NATIONAL BIO AND AGRO-DEFENSE FACILITY

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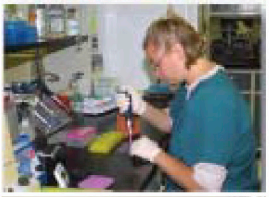
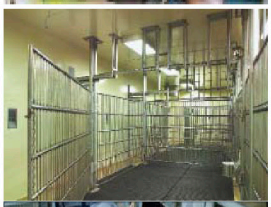
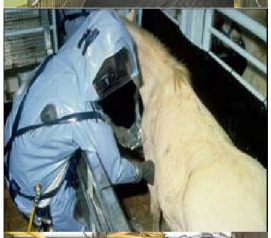

US DEPARTMENT OF HOMELAND SECURITY NATIONAL BIO AND AGRO-DEFENSE FACILITY

APPENDIX C

SOCIOECONOMICS TABLES

JUNE 2008

U.S. DEPARTMENT OF HOMELAND SECURITY

SOCIOECONOMIC TABLES

Table C-1 — Labor Force and Unemployment, 1990, 2000, and 2006 (Plum Island Site)

Year	Suffolk County				Middlesex County			
	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	785,622	755,095	30,527	3.9	91,681	88,343	3,338	3.6
2000	735,938	710,784	25,154	3.4	85,321	83,607	1,714	2.0
1990	708,662	677,721	30,941	4.4	83,461	80,169	3,292	3.9

Year	New London County				Area Total			
	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	146,963	140,959	6,004	4.1	1,024,266	984,397	39,869	3.9
2000	131,618	128,697	2,921	2.2	952,877	923,088	29,789	3.1
1990	130,952	123,736	7,216	5.5	923,075	881,626	41,449	4.5

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, 1990, 2000, and 2006 data.

Table C-2 — Journey-to-Work Patterns, 2000 (Plum Island Site)

Residence County	Work County	Workers	Percent
Middlesex Co. CT	Middlesex Co. CT	41,641	51.6
Middlesex Co. CT	Hartford Co. CT	19,225	23.8
Middlesex Co. CT	New Haven Co. CT	12,833	15.9
Middlesex Co. CT	New London Co. CT	3,878	4.8
Middlesex Co. CT	Fairfield Co. CT	1,161	1.4
New London Co. CT	New London Co. CT	107,232	82.8
New London Co. CT	Hartford Co. CT	7,093	5.5
New London Co. CT	Middlesex Co. CT	4,909	3.8
New London Co. CT	Windham Co. CT	3,181	2.5
New London Co. CT	New Haven Co. CT	1,638	1.3
Suffolk Co. NY	Suffolk Co. NY	491,836	73.4
Suffolk Co. NY	Nassau Co. NY	90,930	13.6
Suffolk Co. NY	New York Co. NY	41,121	6.1
Suffolk Co. NY	Queens Co. NY	25,159	3.8
Suffolk Co. NY	Kings Co. NY	10,586	1.6

Source: U.S. Census Bureau, 2000 County to County Worker Flow Files.

Table C-3 — Top Five Industry Employers by Number of Jobs (Plum Island Site)

	Suffolk	Middlesex	New London	Total Study Area
1	Government and government enterprises	Health care and social assistance	Government and government enterprises	Government and government enterprises
2	Retail trade	Manufacturing	Retail trade	Retail trade
3	Health care and social assistance	Retail trade	Manufacturing	Health care and social assistance
4	Manufacturing	Government and government enterprises	Health care and social assistance	Manufacturing
5	Professional and technical services	Finance and insurance	Accommodation and food services	Professional and technical services

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.

Table C-4 — Employment by Industry, 2005 (Plum Island Site)

Industry	Employment (total number of jobs) 2005				Employment (total percentage of jobs) 2005			
	Suffolk	Middlesex	New London	Area Total	Suffolk	Middlesex	New London	Area Total
Farm	2,305	785	2,137	5,227	0.3	0.8	1.2	0.5
Forestry, fishing, related activities, and other[a]	(D)	(D)	486	NA	(D)	(D)	0.3	NA
Mining	(D)	(D)	109	NA	(D)	(D)	0.1	NA
Utilities	1,786	387	1,460	3,633	0.2	0.4	0.8	0.3
Construction	54,834	6,171	8,412	69,417	6.9	6.4	4.9	6.5
Manufacturing	61,489	11,318	17,957	90,764	7.8	11.8	10.4	8.6
Wholesale trade	42,438	2,880	2,632	47,950	5.4	3.0	1.5	4.5
Retail trade	90,299	10,456	18,157	118,912	11.4	10.9	10.5	11.2
Transportation and warehousing	21,792	1,504	3,429	26,725	2.8	1.6	2.0	2.5
Information	16,747	1,404	2,252	20,403	2.1	1.5	1.3	1.9
Finance and insurance	40,775	8,527	3,637	52,939	5.1	8.9	2.1	5.0
Real estate and rental and leasing	32,582	3,725	5,030	41,337	4.1	3.9	2.9	3. 9
Professional and technical services	60,909	5,751	9,534	76,194	7.7	6.0	5.5	7.2
Management of companies and enterprises	10,206	(D)	533	NA	1.3	(D)	0.3	NA
Administrative and waste services	46,537	4,328	5,317	56,182	5.9	4.5	3.1	5.3
Educational services	17,245	2,596	3,618	23,459	2.2	2.7	2.1	2.2
Health care and social assistance	88,153	12,247	17,480	117,880	11.1	12.8	10.1	11.1
Arts, entertainment, and recreation	16,889	2,429	3,674	22,992	2.1	2.5	2.1	2.2
Accommodation and food services	38,763	5,708	11,177	55,648	4.9	6.0	6.5	5.2
Other services, except public administration	41,692	4,704	7,097	53,493	5.3	4.9	4.1	5.0
Government and government enterprises	106,129	10,378	48,833	165,340	13.4	10.8	28.2	15.6
Total Number of Jobs	793,253	95,813	172,961	1,062,027				

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a]This includes agriculture and forestry support industries.

