ballston Spa	Technology	Computer Aided Design/CIMS
Ballston Spa	Technology	Digital Electronics
Ballston Spa	Technology	Engineering Design & Development
Ballston Spa	Technology	Engineering, principles of
Ballston Spa	Technology	Metals Advanced
Bolton	Business	Applied Communications and Desktop Publishing
Bolton	Business	E-Commerce
Bolton	Business	Web Design
Bolton	Mathematics	Advanced Algebra and Trigonometry
Bolton	Mathematics	Calculus
Bolton	Mathematics	Pre-Calculus
Bolton	Technology	Computer Aided Design (CAD)
Bolton	Technology	Design and Drawing for Production
Bolton	Technology	Energy Systems
Bolton	Technology	Materials Processing
Bolton	Technology	Production Systems
Bolton	Technology	Transportation Systems
Cambridge	Business	Business Law
Cambridge	Business	Computer Applications
Cambridge	Business	Math and Financial Applications
Cambridge	Mathematics	Calculus AP

TABLE 5 (continued)

Cambridge	Mathematics	Pre-Calculus
Cambridge	Science	Biology AP
Cambridge	Science	Environmental Science AP
Cambridge	Technology	Architectural Design and Drawing
Cambridge	Technology	Computer Aided Design (CAD)
Cambridge	Technology	Design and Drawing for Production (DDP)
Cambridge	Technology	Engineering, principles of
Corinth	Business	Business Computer Applications
Corinth	Business	Business Law
Corinth	Business	Cisco Networking Technology
Corinth	Business	E-Marketing
Corinth	Business	Financial Math Applications
Corinth	Mathematics	Calculus 1
Corinth	Mathematics	Pre-Calculus
Corinth	Mathematics	Probablity and Statistics
Corinth	Science	Criminal Justice Studies
Corinth	Science	Forensic Science
Corinth	Technology	Computer Aided Design I (AutoCAD)
Corinth	Technology	Computer Aided Design II (AutoCAD)
Corinth	Technology	Engineering
Corinth	Technology	Graphic and Visual Communications
Fort Ann	Business	Business Communications (Bus 211)
Fort Ann	Business	Business Law
Fort Ann	Business	Business Math
Fort Ann	Business	Computer Literacy, Advanced
Fort Ann	Business	Word Processing in Windows (Bus 100)
Fort Ann	Mathematics	Calculus I (MAT 131)
Fort Ann	Mathematics	Pre-Calculus (MAT 123)
Fort Ann	Science	Forensic Science
Fort Ann	Science	Zoology
Fort Ann	Technology	Computer Aided Design, CAD I
Fort Ann	Technology	Computer Aided Design, CAD II
Fort Ann	Technology	Computer Graphics I
Fort Ann	Technology	Computer Graphics II
Fort Ann	Technology	Computer Programming, introduction
Fort Ann	Technology	Design & Drawing for Production
Fort Ann	Technology	Robotics
Fort Edward	Business	Business Analysis/Business Computer Application
Fort Edward	Business	Business Law
Fort Edward	Business	Math & Finance
Fort Edward	Mathematics	Calculus
Fort Edward	Mathematics	Pre-Calculus
Fort Edward	Science	Forensics
Fort Edward	Science	Meteorology
Fort Edward	Technology	Architectural Drawing
Fort Edward	Technology	Prog in C++, intermediate
Fort Edward	Technology	Prog in C++, Introduction
Fort Edward	Technology	Technical Drawing
Galway	Business	Business Management
Galway	Business	Computers, introduction
Galway	Business	E-Commerce
Galway	Mathematics	Calculus
Galway	Mathematics	Pre-Calculus
Galway	Mathematics	Statistics College
Galway	Science	Biology AP
Galway	Science	Forensics

TABLE 5 (continued)

Galway	Technology	Biotechnology
Galway	Technology	Design and Drawing for Production
Galway	Technology	Digital Electronics
Galway	Technology	Energy Systems
Galway	Technology	Engineering, principles of
Galway	Technology	Production Systems
Galway	Technology	Transportation Systems
Glens Falls	Business	Business Communications
Glens Falls	Business	Business Law
Glens Falls	Business	Cisco Networking Year 1
Glens Falls	Business	Cisco Networking Year 2
Glens Falls	Business	Computers, Advanced
Glens Falls	Business	Economics Ideas and Issues Honors
Glens Falls	Business	Math, Applied
Glens Falls	Mathematics	Calculus AB (AP)
Glens Falls	Mathematics	Calculus BC (AP)
Glens Falls	Mathematics	Calculus Honors
Glens Falls	Mathematics	Pre-Calculus Honors
Glens Falls	Mathematics	Probability & Statistics
Glens Falls	Science	Astronomy
Glens Falls	Science	Biology AP
Glens Falls	Science	Biology, Field
Glens Falls	Science	Chemistry AP
Glens Falls	Science	Forensic Science
Glens Falls	Science	Physics AP
Glens Falls	Science	Science Research
Glens Falls	Technology	Architectural Drawing
Glens Falls	Technology	Computer Aided Drawing (CAD)
Glens Falls	Technology	Production Systems
Granville	Business	Business and Personal Law
Granville	Business	Business, introduction
Granville	Business	Computer Applications II
Granville	Business	E-Commerce
Granville	Business	Management, principles of
Granville	Business	Website Development
Granville	Mathematics	Calculus AP
Granville	Mathematics	Pre-Calculus
Granville	Mathematics	Statistics College
Granville	Science	Biology AP
Granville	Science	Marine Science
Granville	Science	Science Research
Granville	Technology	Architectural Drawing
Granville	Technology	Computer Aided Design
Granville	Technology	Design and Drawing for Production
Granville	Technology	Digital Electronics
Granville	Technology	Engineering, principles of
Granville	Technology	Technical Drawing
Greenwich	Business	Business Law
Greenwich	Business	Business Ownership
Greenwich	Business	E-Commerce and Beyond
Greenwich	Business	Keyboarding/Business Communications Core
Greenwich	Mathematics	Calculus
Greenwich	Mathematics	Calculus AP
Greenwich	Science	Animal Science
Greenwich	Science	Animal Science, advanced
Greenwich	Science	Biology AP

TABLE 5 (continued)

Greenwich	Science	Environmental Science Advanced
Greenwich	Science	Food Science, Applied
Greenwich	Science	Plant Science
Greenwich	Technology	Agricultural Engineering
Greenwich	Technology	Digital Electronics
Greenwich	Technology	Engineering, principles of
Hadley-Luzerne	Business	Business Analysis/Computer Applications
Hadley-Luzerne	Business	Business Law
Hadley-Luzerne	Business	Business Math
Hadley-Luzerne	Business	Keyboarding, Advanced
Hadley-Luzerne	Business	Keyboarding/Business Communications Core
Hadley-Luzerne	Mathematics	Calculus AB (AP)
Hadley-Luzerne	Mathematics	Pre-calculus
Hadley-Luzerne	Technology	Computer Aided Design (CAD)
Hadley-Luzerne	Technology	Design & Drawing Production A
Hadley-Luzerne	Technology	Design & Drawing Production B
Hadley-Luzerne	Technology	Energy
Hadley-Luzerne	Technology	Materials Processing
Hadley-Luzerne	Technology	Production Systems
Hartford	Business	Computer Applications
Hartford	Business	Web Design
Hartford	Mathematics	Pre-Calculus
Hartford	Science	Plant & Animal Science
Hudson Falls	Mathematics	Calculus ACC
Hudson Falls	Mathematics	Precalculus
Hudson Falls	Mathematics	Precalculus Honors
Hudson Falls	Science	Chemistry ACC
Hudson Falls	Technology	Computer Aided Drafting
Hudson Falls	Technology	Computer Graphics
Hudson Falls	Technology	Design and Drawing
Hudson Falls	Technology	Engineering, pre
Hudson Falls	Technology	Graphic and Visual Communication
Hudson Falls	Technology	Microsoft Office 2000
Indian Lake	Business	Accounting, Advanced
Indian Lake	Business	Business Analysis
Indian Lake	Business	Business Communication
Indian Lake	Business	Business Computer Applications
Indian Lake	Business	Business Law
Indian Lake	Business	Keyboarding, Advanced
Indian Lake	Mathematics	Calculus I
Indian Lake	Mathematics	Calculus II
Indian Lake	Mathematics	Pre-Calculus
Indian Lake	Science	Food Science, Applied
Indian Lake	Science	Meteorology
Indian Lake	Technology	Design & Drawing for Production
Indian Lake	Technology	Energy
Indian Lake	Technology	Production Systems
Indian Lake	Technology	Transportation Systems
Johnsburg	Business	Business Law
Johnsburg	Mathematics	Calculus AP
Johnsburg	Mathematics	Pre-Calculus
Johnsburg	Technology	Computer Graphics
Johnsburg	Technology	Design & Drawing for Production
Lake George	Business	Accounting, Advanced
Lake George	Business	Business Ownership & Marketing
Lake George	Business	Business, Analyzing

TABLE 5 (continued)

Lake George	Business	Communications
Lake George	Business	Computer Applications for College
Lake George	Business	Computer Apps. for College, Advanced
Lake George	Business	Criminal and Personal Business Law
Lake George	Business	Desktop Publishing
Lake George	Mathematics	Calculus AP
Lake George	Mathematics	Pre-Calculus
Lake George	Mathematics	Pre-Calculus Honors
Lake George	Mathematics	Probability & Statistics
Lake George	Science	Astronomy
Lake George	Science	Biology AP
Lake George	Science	Forensic Science
Lake George	Science	Science Research I
Lake George	Science	Science Research II
Lake George	Science	Science Research III
Lake George	Technology	Architectural Design
Lake George	Technology	Computer Aided Design (CAD)
Lake George	Technology	Design and Drawing for Production (CAD)
Lake George	Technology	Engineering, principles of
Lake George	Technology	Production Systems
Lake George	Technology	Transportation Systems
Mechanicville	Business	Accounting II
Mechanicville	Business	Business Law
Mechanicville	Business	Communications
Mechanicville	Business	Computer Applications, Advanced
Mechanicville	Business	E-Commerce
Mechanicville	Business	Math and Financial Applications
Mechanicville	Mathematics	Calculus
Mechanicville	Mathematics	Pre-Calculus
Mechanicville	Science	Biology AP
Minerva	Business	Accounting 2
Minerva	Business	Cisco Networking 1
Minerva	Business	Cisco Networking 2
Minerva	Business	Computers, Advanced
Minerva	Mathematics	Calculus AP
Minerva	Mathematics	Pre-Calculus
Minerva	Technology	Electronics and Energy
Minerva	Technology	Production Systems Technology 3
Newcomb	Business	Accounting 2
Newcomb	Business	Web Design
Newcomb	Mathematics	Calculus
Newcomb	Technology	Computer Aided Design (CAD)
Newcomb	Technology	Design and Drawing for Production (DDP)
Newcomb	Technology	Engineering, principles of
Newcomb	Technology	Technical Drawing
North Warren	Business	Business Analysis/Business Computer Application
North Warren	Business	Business Law
North Warren	Business	Economics in Business
North Warren	Business	Government and Business
North Warren	Business	Math of Finance
North Warren	Mathematics	Calculus AP
North Warren	Mathematics	Pre-Calculus
North Warren	Science	Environmental Science/Criminology
North Warren	Science	Spheres of the Universe
North Warren	Technology	Aerospace
North Warren	Technology	Architectural Drawing

TABLE 5 (continued)

North Warren	Technology	Computer Aided Design
North Warren	Technology	Design and Drawing for Production
North Warren	Technology	Production
North Warren	Technology	Technical Drawing
Queensbury	Business	Accounting, Advanced
Queensbury	Business	Business Law
Queensbury	Business	Cisco Networking Courses
Queensbury	Business	Computer Applications, Advanced
Queensbury	Mathematics	Calculus
Queensbury	Mathematics	Calculus AP (AB)
Queensbury	Mathematics	Calculus AP (BC)
Queensbury	Mathematics	Pre-Calculus Honors
Queensbury	Science	Biology, Advanced
Queensbury	Science	Chemistry (AP)
Queensbury	Science	Physics (AP)
Queensbury	Technology	Architectural Drawing
Queensbury	Technology	Audio Electronics
Queensbury	Technology	Computer Assembly & Q-Basic Programming
Queensbury	Technology	Graphic Communications
Queensbury	Technology	Mechanical Drawing
Queensbury	Technology	Production Systems
Queensbury	Technology	Technical Drawing
Salem	Business	Business Law
Salem	Business	Computer Applications
Salem	Business	Computer Applications, Advanced
Salem	Business	Math & Financial Applications
Salem	Mathematics	Calculus AP
Salem	Mathematics	Pre-Calculus course
Salem	Science	Animal Science
Salem	Science	Environmental Science Advanced
Salem	Technology	Computer Aided Design & Drafting
Salem	Technology	Drafting
Saratoga Springs	Business	Accounting, College
Saratoga Springs	Business	Business Law, College
Saratoga Springs	Business	Computer Applications and Business Management
Saratoga Springs	Business	Economics Honors
Saratoga Springs	Business	Principles of Business, College
Saratoga Springs	Mathematics	Calculus (Honors)
Saratoga Springs	Mathematics	Calculus AB (AP)
Saratoga Springs	Mathematics	Pre-Calculus (Honors)
Saratoga Springs	Science	Biology AP
Saratoga Springs	Science	Biology Honors
Saratoga Springs	Science	Chemistry AP
Saratoga Springs	Science	Chemistry Honors
Saratoga Springs	Science	Physics "B" (AP)
Saratoga Springs	Science	Physics "C" (AP)
Saratoga Springs	Science	Science Research
Saratoga Springs	Technology	Architectural Drawing
Saratoga Springs	Technology	Civil Engineering/Architecture
Saratoga Springs	Technology	Computer Integrated Manufacturing
Saratoga Springs	Technology	Design and Drawing for Production
Saratoga Springs	Technology	Digital Electronics
Saratoga Springs	Technology	Energy Technology
Saratoga Springs	Technology	Engineering Design & Development
Saratoga Springs	Technology	Engineering, principles of
Saratoga Springs	Technology	Production Systems