Table C-5 — Major Employers in the Region of Study (Plum Island Site)

Suffolk County (NY) [a]	Middlesex and New London Counties (CT)
Northshore Health System	General Dynamics/Electric Boat
Diocese of Rockville Center	Mohegan Sun
Wauldbaums Supermarkets	Foxwoods Resort Casino
North Fork Bank	Middlesex Hospital
Long Island Railroad	William W. Backus Hospital
Cablevision Systems	
Winthrop Health System	
Home Depot	
Pathmark Supermarkets	
King Kullen Supermarkets	
KeySpan	
Long Island University	
Stony Brook University Hospital	
United Parcel Service	
Brookhaven National Laboratory	
Newsday	
Estee Lauder	
Computer Associates	

Source: Connecticut Business News Journal & Suffolk County Department of Planning.
[a]This includes some firms with operations in adjacent Nassau County.

Table C-6 — Top Five Industry Employers by Total Compensation Paid (Plum Island Site)

	Suffolk	Middlesex	New London	Total Study Area
1	Government and government enterprises	Manufacturing	Government and government enterprises	Government and government enterprises
2	Manufacturing	Finance and insurance	Manufacturing	Manufacturing
3	Health care and social assistance	Government and government enterprises	Health care and social assistance	Health care and social assistance
4	Wholesale trade	Health care and social assistance	Professional and technical services	Retail trade
5	Retail trade	Retail trade	Retail trade	Wholesale trade

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.

Table C-7 — Employment Compensation by Industry, 2005 (Plum Island Site)

	Employment (total wages - thousands of dollars) 2005				Employment (total wages - percent) 2005			
Industry	Suffolk	Middlesex	New London	Area Total	Suffolk	Middlesex	New London	Area Total
Farm	47,461	12,133	35,834	95,428	0.1	0.3	0.5	0.2
Forestry, fishing, related activities, and other[a]	(D)	(D)	4,234	NA	(D)	(D)	0.1	NA
Mining	(D)	(D)	3,891	NA	(D)	(D)	0.1	NA
Utilities	183,719	48,315	190,975	423,009	0.5	1.1	2.5	1
Construction	2,375,960	188,297	274,100	2,838,357	6.9	4.4	3.5	6.1
Manufacturing	3,840,953	920,011	1,741,169	6,502,133	11.2	21.7	22.3	14.0
Wholesale trade	2,868,531	170,722	140,820	3,180,073	8.4	4.0	1.8	7
Retail trade	2,799,301	261,226	451,049	3,511,576	8.2	6.2	5.8	7.6
Transportation and warehousing	819,882	51,384	129,483	1,000,749	2.4	1.2	1.7	2
Information	968,691	60,384	96,670	1,125,745	2.8	1.4	1.2	2.4
Finance and insurance	2,301,805	726,409	131,525	3,159,739	6.7	17.1	1.7	6.8
Real estate and rental and leasing	391,580	19,695	46,739	458,014	1.1	0.5	0.6	1
Professional and technical services	2,288,984	171,093	523,571	2,983,648	6.7	4.0	6.7	6
Management of companies and enterprises	927,853	(D)	21,443	NA	2.7	(D)	0.3	NA
Administrative and waste services	1,384,655	110,434	119,300	1,614,389	4.0	2.6	1.5	3
Educational services	358,753	87,678	98,760	545,191	1.1	2.1	1.3	1
Health care and social assistance	3,441,402	478,752	708,255	4,628,409	10.0	11.3	9.1	10
Arts, entertainment, and recreation	280,489	45,780	61,871	388,140	0.8	1.1	0.8	0.8
Accommodation and food services	776,109	112,273	211,474	1,099,856	2.3	2.7	2.7	2.4
Other services, except public administration	973,237	95,406	141,174	1,209,817	2.8	2.3	1.8	2.6
Government and government enterprises	7,227,379	670,238	2,670,840	10,568,457	21.1	15.8	34.2	22.8
Total Compensation of Employees	34,283,790	4,244,027	7,803,177	46,330,994				

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a]This includes agriculture and forestry support industries.

Table C-8 — Agriculture and Hunting Industries in Study Area, 2006 (Plum Island Site)

Industry	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)
	Suffolk			New London			Middlesex			Area Total		
Agriculture and Hunting	264.7	3,829	69.2	147.9	2,249	38.4	50.0	819	13.7	462.6	6,897	121.3
(Percentage of Total)	(0.249)	(0.525)	(0.190)	(0.636)	(1.339)	(0.485)	(0.338)	(0.906)	(0.298)	(0.320)	(0.698)	(0.248)
Animal Production[a]	10.2	267	1.1	51.2	855	6.3	3.1	45	0.3	64.5	1,167	7.7
(Percentage of Total)	(0.010)	(0.037)	(0.003)	(0.220)	(0.509)	(0.080)	(0.021)	(0.050)	(0.006)	(0.045)	(0.118)	(0.016)
Hunting and Trapping[a]	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0	0.0	0	0.0
(Percentage of Total)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Total (for all industries)	106,413.5	729,247	36,375.2	23,276.6	167,977	7,911.6	14,796.8	90,393	4,599.6	144,486.9	987,617	48,886.4

Source: Implan 2006 New York Data, MIG 2006.

[a]These values are included in the total value of Agriculture and Hunting industries.

Table C-9 — Income and Poverty, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2000 (Plum Island Site)

	Town of Southold		Suffolk County		Middlesex County		New London County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Income										
Median Household Income,1999	$47,800	NA	$64,885	NA	$59,175	NA	$50,659	NA	$62,006	NA
Per Capita Income, 1999	$29,761	NA	$26,577	NA	$28,251	NA	$24,678	NA	$26,450	NA
Poverty										
Population for Whom Poverty Status Is Determined[a]	5,465	100.0	1,393,546	100.0	149,529	100.0	247,198	100.0	1,790,273	100.0
Population With Income in 1999 Below Poverty Level	115	2.1	83,171	6.0	6,911	4.6	15,780	6.4	105,862	5.9

Sources: U.S. Census Bureau. Study area total Median Household and Per Capita Income from ESRI BIS weighted average.
[a]Includes most population groups except for Group Quarters (e.g., barracks, dormitories, nursing homes, prisons, etc.).