TABLE 5 (continued)

Saratoga Springs	Technology	Transportation Systems
Schuylerville	Business	Accounting II
Schuylerville	Business	Business Law
Schuylerville	Business	Computer Essentials, College
Schuylerville	Business	Keyboarding, College
Schuylerville	Business	Word Processing/Desktop Publishing
Schuylerville	Mathematics	Math AP
Schuylerville	Mathematics	Precalculus
Schuylerville	Science	Agricultural Skills, Special
Schuylerville	Science	Biology AP
Schuylerville	Science	Earth Science: the Physical Setting Honors
Schuylerville	Science	Living Environment Honors
Schuylerville	Technology	Computer Integrated Manufacturing
Schuylerville	Technology	Design and Drawing for Production
Schuylerville	Technology	Digital Electronics
Schuylerville	Technology	Engineering, principles of
Schuylerville	Technology	Technical Education 10
South Glens Falls	Business	Accounting, Advanced
South Glens Falls	Business	Business Analysis/Business Computer Application
South Glens Falls	Business	Business Communications Technology
South Glens Falls	Business	Computers for the College-Bound
South Glens Falls	Business	E-Commerce
South Glens Falls	Business	Law (Business Law), introduction
South Glens Falls	Business	Management, principles of
South Glens Falls	Business	Math and Financial Applications
South Glens Falls	Business	Math, Applied Advanced
South Glens Falls	Mathematics	Calculus I
South Glens Falls	Mathematics	Calculus II
South Glens Falls	Mathematics	Pre-Calculus, Accelerated Trigonometry
South Glens Falls	Mathematics	Statistics with Probability, introduction College
South Glens Falls	Science	Biology AP
South Glens Falls	Science	Forensics
South Glens Falls	Science	Physics AP
South Glens Falls	Technology	Architectural Drawing
South Glens Falls	Technology	Computer Aided Design (AutoCAD)
South Glens Falls	Technology	Computer Integrated Manufacturing
South Glens Falls	Technology	Design and Drawing for Production
South Glens Falls	Technology	Digital Electronics I
South Glens Falls	Technology	Digital Electronics II
South Glens Falls	Technology	Engineering Design & Development
South Glens Falls	Technology	Engineering, principles of
Stillwater	Business	Business Computer Applications
Stillwater	Business	Business Law
Stillwater	Business	Mathematics, Applied
Stillwater	Business	E-Commerce
Stillwater	Business	Principles of Macroeconomics, College
Stillwater	Mathematics	Calculus with Precalc I
Stillwater	Mathematics	Calculus with Precalc II
Stillwater	Mathematics	Pre-Calculus
Stillwater	Science	Physics, AP
Stillwater	Technology	Design and Drafting for Production
Stillwater	Technology	Engineering, Principles of
Warrensburg	Business	Business Law
Warrensburg	Business	Computers and Communications
Warrensburg	Mathematics	Calculus
Warrensburg	Mathematics	Math 12 College Level

TABLE 5 (continued)

Warrensburg	Science	Biology AP
Warrensburg	Science	Science, Applied
Warrensburg	Technology	Computer Aided Design I - Mechanical
Warrensburg	Technology	Computer Aided Design II - Architectural
Warrensburg	Technology	Design and Drawing for Production
Warrensburg	Technology	Materials Processing
Warrensburg	Technology	Production Systems
Warrensburg	Technology	Transportation
Waterford-Halfmoon	Business	Business Analysis/Business Computer Application
Waterford-Halfmoon	Business	Business Communications
Waterford-Halfmoon	Business	Business Law
Waterford-Halfmoon	Business	Math and Financial Applications
Waterford-Halfmoon	Mathematics	Calculus
Waterford-Halfmoon	Mathematics	Pre-Calculus
Waterford-Halfmoon	Science	Forensic Science Course
Waterford-Halfmoon	Technology	Architectural Drawing
Waterford-Halfmoon	Technology	Computer Aided Drafting (CAD)
Waterford-Halfmoon	Technology	Design and Drawing for Production
Waterford-Halfmoon	Technology	Electricity/Electronics
Waterford-Halfmoon	Technology	Transportation & Energy Systems
Whitehall	Business	Computer Studies, Basic
Whitehall	Business	Independent Systems Operation
Whitehall	Business	Math of Finance
Whitehall	Mathematics	Calculus
Whitehall	Mathematics	Math III AB ACC Track
Whitehall	Mathematics	Pre-Calculus
Whitehall	Science	Biology AP
Whitehall	Science	Forensic Science
Whitehall	Technology	Design and Drawing for Production
Whitehall	Technology	Graphic and Visual Communications
WSWHE BOCES	CTE	Automotive Technology
WSWHE BOCES	CTE	Conservation/Forestry/Wildlife
WSWHE BOCES	CTE	Engineering (New Visions)
WSWHE BOCES	CTE	Graphic and Visual Communications
WSWHE BOCES	CTE	Information Tech/Cisco Systems
WSWHE BOCES	CTE	Machine Tool Technology
WSWHE BOCES	CTE	Mechanical Technology

TABLE 5 A		
2005-06 or 2006-07 High School Course Offerings		
District	**Discipline**	**Course Title**
Ballston Spa	Business	Accounting 2
Indian Lake	Business	Accounting, Advanced
Lake George	Business	Accounting, Advanced
Mechanicville	Business	Accounting II
Minerva	Business	Accounting 2
Newcomb	Business	Accounting 2
Queensbury	Business	Accounting, Advanced
Saratoga Springs	Business	Accounting, College
Schuylerville	Business	Accounting II
South Glens Falls	Business	Accounting, Advanced
Ballston Spa	Mathematics	Statistics College
Corinth	Mathematics	Probablity and Statistics
Galway	Mathematics	Statistics College
Glens Falls	Mathematics	Probability & Statistics
Granville	Mathematics	Statistics College
Lake George	Mathematics	Probability & Statistics
Schuylerville	Mathematics	Math AP
South Glens Falls	Mathematics	Statistics with Probability, introduction College
Warrensburg	Mathematics	Math 12 College Level
Whitehall	Mathematics	Math III AB ACC Track
Argyle	Science	Animal Science
Fort Ann	Science	Zoology
Greenwich	Science	Animal Science
Greenwich	Science	Animal Science, advanced
Greenwich	Science	Plant Science
Hartford	Science	Plant & Animal Science
Salem	Science	Animal Science
Schuylerville	Science	Agricultural Skills, Special
Cambridge	Technology	Architectural Design and Drawing
Fort Edward	Technology	Architectural Drawing
Glens Falls	Technology	Architectural Drawing
Granville	Technology	Architectural Drawing
Lake George	Technology	Architectural Design
North Warren	Technology	Architectural Drawing
Queensbury	Technology	Architectural Drawing
Saratoga Springs	Technology	Architectural Drawing
South Glens Falls	Technology	Architectural Drawing
Waterford-Halfmoon	Technology	Architectural Drawing
Glens Falls	Science	Astronomy
Lake George	Science	Astronomy
North Warren	Technology	Aerospace
Galway	Technology	Biotechnology
Ballston Spa	Science	Biology AP
Cambridge	Science	Biology AP
Galway	Science	Biology AP
Glens Falls	Science	Biology AP
Glens Falls	Science	Biology, Field
Granville	Science	Biology AP
Greenwich	Science	Biology AP
Lake George	Science	Biology AP
Mechanicville	Science	Biology AP
Queensbury	Science	Biology, Advanced
Saratoga Springs	Science	Biology AP
Saratoga Springs	Science	Biology Honors

TABLE 5 A (continued)

Schuylerville	Science	Biology AP
Schuylerville	Science	Living Environment Honors
South Glens Falls	Science	Biology AP
Warrensburg	Science	Biology AP
Whitehall	Science	Biology AP
Argyle	Business	Business Law
Argyle	Business	Computer Applications
Ballston Spa	Business	Business Law
Ballston Spa	Business	Business Management
Ballston Spa	Business	Communications in Business
Ballston Spa	Business	Computer Applications, principles of
Cambridge	Business	Business Law
Cambridge	Business	Computer Applications
Corinth	Business	Business Computer Applications
Corinth	Business	Business Law
Fort Ann	Business	Business Communications (Bus 211)
Fort Ann	Business	Business Law
Fort Edward	Business	Business Analysis/Business Computer Application
Fort Edward	Business	Business Law
Galway	Business	Business Management
Glens Falls	Business	Business Communications
Glens Falls	Business	Business Law
Granville	Business	Business and Personal Law
Granville	Business	Business, introduction
Granville	Business	Computer Applications II
Granville	Business	Management, principles of
Greenwich	Business	Business Law
Greenwich	Business	Business Ownership
Greenwich	Business	Keyboarding/Business Communications Core
Hadley-Luzerne	Business	Business Analysis/Computer Applications
Hadley-Luzerne	Business	Business Law
Hadley-Luzerne	Business	Keyboarding/Business Communications Core
Hartford	Business	Computer Applications
Indian Lake	Business	Business Analysis
Indian Lake	Business	Business Communication
Indian Lake	Business	Business Computer Applications
Indian Lake	Business	Business Law
Johnsburg	Business	Business Law
Lake George	Business	Business Ownership & Marketing
Lake George	Business	Business, Analyzing
Lake George	Business	Communications
Lake George	Business	Computer Applications for College
Lake George	Business	Computer Apps. for College, Advanced
Lake George	Business	Criminal and Personal Business Law
Mechanicville	Business	Business Law
Mechanicville	Business	Communications
Mechanicville	Business	Computer Applications, Advanced
North Warren	Business	Business Analysis/Business Computer Application
North Warren	Business	Business Law
North Warren	Business	Government and Business
Queensbury	Business	Business Law
Queensbury	Business	Computer Applications, Advanced
Salem	Business	Business Law
Salem	Business	Computer Applications
Salem	Business	Computer Applications, Advanced
Saratoga Springs	Business	Business Law, College

TABLE 5 A (continued)

Saratoga Springs	Business	Computer Applications and Business Management
Saratoga Springs	Business	Principles of Business, College
Schuylerville	Business	Business Law
South Glens Falls	Business	Business Analysis/Business Computer Application
South Glens Falls	Business	Business Communications Technology
South Glens Falls	Business	Law (Business Law), introduction
South Glens Falls	Business	Management, principles of
Stillwater	Business	Business Computer Applications
Stillwater	Business	Business Law
Warrensburg	Business	Business Law
Waterford-Halfmoon	Business	Business Analysis/Business Computer Application
Waterford-Halfmoon	Business	Business Communications
Waterford-Halfmoon	Business	Business Law
Whitehall	Business	Independent Systems Operation
Ballston Spa	Mathematics	Visual Basic
Fort Ann	Technology	Computer Programming, introduction
Fort Edward	Technology	Prog in C++, intermediate
Fort Edward	Technology	Prog in C++, Introduction
Queensbury	Technology	Computer Assembly & Q-Basic Programming
Argyle	Mathematics	Calculus
Argyle	Mathematics	Pre-Calculus
Ballston Spa	Mathematics	Calculus AP
Ballston Spa	Mathematics	Pre-Calculus 11
Ballston Spa	Mathematics	Pre-Calculus 12
Bolton	Mathematics	Advanced Algebra and Trigonometry
Bolton	Mathematics	Calculus
Bolton	Mathematics	Pre-Calculus
Cambridge	Mathematics	Calculus AP
Cambridge	Mathematics	Pre-Calculus
Corinth	Mathematics	Calculus 1
Corinth	Mathematics	Pre-Calculus
Fort Ann	Mathematics	Calculus I (MAT 131)
Fort Ann	Mathematics	Pre-Calculus (MAT 123)
Fort Edward	Mathematics	Calculus
Fort Edward	Mathematics	Pre-Calculus
Galway	Mathematics	Calculus
Galway	Mathematics	Pre-Calculus
Glens Falls	Mathematics	Calculus AB (AP)
Glens Falls	Mathematics	Calculus BC (AP)
Glens Falls	Mathematics	Calculus Honors
Glens Falls	Mathematics	Pre-Calculus Honors
Granville	Mathematics	Calculus AP
Granville	Mathematics	Pre-Calculus
Greenwich	Mathematics	Calculus
Greenwich	Mathematics	Calculus AP
Hadley-Luzerne	Mathematics	Calculus AB (AP)
Hadley-Luzerne	Mathematics	Pre-calculus
Hartford	Mathematics	Pre-Calculus
Hudson Falls	Mathematics	Calculus ACC
Hudson Falls	Mathematics	Precalculus
Hudson Falls	Mathematics	Precalculus Honors
Indian Lake	Mathematics	Calculus I
Indian Lake	Mathematics	Calculus II
Indian Lake	Mathematics	Pre-Calculus
Johnsburg	Mathematics	Calculus AP
Johnsburg	Mathematics	Pre-Calculus

TABLE 5 A (continued)