Table C-10 — Population, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 1990-2012 (Plum Island Site)

	Population				Compound Annual Growth Rate (CAGR) Percent [a]			
	1990	2000	2007	2012	1990 -2000	2000-2007	2007-2012	1990-2012
Town of Southold	5,203	5,465	6,596	7,197	0.5	2.7	1.8	1.5
Suffolk County	1,321,768	1,419,369	1,506,021	1,561,288	0.7	0.9	0.7	0.8
Middlesex County	143,196	155,071	166,150	173,700	0.8	1.0	0.9	0.9
New London County	254,957	259,088	271,317	279,062	0.2	0.7	0.6	0.4
Study Area Total	1,719,921	1,833,528	1,943,488	2,014,050	0.6	0.8	0.7	0.7
New York	17,990,455	18,976,457	19,581,872	19,995,757	0.5	0.5	0.4	0.9
Connecticut	3,287,116	3,405,565	3,556,875	3,659,841	0.4	0.6	0.6	0.5

Source: U.S. Census Bureau 1990-2000. 2007 and 2012 population forecasts: ESRI BIS.
[a]The CAGR is a simplified estimate that measures the growth of the population as if it had grown at a steady single rate on an annually compounded basis.

Table C-11 — Population by Ethnicity and Race, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2000 (Plum Island Site)

	Town of Southold		Suffolk County		Middlesex County		New London County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
White Alone	5,271	96.5	1,200,755	84.6	141,555	91.3	225,406	87.0	1,567,716	85.5
Non-Hispanic White	5,203	95.2	1,118,405	78.8	138,979	89.6	219,542	84.7	1,476,926	80.6
Hispanic White	68	1.2	82,350	5.8	2,576	1.7	5,864	2.3	90,790	5.0
Non-White Alone	194	3.6	218,614	15.4	13,516	8.7	33,682	13.0	265,812	14.50
Black or African American Alone	51	0.9	98,553	6.9	6,856	4.4	13,703	5.3	119,112	6.5
American Indian and Native Alaskan Alone	7	0.1	3,807	0.3	269	0.2	2,487	1.0	6,563	0.4
Asian Alone	11	0.2	34,711	2.5	2,419	1.6	5,075	2.0	42,205	2.3
Native Hawaiian and Other Pacific Islander	1	0.0	484	0.0	58	0.0	151	0.1	693	0.0
Other[a]	124	2.3	81,059	5.7	3,914	2.5	12,266	4.7	97,239	5.3
Total	5,465	100.0	1,419,369	100.0	155,071	100.0	259,088	100.0	1,833,528	100.0
Minority Population Total[b]	262	4.8	300,964	21.2	16,092	10.4	39,546	15.3	356,602	19.5
Hispanic Population Total	148	2.7	149,411	10.5	4,649	3.0	13,236	5.1	167,296	9.1

Source: U.S. Census Bureau 2000.

Table C-12 — Age Profile, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2000 (Plum Island Site)

	Town of Southold		Suffolk County		Middlesex County		New London County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5 Years	281	5.1	100,304	7.1	9,632	6.2	16,379	6.3	126,315	6.9
5 to 9 Years	312	5.7	109,690	7.7	10,421	6.7	18,332	7.1	138,443	7.6
10 to 14 Years	356	6.5	103,930	7.3	10,074	6.5	18,339	7.1	132,343	7.2
15 to 18Years	222	4.1	72,789	5.1	7,611	4.9	13,321	5.1	93,721	5.1
19 to 24 Years	189	3.5	91,434	6.4	9,521	6.1	19,037	7.4	119,992	6.5
25 to 34 Years	473	8.7	191,695	13.5	20,451	13.2	35,184	13.6	247,330	13.5
35 to 49 Years	1,193	21.8	353,695	24.9	40,127	25.9	65,054	25.1	458,877	25.0
50 to 64 Years	1,024	18.7	228,274	16.1	26,149	16.9	39,677	15.3	294,100	16.0
65 Years and Above	1,415	25.9	167,558	11.8	21,085	13.6	33,765	13.0	222,408	12.1
Total	5,465	100.0	1,419,369	100.0	155,071	100.0	259,088	100.0	1,833,530	100.0

Source: U.S. Census Bureau 2000.

Table C-13 — Educational Attainment, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2000 (Plum Island Site)

	Town of Southold		Suffolk County		Middlesex County		New London County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than Ninth Grade	93	2.3	41,038	4.4	3,554	3.3	8,047	4.6	52,639	4.3
9th to 12th Grade	254	6.2	89,136	9.5	8,630	8.0	16,229	9.3	113,995	9.3
High School Graduate	1,404	34.3	294,953	31.3	30,873	28.6	55,719	32.0	381,545	31.2
Some College, No Degree	758	18.5	183,330	19.5	20,372	18.8	35,225	20.3	238,927	19.5
Associate Degree	338	8.3	75,080	8.0	8,132	7.5	13,074	7.5	96,286	7.9
Bachelor's Degree	676	16.5	147,323	15.6	21,745	20.1	26,426	15.2	195,494	16.0
Graduate or Professional Degree	567	13.9	111,541	11.8	14,800	13.7	19,190	11.0	145,531	11.9
Total	4,090	100.0	942,401	100.0	108,106	100.0	173,910	100.0	1,224,417	100.0

Source: U.S. Census Bureau 2000.

Table C-14 — Housing Units by Occupancy, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2007 (Plum Island Site)

	Town of Southold		Suffolk County		Middlesex County		New London County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	4,140	100.0	547,377	100.0	72,523	100.0	116,664	100.0	736,564	100.0
Occupied Housing Units	2,771	66.9	496,315	90.7	66,238	91.3	106,266	91.1	668,819	90.8
Owner-Occupied Housing Units	2,368	57.2	405,503	74.1	49,552	68.3	74,228	63.6	529,283	71.9
Renter-Occupied Housing Units	403	9.7	90,812	16.6	16,686	23.0	32,038	27.5	139,536	18.9
Vacant Housing Units	1,369	33.1	51,062	9.3	6,285	8.7	10,398	8.9	67,745	9.2

Source: 2007 population forecasts: ESRI BIS.

Table C-15 — Housing Units by Structure Type, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2000 (Plum Island Site)

	Town of Southold		Suffolk County		Middlesex County		New London County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	3,710	100.0	522,323	100.0	67,285	100.0	110,674	100.0	700,282	100.0
1, Detached	3,390	91.4	426,250	81.6	46,845	69.6	71,319	64.4	544,414	77.7
1, Attached	98	2.6	21,835	4.2	2,851	4.2	4,370	4.0	29,056	4.2
2	20	0.5	20,669	4.0	3,561	5.3	9,841	8.9	34,071	4.9
3 or 4	18	0.5	10,116	1.9	3,242	4.8	7,429	6.7	20,787	3.0
5 to 9	120	3.2	11,119	2.1	3,391	5.0	6,010	5.4	20,520	2.9
10 to 19	0	0.0	11,934	2.3	2,273	3.4	3,225	2.9	17,432	2.5
20+	47	1.3	14,927	2.9	4,177	6.2	5,262	4.8	24,366	3.5
Mobile Home	17	0.5	5,374	1.0	903	1.3	2,951	2.7	9,228	1.3
Other	0	0.0	99	0.0	42	0.1	267	0.2	408	0.1

Source: U.S. Census Bureau 2000.

Table C-16 — Median Housing Value, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2000-2007[a] (Plum Island Site)

	Town of Southold			Suffolk County			Middlesex County			New London County		
	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR
Median Housing Value	$224,454	$456,934	10.7%	$183,520	$384,349	11.1%	$163,401	$294,580	8.8%	$139,686	$279,094	10.4%

Source: U.S. Census Bureau 2000. 2007 population forecasts: ESRI BIS.
CAGR = Compound Annual Growth Rate.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-17— Housing Value, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2007[a] (Plum Island Site)

	Town of Southold		Suffolk County		Middlesex County		New London County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$50,000	0	0.0	1,676	0.4	431	0.9	1,518	2.1	3,625	0.7
$50,000 - $99,000	0	0.0	1,981	0.5	1,116	2.3	1,520	2.1	4,617	0.9
$100,000 - $149,999	0	0.0	2,770	0.7	2,617	5.3	3,480	4.7	8,867	1.7
$150,000 - $199,999	11	0.5	10,020	2.5	5,216	10.5	9,116	12.3	24,352	4.6
$200,000 - $299,999	121	5.1	68,563	16.9	16,297	32.9	27,375	36.9	112,235	21.2
$300,000 -$499,999	1,288	54.4	209,072	51.6	17,427	35.2	21,296	28.7	247,795	46.8
$500,000 +	948	40.0	111,416	27.5	6,448	13.0	9,922	13.4	127,786	24.1
Total	2,368	100.0	405,498	100.0	49,552	100.0	74,227	100.0	529,277	100.0

Source: 2007 population forecasts: ESRI BIS.
[a]Specified owner occupied housing units

Table C-18 — Median Rent, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 1990-2000 (Plum Island Site)

	Town of Southold			Suffolk County			Middlesex County			New London County		
	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR
Median Rent	$613	$854	3.4%	$696	$861	2.2%	$537	$626	1.6%	$493	$562	1.3%

Source: 1990-2000 population: U.S. Census Bureau.
CAGR = Compound Annual Growth Rate.

Table C-19 — Contract Rent, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut 2000[a] (Plum Island Site)

	Town of Southold		Suffolk County		Middlesex County		New London County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$200	0	0.0	3,491	3.9	986	6.1	2,154	7.2	6,631	4.9
$200 - $499	26	7.3	6,261	7.0	3,276	20.3	9,060	30.1	18,597	13.7
$500 - $749	93	26.1	19,299	21.6	7,289	45.1	13,659	45.3	40,247	29.6
$750 - $999	117	32.8	34,544	38.6	3,238	20.1	3,978	13.2	41,760	30.7
$1,000+	121	33.9	25,950	29.0	1,360	8.4	1,282	4.3	28,592	21.1
Total	357	100.0	89,545	100.0	16,149	100.0	30,133	100.0	135,827	100.0

Source: U.S. Census Bureau 2000.
[a]Specified renter-occupied housing units.

Table C-20 — Annual New Privately Owned Residential Building Permits, Town of Southold and Suffolk County, New York, and Middlesex County and New London County, Connecticut, 2005 (Plum Island Site)

	Town of Southold			Suffolk County			Middlesex County			New London County		
	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost
Single Family	141	141	$17,330,306	4,241	4,241	$1,075,523,773	620	620	$110,131,176	945	945	$174,614,267
Two Family	0	0	$0	1	2	$165,000	2	4	$515,320	17	34	$2,414,574
Three and Four Family	0	0	$0	0	0	$0	1	4	$300,000	12	44	$3,435,660
Five or More Family	0	0	$0	47	940	$75,642,196	22	167	$2,163,069	13	185	$13,514,163
Total	141	141	$17,330,306	4,289	5,183	$1,151,330,969	645	795	$113,109,565	987	1,208	$193,978,664

Source: U.S. Census Bureau 2000.