Lake George	Mathematics	Calculus AP
Lake George	Mathematics	Pre-Calculus
Lake George	Mathematics	Pre-Calculus Honors
Mechanicville	Mathematics	Calculus
Mechanicville	Mathematics	Pre-Calculus
Minerva	Mathematics	Calculus AP
Minerva	Mathematics	Pre-Calculus
Newcomb	Mathematics	Calculus
North Warren	Mathematics	Calculus AP
North Warren	Mathematics	Pre-Calculus
Queensbury	Mathematics	Calculus
Queensbury	Mathematics	Calculus AP (AB)
Queensbury	Mathematics	Calculus AP (BC)
Queensbury	Mathematics	Pre-Calculus Honors
Salem	Mathematics	Calculus AP
Salem	Mathematics	Pre-Calculus course
Saratoga Springs	Mathematics	Calculus (Honors)
Saratoga Springs	Mathematics	Calculus AB (AP)
Saratoga Springs	Mathematics	Pre-Calculus (Honors)
Schuylerville	Mathematics	Precalculus
South Glens Falls	Mathematics	Calculus I
South Glens Falls	Mathematics	Calculus II
South Glens Falls	Mathematics	Pre-Calculus, Accelerated Trigonometry
Stillwater	Mathematics	Calculus with Precalc I
Stillwater	Mathematics	Calculus with Precalc II
Stillwater	Mathematics	Pre-Calculus
Warrensburg	Mathematics	Calculus
Waterford-Halfmoon	Mathematics	Calculus
Waterford-Halfmoon	Mathematics	Pre-Calculus
Whitehall	Mathematics	Calculus
Whitehall	Mathematics	Pre-Calculus
Ballston Spa	Science	Chemistry AP
Glens Falls	Science	Chemistry AP
Hudson Falls	Science	Chemistry ACC
Queensbury	Science	Chemistry (AP)
Saratoga Springs	Science	Chemistry AP
Saratoga Springs	Science	Chemistry Honors
Argyle	Technology	Design and Drafting for Production I&II
Ballston Spa	Technology	Computer Aided Design/CIMS
Bolton	Technology	Computer Aided Design (CAD)
Bolton	Technology	Design and Drawing for Production
Cambridge	Technology	Computer Aided Design (CAD)
Cambridge	Technology	Design and Drawing for Production (DDP)
Corinth	Technology	Computer Aided Design I (AutoCAD)
Corinth	Technology	Computer Aided Design II (AutoCAD)
Corinth	Technology	Graphic and Visual Communications
Fort Ann	Technology	Computer Aided Design, CAD I
Fort Ann	Technology	Computer Aided Design, CAD II
Fort Ann	Technology	Computer Graphics I
Fort Ann	Technology	Computer Graphics II
Fort Ann	Technology	Design & Drawing for Production
Fort Edward	Technology	Technical Drawing
Galway	Technology	Design and Drawing for Production
Glens Falls	Technology	Computer Aided Drawing (CAD)
Granville	Technology	Computer Aided Design
Granville	Technology	Design and Drawing for Production

TABLE 5 A (continued)

Granville	Technology	Technical Drawing
Hadley-Luzerne	Technology	Computer Aided Design (CAD)
Hadley-Luzerne	Technology	Design & Drawing Production A
Hadley-Luzerne	Technology	Design & Drawing Production B
Hudson Falls	Technology	Computer Aided Drafting
Hudson Falls	Technology	Computer Graphics
Hudson Falls	Technology	Design and Drawing
Hudson Falls	Technology	Graphic and Visual Communication
Indian Lake	Technology	Design & Drawing for Production
Johnsburg	Technology	Computer Graphics
Johnsburg	Technology	Design & Drawing for Production
Lake George	Technology	Computer Aided Design (CAD)
Lake George	Technology	Design and Drawing for Production (CAD)
Newcomb	Technology	Computer Aided Design (CAD)
Newcomb	Technology	Design and Drawing for Production (DDP)
Newcomb	Technology	Technical Drawing
North Warren	Technology	Computer Aided Design
North Warren	Technology	Design and Drawing for Production
North Warren	Technology	Technical Drawing
Queensbury	Technology	Graphic Communications
Queensbury	Technology	Mechanical Drawing
Queensbury	Technology	Technical Drawing
Salem	Technology	Computer Aided Design & Drafting
Salem	Technology	Drafting
Saratoga Springs	Technology	Computer Integrated Manufacturing
Saratoga Springs	Technology	Design and Drawing for Production
Schuylerville	Technology	Computer Integrated Manufacturing
Schuylerville	Technology	Design and Drawing for Production
Schuylerville	Technology	Technical Education 10
South Glens Falls	Technology	Computer Aided Design (AutoCAD)
South Glens Falls	Technology	Computer Integrated Manufacturing
South Glens Falls	Technology	Design and Drawing for Production
Stillwater	Technology	Design and Drafting for Production
Warrensburg	Technology	Computer Aided Design I - Mechanical
Warrensburg	Technology	Computer Aided Design II - Architectural
Warrensburg	Technology	Design and Drawing for Production
Waterford-Halfmoon	Technology	Computer Aided Drafting (CAD)
Waterford-Halfmoon	Technology	Design and Drawing for Production
Whitehall	Technology	Design and Drawing for Production
Whitehall	Technology	Graphic and Visual Communications
WSWHE BOCES	CTE	Graphic and Visual Communications
Ballston Spa	Business	E-Commerce
Bolton	Business	Applied Communications and Desktop Publishing
Bolton	Business	E-Commerce
Bolton	Business	Web Design
Corinth	Business	Cisco Networking Technology
Corinth	Business	E-Marketing
Fort Ann	Business	Computer Literacy, Advanced
Fort Ann	Business	Word Processing in Windows (Bus 100)
Galway	Business	Computers, introduction
Galway	Business	E-Commerce
Glens Falls	Business	Cisco Networking Year 1
Glens Falls	Business	Cisco Networking Year 2
Glens Falls	Business	Computers, Advanced
Granville	Business	E-Commerce
Granville	Business	Website Development

TABLE 5 A (continued)

Greenwich	Business	E-Commerce and Beyond
Hadley-Luzerne	Business	Keyboarding, Advanced
Hartford	Business	Web Design
Hudson Falls	Technology	Microsoft Office 2000
Indian Lake	Business	Keyboarding, Advanced
Lake George	Business	Desktop Publishing
Mechanicville	Business	E-Commerce
Minerva	Business	Cisco Networking 1
Minerva	Business	Cisco Networking 2
Minerva	Business	Computers, Advanced
Newcomb	Business	Web Design
Queensbury	Business	Cisco Networking Courses
Schuylerville	Business	Computer Essentials, College
Schuylerville	Business	Keyboarding, College
Schuylerville	Business	Word Processing/Desktop Publishing
South Glens Falls	Business	Computers for the College-Bound
South Glens Falls	Business	E-Commerce
Stillwater	Business	E-Commerce
Warrensburg	Business	Computers and Communications
Whitehall	Business	Computer Studies, Basic
WSWHE BOCES	CTE	Information Tech/Cisco Systems
Ballston Spa	Technology	Digital Electronics
Galway	Technology	Digital Electronics
Granville	Technology	Digital Electronics
Greenwich	Technology	Digital Electronics
Saratoga Springs	Technology	Digital Electronics
Schuylerville	Technology	Digital Electronics
South Glens Falls	Technology	Digital Electronics I
South Glens Falls	Technology	Digital Electronics II
Cambridge	Science	Environmental Science AP
Greenwich	Science	Environmental Science Advanced
Salem	Science	Environmental Science Advanced
WSWHE BOCES	CTE	Conservation/Forestry/Wildlife
Glens Falls	Business	Economics Ideas and Issues Honors
North Warren	Business	Economics in Business
Saratoga Springs	Business	Economics Honors
Stillwater	Business	Principles of Macroeconomics, College
Argyle	Technology	Energy Systems
Argyle	Technology	Engineering Concepts
Argyle	Technology	Materials Processing
Argyle	Technology	Production Systems
Ballston Spa	Technology	Civil Engineering
Ballston Spa	Technology	Engineering Design & Development
Ballston Spa	Technology	Engineering, principles of
Ballston Spa	Technology	Metals Advanced
Bolton	Technology	Energy Systems
Bolton	Technology	Materials Processing
Bolton	Technology	Production Systems
Bolton	Technology	Transportation Systems
Cambridge	Technology	Engineering, principles of
Corinth	Technology	Engineering
Fort Ann	Technology	Robotics
Galway	Technology	Energy Systems
Galway	Technology	Engineering, principles of
Galway	Technology	Production Systems
Galway	Technology	Transportation Systems

TABLE 5 A (continued)

Glens Falls	Technology	Production Systems
Granville	Technology	Engineering, principles of
Greenwich	Technology	Agricultural Engineering
Greenwich	Technology	Engineering, principles of
Hadley-Luzerne	Technology	Energy
Hadley-Luzerne	Technology	Materials Processing
Hadley-Luzerne	Technology	Production Systems
Hudson Falls	Technology	Engineering, pre
Indian Lake	Technology	Energy
Indian Lake	Technology	Production Systems
Indian Lake	Technology	Transportation Systems
Lake George	Technology	Engineering, principles of
Lake George	Technology	Production Systems
Lake George	Technology	Transportation Systems
Minerva	Technology	Electronics and Energy
Minerva	Technology	Production Systems Technology 3
Newcomb	Technology	Engineering, principles of
North Warren	Technology	Production
Queensbury	Technology	Production Systems
Saratoga Springs	Technology	Civil Engineering/Architecture
Saratoga Springs	Technology	Energy Technology
Saratoga Springs	Technology	Engineering Design & Development
Saratoga Springs	Technology	Engineering, principles of
Saratoga Springs	Technology	Production Systems
Saratoga Springs	Technology	Transportation Systems
Schuylerville	Technology	Engineering, principles of
South Glens Falls	Technology	Engineering Design & Development
South Glens Falls	Technology	Engineering, principles of
Stillwater	Technology	Engineering, Principles of
Warrensburg	Technology	Materials Processing
Warrensburg	Technology	Production Systems
Warrensburg	Technology	Transportation
Waterford-Halfmoon	Technology	Electricity/Electronics
Waterford-Halfmoon	Technology	Transportation & Energy Systems
WSWHE BOCES	CTE	Automotive Technology
WSWHE BOCES	CTE	Engineering (New Visions)
WSWHE BOCES	CTE	Machine Tool Technology
WSWHE BOCES	CTE	Mechanical Technology
Ballston Spa	Business	Math for Business
Ballston Spa	Business	Math for Business Finance
Cambridge	Business	Math and Financial Applications
Corinth	Business	Financial Math Applications
Fort Ann	Business	Business Math
Fort Edward	Business	Math & Finance
Glens Falls	Business	Math, Applied
Hadley-Luzerne	Business	Business Math
Mechanicville	Business	Math and Financial Applications
North Warren	Business	Math of Finance
Salem	Business	Math & Financial Applications
South Glens Falls	Business	Math and Financial Applications
South Glens Falls	Business	Math, Applied Advanced
Stillwater	Business	Mathematics, Applied
Waterford-Halfmoon	Business	Math and Financial Applications
Whitehall	Business	Math of Finance
Greenwich	Science	Food Science, Applied
Indian Lake	Science	Food Science, Applied

TABLE 5 A (continued)

Ballston Spa	Science	Physical Geology
Granville	Science	Marine Science
North Warren	Science	Spheres of the Universe
Schuylerville	Science	Earth Science: the Physical Setting Honors
Fort Edward	Science	Meteorology
Indian Lake	Science	Meteorology
Argyle	Science	Physics 111
Argyle	Science	Physics 112
Ballston Spa	Science	Physics AP
Glens Falls	Science	Physics AP
Queensbury	Technology	Audio Electronics
Queensbury	Science	Physics (AP)
Saratoga Springs	Science	Physics "B" (AP)
Saratoga Springs	Science	Physics "C" (AP)
South Glens Falls	Science	Physics AP
Stillwater	Science	Physics, AP
Argyle	Science	Forensic Science
Ballston Spa	Science	Forensic Science
Corinth	Science	Criminal Justice Studies
Corinth	Science	Forensic Science
Fort Ann	Science	Forensic Science
Fort Edward	Science	Forensics
Galway	Science	Forensics
Glens Falls	Science	Forensic Science
Lake George	Science	Forensic Science
North Warren	Science	Environmental Science/Criminology
South Glens Falls	Science	Forensics
Waterford-Halfmoon	Science	Forensic Science Course
Whitehall	Science	Forensic Science
Ballston Spa	Science	Science Research
Glens Falls	Science	Science Research
Granville	Science	Science Research
Lake George	Science	Science Research I
Lake George	Science	Science Research II
Lake George	Science	Science Research III
Saratoga Springs	Science	Science Research
Warrensburg	Science	Science, Applied

TABLE 6
ID Key - CGR Cross Reference for Grouping District Courses into USDOL Course Groupings

ID	Courses - School District Titles	Courses - DOL Titles
1	Accounting	Accounting
2	Algebra, Math, Probability, Statistics	Algebra, Geometry, Probability, Statistics
3	Animal Science, Plant Science, Zoology	Animal Breeding, Entomology, Taxonomy, Plant Physiology, Muscle Biology, Soil Chemistry
4	Architectural Design & Drawing	Architecture
5	Aerospace, Astronomy	Atmospheric Science
6	Biotechnology	Biochemistry
7	Biology, Living Environment	Biology
8	Business: -analysis, -law, -communication, -ownership, -management	Business, Business Administration
9	Computer Programming, C++, Visual Basic	Java, C++
10	Calculus	Calculus, Differential Equations
11	Chemistry	Chemistry
12	Computer Aided Design, Computer Graphics, Design and Drawing for Production, Technical Drawing	Computer Graphics
13	(Business) Computer Applications, CISCO, E-Commerce, Keyboarding, Web Design	Computer Science
14	Digital Electronics	Digital Electronics
15	Environmental Science, Conservation	Ecology
16	Economics	Economics
17	Engineering, Mechanical Technology, Energy, Production Systems, Transportation Systems, Materials & Processing	Engineering, Environmental Regulations
18	Math and Finance	Finance
19	Food Science	Food Chemistry, Food Engineering, Food Microbiology
20	Geology, Earth Science, Marine Science	Geology, Geophysics, Mineralogy, Paleontology, Petrology, Hydrology, Stratigraphy
21		Land Surveying
22	Meteorology	Meteorology
23		Optics
24	Physics, Audio Electronics	Physics, Quantum Mechanics, Thermodynamics
25		Political Science
26		Psychology
27		Remote Sensing
28		Sociology
29	Forensic Science	
30	Science, Science Research	