Table C-21— Labor Force and Unemployment, 1990, 2000, and 2006
(South Milledge Avenue Site)

Year	Clarke County				Madison County				Oconee County			
	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	61,628	59,199	2,429	3.9	16,090	15,511	579	3.6	17,878	17,328	550	3.1
2000	54,479	52,640	1,839	3.4	13,866	13,422	444	3.2	14,408	14,045	363	2.5
1990	43,495	41,082	2,413	5.5	11,241	10,497	744	6.6	9,493	9,104	389	4.1

Year	Area Total				Georgia			
	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	95,596	92,038	3,558	3.7	4,741,872	4,522,032	219,840	4.6
2000	82,753	80,107	2,646	3.2	4,242,897	4,095,367	147,530	3.5
1990	64,229	60,683	3,546	5.5	3,300,158	3,129,403	170,755	5.2

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, 1990, 2000, and 2006 data.

Table C-22 — Journey-to-Work Patterns, 2000
(South Milledge Avenue Site)

Residence County	Work County	Workers	Percent
Clarke Co. GA	Clarke Co. GA	39,009	80.9
Clarke Co. GA	Oconee Co. GA	1,975	4.1
Clarke Co. GA	Jackson Co. GA	952	2.0
Clarke Co. GA	Gwinnett Co. GA	932	1.9
Clarke Co. GA	Fulton Co. GA	803	1.7
Madison Co. GA	Clarke Co. GA	6,048	49.3
Madison Co. GA	Madison Co. GA	3,432	28.0
Madison Co. GA	Jackson Co. GA	706	5.8
Madison Co. GA	Franklin Co. GA	428	3.5
Madison Co. GA	Oconee Co. GA	286	2.3
Oconee Co. GA	Clarke Co. GA	6,696	51.9
Oconee Co. GA	Oconee Co. GA	3,630	28.1
Oconee Co. GA	Barrow Co. GA	358	2.8
Oconee Co. GA	Gwinnett Co. GA	349	2.7
Oconee Co. GA	Walton Co. GA	241	1.9

Source: U.S. Census Bureau, 2000 County to County Worker Flow Files.

Table C-23 — Top Five Industry Employers by Number of Jobs (South Milledge Avenue Site)

	Clarke	Madison	Oconee	Total Study Area
1	Government and government enterprises	Construction	Government and government enterprises	Government and government enterprises
2	Health care and social assistance	Government and government enterprises	Retail trade	Retail trade
3	Retail trade	Farm	Construction	Manufacturing
4	Manufacturing	Other services, except public administration	Professional and technical services	Accommodation and food services
5	Accommodation and food services	Retail trade	Other services, except public administration	Other services, except public administration

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.

Table C-24 — Employment by Industry, 2005 (South Milledge Avenue Site)

	Employment (total number of jobs) 2005				Employment (total percentage of jobs) 2005			
Industry	Clarke	Madison	Oconee	Area Total	Clarke	Madison	Oconee	Area Total
Farm	158	858	481	1,497	0.20	10.54	4.06	1.48
Forestry, fishing, related activities, and other[a]	(D)	(D)	60	60	(D)	(D)	0.51	0.06
Mining	(D)	(D)	(L)	NA	(D)	(D)	(L)	NA
Utilities	(D)	(D)	(D)	NA	(D)	(D)	(D)	NA
Construction	2,987	1,343	1,140	5,470	3.70	16.50	9.62	5.43
Manufacturing	8,203	701	757	9,661	10.15	8.61	6.39	9.58
Wholesale trade	1,946	(D)	490	NA	2.41	(D)	4.13	NA
Retail trade	8,514	732	1,421	10,667	10.53	8.99	11.99	10.58
Transportation and warehousing	(D)	190	(D)	NA	(D)	2.33	(D)	NA
Information	1,085	(D)	101	NA	1.34	(D)	0.85	NA
Finance and insurance	1,819	173	526	2,518	2.25	2.13	4.44	2.50
Real estate and rental and leasing	2,780	(D)	587	NA	3.44	(D)	4.95	NA
Professional and technical services	3,747	317	906	4,970	4.64	3.90	7.64	4.93
Management of companies and enterprises	238	54	(D)	NA	0.29	0.66	(D)	NA
Administrative and waste services	4,053	411	(D)	NA	5.01	5.05	(D)	NA
Educational services	1,091	(D)	491	NA	1.35	(D)	4.14	NA
Health care and social assistance	8,830	(D)	724	NA	10.92	(D)	6.11	NA
Arts, entertainment, and recreation	1,334	96	248	1,678	1.65	1.18	2.09	1.66
Accommodation and food services	6,802	175	416	7,393	8.42	2.15	3.51	7.33
Other services, except public administration	4,607	831	886	6,324	5.70	10.21	7.47	6.27
Government and government enterprises	21,155	1,252	1,543	23,950	26.17	15.38	13.02	23.76
Total Number of Jobs	80,825	8,138	11,855	100,818				

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
(L) = Less than 10 jobs, but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a]This includes agriculture and forestry support industries.

Table C-25 — Major Employers in the Region of Study (South Milledge Avenue Site)

Clarke		Madison		Oconee	
Company	Employees	Company	Employees	Company	Employees
University of Georgia	10,000+	I Level By Weyerhaeuser	250-499	Burton + Burton	250-499
Crop & Soil Sciences Ag.	1,000-4,999	Madison Board of Commissioners	100-249	Sam's Club	100-249
Athens Regional Medical Ctr.	1,000-4,999	Madison County High School	100-249	Southwire Watkinsville Plant	100-249
Pilgrim's Pride Corp	1,000-4,999	Ingles Market	100-249	Vend Food Svc.	100-249
St. Mary's Hospital	1,000-4,999	American Specialty Trucks	100-249	Georgia Emergency Medicine	100-249
Power Partners, Inc.	500-999	Cobb Health Care Ctr.	100-249	Oconee County High School	100-249
Dial America Marketing, Inc.	500-999	Madison County Middle School	50-99	Family Enrichment	100-249
Advantage Behavioral Health	500-999	Platoon Uniforms & Sports Wear	50-99	Publix Super Market	100-249
Wal-Mart Supercenter	250-499	Ila Elementary School	50-99	Georgia Options In Comm. Living	100-249
Rockwell Automation/Reliance	250-499	Danielsville Elementary School	50-99	Ameri Pride Uniform Svc.	100-249
Mc Lane Southeast	250-499	Madison County Jail	50-99	Malcom Bridge Middle School	100-249
Eaton Corp	250-499	Colbert Elementary School	50-99	Reinicke Construction	100-249
University of Georgia Library	250-499	Comer Elementary School	50-99	Atlanta Journal & Constitution	100-249
Carrier Transicold	250-499	Hull Sanford Elementary	50-99	Zoom Bait Co.	100-249
Georgia Center-UGA	250-499	Madison County Recreation Dept	50-99	Oconee County Elementary	100-249
Athens Clarke County Police	250-499	Madison County Sheriff Adm.	50-99		
Athens Banner-Herald	250-499				
Athens Technical College	250-499				

Source: Georgia Labor Market Explorer – available at http://explorer.dol.state.ga.us/.