TABLE 8			
Courses for High Tech Occupations. Highlighted are those Occupations in High Tech Industries Targeted for Tech Valley			
Courses	**Occupation**	**# courses**	**# districts**
Accounting	Actuaries		
Group ID 1			
WSWHE Districts Offerings: Accounting		10	10
Algebra	Aerospace engineers		
Algebra	Biomedical engineers		
Algebra	Chemical engineers		
Algebra	Civil engineers		
Algebra	***Computer hardware engineers***		
Algebra	***Electrical engineers***		
Algebra	***Electronics engineers, except computer***		
Algebra	Environmental engineers		
Algebra	Health and safety engineers, except mining safety engineers and inspectors		
Algebra	***Industrial engineers***		
Algebra	Marine engineers and naval architects		
Algebra	Materials engineers		
Algebra	Mathematicians		
Algebra	***Mechanical engineers***		
Algebra	Mining and geological engineers, including mining safety engineers		
Algebra	Nuclear engineers		
Algebra	Petroleum engineers		
Algebra	Surveying and mapping technicians		
Geometry	Aerospace engineers		
Geometry	Biomedical engineers		
Geometry	Chemical engineers		
Geometry	Civil engineers		
Geometry	***Computer hardware engineers***		
Geometry	***Electrical engineers***		
Geometry	***Electronics engineers, except computer***		
Geometry	Environmental engineers		
Geometry	Health and safety engineers, except mining safety engineers and inspectors		
Geometry	***Industrial engineers***		
Geometry	Marine engineers and naval architects		
Geometry	Materials engineers		
Geometry	***Mechanical engineers***		
Geometry	Mining and geological engineers, including mining safety engineers		
Geometry	Nuclear engineers		
Geometry	Petroleum engineers		
Geometry	Surveying and mapping technicians		
Probability	Actuaries		
Probability theory	Statisticians		
Statistics	Actuaries		
Statistics	Atmospheric and space scientists		
Statistics	Conservation Scientists		
Statistics	Foresters		
Statistics	Statisticians		
Group ID 2			
WSWHE Districts Offerings: Algebra/Geometry/Statistics		10	10
Animal Breeding	Animal scientists		
Entomology	Soil and plant scientists		
Taxonomy	Foresters		
Plant physiology	Soil and plant scientists		
Muscle Biology	Animal scientists		
Soil chemistry	Soil and plant scientists		
Group ID 3			
WSWHE Districts Offerings: Animal Breeding/Entomology/Taxonomy/Plant Physiology		8	6
Architecture	Architectural drafters		
Architecture	Electrical and electronic drafters		
Architecture	***Mechanical drafters***		
Group ID 4			
WSWHE Districts Offerings: Architecture		10	10

TABLE 8 (continued)

Atmospheric science	Environmental scientists and specialists, including health		
Atmospheric science	Hydrologists		
Group ID 5			
WSWHE Districts Offerings: Atmospheric Science		3	3
Biochemistry	Soil and plant scientists		
Group ID 6			
WSWHE Districts Offerings: Biochemistry		1	1
Biology	Aerospace engineers		
Biology	***Biochemists and biophysicists***		
Biology	Biomedical engineers		
Biology	Chemical engineers		
Biology	***Chemists***		
Biology	Civil engineers		
Biology	***Computer hardware engineers***		
Biology	***Electrical engineers***		
Biology	***Electronics engineers, except computer***		
Biology	Environmental engineers		
Biology	Environmental scientists and specialists, including health		
Biology	Foresters		
Biology	Health and safety engineers, except mining safety engineers and inspectors		
Biology	***Industrial engineers***		
Biology	Marine engineers and naval architects		
Biology	Materials engineers		
Biology	***Mechanical engineers***		
Biology	***Medical scientists, except epidemiologists***		
Biology	***Microbiologists***		
Biology	Mining and geological engineers, including mining safety engineers		
Biology	Nuclear engineers		
Biology	Petroleum engineers		
Biology	Zoologists and wildlife biologists		
Group ID 7			
WSWHE Districts Offerings: Biology		17	14
Business	Food scientists and technologists		
Business administration	***Compensation and benefits managers***		
Business administration	***Training and development managers***		
Group ID 8			
WSWHE Districts Offerings: Business		65	26
Java	***Computer programmers***		
C++	***Computer programmers***		
Group ID 9			
WSWHE Districts Offerings: Programming		5	4
Calculus	Actuaries		
Calculus	Aerospace engineers		
Calculus	Biomedical engineers		
Calculus	Chemical engineers		
Calculus	Civil engineers		
Calculus	***Computer hardware engineers***		
Calculus	***Electrical engineers***		
Calculus	***Electronics engineers, except computer***		
Calculus	Environmental engineers		
Calculus	Health and safety engineers, except mining safety engineers and inspectors		
Calculus	***Industrial engineers***		
Calculus	Marine engineers and naval architects		
Calculus	Materials engineers		
Calculus	Mathematicians		
Calculus	***Mechanical engineers***		
Calculus	Mining and geological engineers, including mining safety engineers		
Calculus	Nuclear engineers		
Calculus	Petroleum engineers		
Calculus	Statisticians		
Differential equations	Mathematicians		
Differential equations	Statisticians		
Group ID 10			
WSWHE Districts Offerings: Calculus		68	30

TABLE 8 (continued)

Chemistry	Aerospace engineers		
Chemistry	Agricultural and food science technicians		
Chemistry	Atmospheric and space scientists		
Chemistry	***Biochemists and biophysicists***		
Chemistry	***Biological technicians***		
Chemistry	Biomedical engineers		
Chemistry	Chemical engineers		
Chemistry	***Chemical technicians***		
Chemistry	***Chemists***		
Chemistry	Civil engineers		
Chemistry	***Computer hardware engineers***		
Chemistry	***Electrical engineers***		
Chemistry	***Electronics engineers, except computer***		
Chemistry	Environmental engineers		
Chemistry	Environmental science and protection technicians, including health		
Chemistry	Environmental scientists and specialists, including health		
Chemistry	Forensic science technicians		
Chemistry	Forest and conservation technicians		
Chemistry	Geological and petroleum technicians		
Chemistry	Health and safety engineers, except mining safety engineers and inspectors		
Chemistry	Hydrologists		
Chemistry	***Industrial engineers***		
Chemistry	Marine engineers and naval architects		
Chemistry	Materials engineers		
Chemistry	Mathematical technicians		
Chemistry	***Mechanical engineers***		
Chemistry	***Microbiologists***		
Chemistry	Mining and geological engineers, including mining safety engineers		
Chemistry	Nuclear engineers		
Chemistry	Nuclear technicians		
Chemistry	Petroleum engineers		
Chemistry	Zoologists and wildlife biologists		
Chemistry	Epidemiologists		
Chemistry	***Medical scientists, except epidemiologists***		
Group ID 11			
WSWHE Districts Offerings: Chemistry		6	5
Computer graphics	Architectural drafters		
Computer graphics	Electrical and electronic drafters		
Computer graphics	***Mechanical drafters***		
Group ID 12			
WSWHE Districts Offerings: Computer Graphics		60	27
Computer science	***Computer systems analysts***		
Computer science	Atmospheric and space scientists		
Computer science	***Biochemists and biophysicists***		
Computer science	***Chemists***		
Computer science	***Computer and information scientists, research***		
Computer science	***Computer software engineers, applications***		
Computer science	***Computer software engineers, systems software***		
Computer science	Conservation Scientists		
Computer science	***Database administrators***		
Computer science	Epidemiologists		
Computer science	***Microbiologists***		
Computer science	***Network systems and data communications analysts***		
Computer science	Operations research analysts		
Computer science	Surveying and mapping technicians		
Computer science	Zoologists and wildlife biologists		
Group ID 13			
WSWHE Districts Offerings: Computer Science		36	23