Table C-26 — Top Five Industry Employers by Total Compensation Paid (South Milledge Avenue Site)

	Clarke	Madison	Oconee	Total Study Area
1	Government and government enterprises	Government and government enterprises	Government and government enterprises	Government and government enterprises
2	Manufacturing	Manufacturing	Retail trade	Manufacturing
3	Health care and social assistance	Construction	Construction	Retail trade
4	Retail trade	Other services, except public administration	Manufacturing	Construction
5	Accommodation and food services	Retail trade	Health care and social assistance	Other services, except public administration

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.

Table C-27 — Employment Compensation by Industry, 2005 (South Milledge Avenue Site)

	Employment (total wages - thousands of dollars) 2005				Employment (total wages - percent) 2005			
Industry	Clarke	Madison	Oconee	Area Total	Clarke	Madison	Oconee	Area Total
Farm	2,585	3,300	2,305	8,190	0.1	2.3	0.7	0.3
Forestry, fishing, related activities, and other[a]	(D)	(D)	3,531	NA	(D)	(D)	1.1	NA
Mining	(D)	(D)	0	NA	(D)	(D)	0	NA
Utilities	(D)	(D)	(D)	NA	(D)	(D)	(D)	NA
Construction	82,809	19,071	31,139	133,019	2.9	13.4	9.9	4.0
Manufacturing	468,936	23,854	30,856	523,646	16.3	16.8	9.8	15.7
Wholesale trade	86,700	(D)	20,070	NA	3.0	(D)	6.4	NA
Retail trade	192,198	8,865	32,067	233,130	6.7	6.2	10.2	7.0
Transportation and warehousing	(D)	3,094	(D)	NA	(D)	2.2	(D)	NA
Information	30,570	(D)	2,112	NA	1.1	(D)	0.7	NA
Finance and insurance	65,783	4,276	21,527	91,586	2.3	3.0	6.8	2.8
Real estate and rental and leasing	32,041	(D)	5,399	NA	1.1	(D)	1.7	NA
Professional and technical services	76,187	3,566	21,721	101,474	2.7	2.5	6.9	3
Management of companies and enterprises	14,697	2,247	(D)	NA	0.5	1.6	(D)	NA
Administrative and waste services	77,729	1,371	(D)	NA	2.7	1.0	(D)	NA
Educational services	14,658	(D)	9,455	NA	0.5	(D)	3.0	NA
Health care and social assistance	404,671	(D)	26,087	NA	14.1	(D)	8.3	NA
Arts, entertainment, and recreation	14,132	474	3,201	17,807	0.5	0.3	1.0	0.5
Accommodation and food services	94,455	1,767	4,460	100,682	3.3	1.2	1.4	3.0
Other services, except public administration	81,372	9,211	17,820	108,403	2.8	6.5	5.7	3.3
Government and government enterprises	1,065,491	46,202	57,558	1,169,251	37.1	32.5	18.2	35.1
Total Compensation of Employees	2,874,193	142,050	315,526	3,331,769				

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.

NA = Partial total due to undisclosed information.

[a]This includes agriculture and forestry support industries.

Table C-28 — Agriculture and Hunting Industries in Study Area and Other Surrounding Counties, 2006 (South Milledge Avenue Site)

Industry	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)
	Clarke			Madison			Oconee			Barrow		
Agriculture, Forestry, Fishing, & Hunting	32.513	197	4.470	185.150	647	15.264	75.949	266	3.602	67.127	358	2.143
(Percentage of Total)	(0.392)	(0.257)	(0.145)	(24.009)	(10.730)	(9.857)	(6.798)	(2.431)	(1.034)	(2.899)	(1.771)	(0.339)
Animal Production[a]	13.388	76	1.976	169.726	556	14.412	55.958	174	1.907	62.828	297	1.705
(Percentage of Total)	(0.161)	(0.099)	(0.064)	(22.009)	(9.221)	(9.307)	(5.008)	(1.590)	(0.547)	(2.713)	(1.469)	(0.270)
Hunting and Trapping[a]	0.678	6	0.000	1.113	9	0.000	0.073	1	0.000	0.244	2	0.000
(Percentage of Total)	(0.008)	(0.008)	(0.000)	(0.144)	(0.149)	(0.000)	(0.007)	(0.009)	(0.000)	(0.011)	(0.010)	(0.000)
Total (for all industries)	8,294.825	76,727	3,075.398	771.177	6,030	154.859	1,117.302	10,943	348.446	2,315.752	20,211	632.564

	Jackson			Oglethorpe			6 County Total		
Agriculture, Forestry, Fishing, & Hunting	181.360	973	10.548	101.849	425	6.470	643.948	2,866	42.497
(Percentage of Total)	(5.945)	(4.185)	(1.339)	(35.857)	(15.376)	(10.809)	(4.067)	(2.048)	(0.840)
Animal Production[a]	162.472	791	8.571	95.102	390	5.752	559.474	2,284	34.323
(Percentage of Total)	(5.326)	(3.402)	(1.088)	(33.482)	(14.110)	(9.609)	(3.533)	(1.632)	(0.678)
Hunting and Trapping[a]	1.087	9	0.000	0.000	0	0.000	3.195	27	0.000
(Percentage of Total)	(0.036)	(0.039)	(0.000)	(0.000)	(0.000)	(0.000)	(0.020)	(0.019)	(0.000)
Total (for all industries)	3,050.606	23,248	788.001	284.042	2,764	59.860	15,833.704	139,923	5,059.128

Source: MIG 2006.