TABLE 8 (continued)

Digital electronics	***Electrical and electronic engineering technicians***		
Group ID 14			
WSWHE Districts Offerings: Digital Electronics		8	7
Ecology	Conservation Scientists		
Ecology	Foresters		
Resource management	Conservation Scientists		
Group ID 15			
WSWHE Districts Offerings: Environmental Science		4	4
Economics	Actuaries		
Economics	Animal scientists		
Economics	***Compensation and benefits managers***		
Economics	Conservation Scientists		
Economics	Food scientists and technologists		
Economics	Soil and plant scientists		
Economics	***Training and development managers***		
Group ID 16			
WSWHE Districts Offerings: Economics		4	4
Engineering	Aerospace engineers		
Engineering	Architectural drafters		
Engineering	***Biochemists and biophysicists***		
Engineering	Biomedical engineers		
Engineering	Chemical engineers		
Engineering	Civil engineering technicians		
Engineering	Civil engineers		
Engineering	***Computer hardware engineers***		
Engineering	***Database administrators***		
Engineering	Electrical and electronic drafters		
Engineering	***Electrical engineers***		
Engineering	Electro-mechanical technicians		
Engineering	***Electronics engineers, except computer***		
Engineering	Engineering manager		
Engineering	Environmental engineering technicians		
Engineering	Environmental engineers		
Engineering	Health and safety engineers, except mining safety engineers and inspectors		
Engineering	***Industrial engineers***		
Engineering	Marine engineers and naval architects		
Engineering	Materials engineers		
Engineering	***Mechanical drafters***		
Engineering	***Mechanical engineers***		
Engineering	***Medical scientists, except epidemiologists***		
Engineering	***Microbiologists***		
Engineering	Mining and geological engineers, including mining safety engineers		
Engineering	***Natural sciences managers***		
Engineering	***Network and computer systems administrators***		
Engineering	***Network and computer systems administrators***		
Engineering	Nuclear engineers		
Engineering	Petroleum engineers		
Engineering	Zoologists and wildlife biologists		
Environmental regulations	Environmental engineering technicians		
Group ID 17			
WSWHE Districts Offerings: Engineering		57	25
Finance	Actuaries		
Group ID 18			
WSWHE Districts Offerings: Finance/Financial Math		16	14
Food chemistry	Food scientists and technologists		
Food engineering	Food scientists and technologists		
Food microbiology	Food scientists and technologists		
Group ID 19			
WSWHE Districts Offerings: Food scientists		2	2

TABLE 8 (continued)

Geology	Environmental scientists and specialists, including health		
Geology	Geoscientists, except hydrologists and geographers		
Geology	Hydrologists		
Geophysics	Environmental scientists and specialists, including health		
Geophysics	Hydrologists		
Mineralogy	Geoscientists, except hydrologists and geographers		
Paleontology	Geoscientists, except hydrologists and geographers		
Petrology	Geoscientists, except hydrologists and geographers		
Hydrology	Conservation Scientists		
Hydrology	Hydrologists		
Stratigraphy	Geoscientists, except hydrologists and geographers		
Group ID 20			
WSWHE Districts Offerings: Geology		4	4
Land surveying	Foresters		
Group ID 21			
WSWHE Districts Offerings: Surveying		0	0
Meteorology	Atmospheric and space scientists		
Group ID 22			
WSWHE Districts Offerings: Meteorology		2	2
Optics	Astronomers		
Optics	Physicists		
Group ID 23			
WSWHE Districts Offerings: Optics		0	0
Physics	Aerospace engineers		
Physics	Agricultural and food science technicians		
Physics	***Biochemists and biophysicists***		
Physics	***Biological technicians***		
Physics	Biomedical engineers		
Physics	Chemical engineers		
Physics	***Chemical technicians***		
Physics	***Chemists***		
Physics	Civil engineers		
Physics	***Computer hardware engineers***		
Physics	***Electrical engineers***		
Physics	***Electronics engineers, except computer***		
Physics	Environmental engineers		
Physics	Environmental science and protection technicians, including health		
Physics	Forensic science technicians		
Physics	Forest and conservation technicians		
Physics	Geological and petroleum technicians		
Physics	Health and safety engineers, except mining safety engineers and inspectors		
Physics	***Industrial engineers***		
Physics	Marine engineers and naval architects		
Physics	Materials engineers		
Physics	Mathematical technicians		
Physics	***Mechanical engineers***		
Physics	***Medical scientists, except epidemiologists***		
Physics	***Microbiologists***		
Physics	Mining and geological engineers, including mining safety engineers		
Physics	Nuclear engineers		
Physics	Nuclear technicians		
Physics	Petroleum engineers		
Physics	Zoologists and wildlife biologists		
Quantum mechanics	Astronomers		
Quantum mechanics	Physicists		
Thermodynamics	Astronomers		
Thermodynamics	***Mechanical engineering technicians***		
Thermodynamics	Physicists		
Group ID 24			
WSWHE Districts Offerings: Physics		10	7

TABLE 8 (continued)

Political Science	***Compensation and benefits managers***		
Political Science	***Training and development managers***		
Group ID 25			
WSWHE Districts Offerings: Political Science		0	0
Psychology	***Compensation and benefits managers***		
Psychology	***Training and development managers***		
Group ID 26			
WSWHE Districts Offerings: Psychology		0	0
Remote Sensing	Atmospheric and space scientists		
Remote Sensing	Foresters		
Group ID 27			
WSWHE Districts Offerings: Remote Sensing		0	0
Sociology	***Compensation and benefits managers***		
Sociology	***Training and development managers***		
Group ID 28			
WSWHE Districts Offerings: Sociology		0	0
Group ID 29			
WSWHE Districts Offerings: Forensic Science		13	12
Group ID 30			
WSWHE Districts Offerings: Science Research		8	6
	Source: U.S. Dept. of Labor Occupation Outlook Handbook		