[a]These values are included in the total value of 'Agriculture and Hunting' industries.

Table C-29 — Livestock Proximal to Proposed NBAF Site (South Milledge Avenue Site)

County	No. Herds	No. Livestock	No. Poultry Farms	No. Poultry
Clarke	53	7,511	89	1,102,891
Oconee	224	11,078	123	5,896,898
Barrow	302	13,356	179	4,932,261
Oglethorpe	252	52,598	98	5,191,069
Madison	474	22,072	252	16,500,000
Jackson	608	26,285	298	14,500,000
Total	**1,913**	**132,900**	**1,039**	**48,123,119**

Source: DHS 2007.

Table C-30 — Income and Poverty, Clarke County, Madison County, and Oconee County, Georgia, 2000 (South Milledge Avenue Site)

	Clarke County		Madison County		Oconee County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Income								
Median Household Income,1999	$28,482	N/A	$36,402	N/A	$54,714	N/A	$33,514	N/A
Per Capita Income, 1999	$17,123	N/A	$16,998	N/A	$24,153	N/A	$18,303	N/A
Poverty								
Population for Whom Poverty Status is Determined*	93,161	100.0	25,456	100.0	26,082	100.0	144,699	100.0
Population with Income in 1999 below poverty level	26,337	28.3	2,964	11.6	1,688	6.5	30,989	21.4

Sources: US Census Bureau. Study area total Median Household and Per Capita Income from ESRI BIS weighted average.
*Includes most population groups except for Group Quarters (e.g. barracks, dormitories, nursing homes, prisons etc.)

Table C-31 — Population, Clarke County, Madison County, and Oconee County, Georgia, 1990-2012 (South Milledge Avenue Site)

	Population				Compound Annual Growth Rate (CAGR) Percent [a]			
	1990	2000	2007	2012	1990 - 2000	2000 - 2007	2007 - 2012	1990 - 2012
Clarke County	87,594	101,489	113,528	119,523	1.5	1.6	1.0	1.4
Madison County	21,050	25,730	28,682	30,564	2.0	1.6	1.3	1.7
Oconee County	17,618	26,225	33,600	39,386	4.1	3.6	3.2	3.7
Study Area Total	126,262	153,444	175,810	189,473	2.0	2.0	1.5	1.9
Georgia	6,478,216	8,186,453	9,654,958	10,783,656	2.4	2.4	2.2	4.3

Source: U.S. Census Bureau 1990-2000. 2007 and 2012 population forecasts: ESRI BIS.
[a]The CAGR is a simplified estimate that measures the growth of the population as if it had grown at a steady single rate on an annually compounded basis.

Table C-32 — Population by Ethnicity and Race, Clarke County, Madison County, and Oconee County, Georgia, 2000 (South Milledge Avenue Site)

	Clarke County		Madison County		Oconee County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
White Alone	65,852	64.9	22,903	89.0	23,492	89.6	112,247	73.2
Non-Hispanic White	62,895	62.0	22,713	88.3	23,112	88.1	108,720	70.9
Hispanic White	2,957	2.9	190	0.7	380	1.5	3,527	2.3
Non-White Alone	35,637	35.1	2,827	11.0	2,733	10.4	41,197	26.9
Black or African American Alone	27,656	27.3	2,176	8.5	1,683	6.4	31,515	20.5
American Indian and Native Alaskan Alone	214	0.2	50	0.2	46	0.2	310	0.2
Asian Alone	3,173	3.1	72	0.3	376	1.4	3,621	2.4
Native Hawaiian and Other Pacific Islander	45	0.0	7	0.0	12	0.1	64	0.0
Other[a]	4,549	4.5	522	2.0	616	2.4	5,687	3.7
Total	101,489	100.0	25,730	100.0	26,225	100.0	153,444	100.0
Minority Population Total[b]	38,594	38.0	3,017	11.7	3,113	11.8	44,724	29.2
Hispanic Population Total	6,436	6.3	507	2.0	833	3.2	7,776	5.1

Source: U.S. Census Bureau 2000.
[a]The Other category includes the census categories "some other race alone" and "two or more races."
[b]The total minority population includes all those who have classified themselves as Black or African American, Hispanic (White and Non-White), Asian Alone, American Indian or Alaskan Native, Native Hawaiian and Other Pacific Islander, and Others.

Table C-33 — Age Profile, Clarke County, Madison County, and Oconee County, Georgia, 2000 (South Milledge Avenue Site)

	Clarke County		Madison County		Oconee County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5 Years	5,287	5.2	1,763	6.9	1,822	7.0	8,872	5.8
5 to 9 Years	5,113	5.0	1,944	7.6	2,325	8.9	9,382	6.1
10 to 14 Years	4,761	4.7	1,965	7.6	2,435	9.3	9,161	6.0
15 to 18 Years	5,754	5.7	1,434	5.6	1,696	6.5	15,025	9.8
19 to 24 Years	28,933	28.5	1,777	6.9	1,489	5.7	26,058	17.0
25 to 34 Years	16,626	16.4	3,632	14.1	3,256	12.4	23,514	15.3
35 to 49 Years	16,278	16.0	6,122	23.8	6,977	26.6	29,377	19.2
50 to 64 Years	10,529	10.4	4,266	16.6	3,987	15.2	18,782	12.2
65 Years and Above	8,208	8.1	2,827	11.0	2,238	8.5	13,273	8.7
Total	101,489	100.0	25,730	100.0	26,225	100.0	153,444	100.0

Source: U.S. Census Bureau 2000.

Table C-34 — Population 25+ Educational Attainment, Clarke County, Madison County, and Oconee County, Georgia, 2000 (South Milledge Avenue Site)

	Clarke County		Madison County		Oconee County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than Ninth Grade	3,703	7.1	1,439	8.5	742	4.5	5,884	6.9
9th to 12th Grade	6,125	11.8	3,493	20.7	1,450	8.8	11,068	13.0
High School Graduate	11,205	21.6	6,891	40.8	3,850	23.4	21,947	25.8
Some College, No Degree	8,174	15.8	2,637	15.6	3,069	18.6	13,880	16.3
Associate Degree	1,992	3.8	582	3.5	806	4.9	3,380	4.0
Bachelor's Degree	10,860	21.0	1,148	6.8	3,739	22.7	15,747	18.5
Graduate or Professional Degree	9,786	18.9	691	4.1	2,814	17.1	13,291	15.6
Total	51,845	100.0	16,881	100.0	16,470	100.0	85,198	100.0

Source: U.S. Census Bureau 2000.

Table C-35 — Housing Units by Occupancy, Clarke County, Madison County, and Oconee County, Georgia, 2007 (South Milledge Avenue Site)

	Clarke County		Madison County		Oconee County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	48,252	100.0	11,781	100.0	12,221	100.0	72,254	100.0
Occupied Housing Units	45,129	93.5	11,063	93.9	11,587	94.8	67,779	93.8
Owner-Occupied Housing Units	19,440	40.3	8,962	76.1	9,408	77.0	37,810	52.3
Renter-Occupied Housing Units	25,689	53.2	2,101	17.8	2,179	17.8	29,969	41.5
Vacant Housing Units	3,123	6.5	718	6.1	634	5.2	4,475	6.2

Source: 2007 population forecasts: ESRI BIS.

Table C-36 — Housing Units by Structure Type, Clarke County, Madison County, and Oconee County, Georgia, 2000 (South Milledge Avenue Site)

	Clarke County		Madison County		Oconee County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	42,126	100.0	10,520	100.0	9,528	100.0	62,174	100.0
1, Detached	19,121	45.4	6,160	58.6	7,690	80.7	32,971	53.0
1, Attached	1,821	4.3	87	0.8	123	1.3	2,031	3.3
2	3,956	9.4	144	1.4	447	4.7	4,547	7.3
3 or 4	3,210	7.6	55	0.5	33	0.4	3,298	5.3
5 to 9	3,384	8.0	18	0.2	15	0.2	3,417	5.5
10 to 19	3,447	8.2	2	0.0	6	0.1	3,455	5.6
20+	4,376	10.4	0	0.0	8	0.1	4,384	7.1
Mobile Home	2,753	6.5	4,040	38.4	1,200	12.6	7,993	12.9
Other	58	0.1	14	0.1	6	0.1	78	0.1

Source: U.S. Census Bureau 2000.

Table C-37 – Median Housing Value, Clarke County, Madison County, and Oconee County, Georgia, 2000-2007[a] (South Milledge Avenue Site)

	Clarke County			Madison County			Oconee County		
	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR
Median Housing Value	$102,593	$143,234	4.9%	$79,094	$109,279	4.7%	$145,866	$216,428	5.8%

Source: U.S. Census Bureau 2000. 2007 population forecasts: ESRI BIS.
CAGR = Compound Annual Growth Rate.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-38 — Housing Value, Clarke County, Madison County, and Oconee County, Georgia, 2007[a] (South Milledge Avenue Site)

	Clarke County		Madison County		Oconee County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$50,000	2,199	11.3	1,566	17.5	614	6.5	4,379	11.6
$50,000 - $99,000	2,655	13.7	2,369	26.4	675	7.2	5,699	15.1
$100,000 - $149,999	5,656	29.1	2,737	30.5	1,602	17.0	9,995	26.4
$150,000 - $199,999	3,103	16.0	912	10.2	1,308	13.9	5,323	14.1
$200,000 - $299,999	3,653	18.8	846	9.4	2,465	26.2	6,964	18.4
$300,000 - $499,999	1,554	8.0	360	4.0	1,681	17.9	3,595	9.5
$500,000+	620	3.2	172	1.9	1,063	11.3	1,855	4.9
Total	19,440	100.0	8,962	100.0	9,408	100.0	37,810	100.0

Source: 2007 population forecasts: ESRI BIS.
[a]Specified owner occupied housing units.

Table C-39— Median Rent, Clarke County, Madison County, and Oconee County, Georgia, 1990-2000 (South Milledge Avenue Site)

	Clarke County			Madison County			Oconee County		
	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR
Median Rent	$313	$451	3.7%	$214	$341	4.8%	$335	$485	3.8%

Source: 1900-2000 population: U.S. Census Bureau 2000.
CAGR = Compound Annual Growth Rate.

Table C-40 — Contract Rent, Clarke County, Madison County, and Oconee County, Georgia, 2000[a] (South Milledge Avenue Site)

	Clarke County		Madison County		Oconee County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$200	1,420	6.4	152	10.2	75	4.9	1,647	6.5
$200 - $499	12,722	57.2	1,138	76.5	749	48.8	14,609	57.9
$500 - $749	5,659	25.5	187	12.6	515	33.5	6,361	25.2
$750 - $999	1,649	7.4	10	0.7	133	8.7	1,792	7.1
$1,000+	780	3.5	0	0.0	64	4.2	844	3.3
Total	22,230	100.0	1,487	100.0	1,536	100.0	25,253	100.0

Source: U.S. Census Bureau 2000.
[a]Specified renter-occupied housing units.

Table C-41 — Annual New Privately Owned Residential Building Permits, Clarke County, Madison County, and Oconee County, Georgia, 2005 (South Milledge Avenue Site)

	Clarke County			Madison County			Oconee County		
	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost
Single Family	779	779	$72,318,339	222	222	$31,837,481	497	497	$119,517,471
Two Family	16	32	$1,667,004	1	2	$55,000	20	40	$3,644,523
Three and Four Family	10	39	$3,238,866	0	0	$0	0	0	$0
Five or More Family	10	164	$11,539,989	0	0	$0	0	0	$0
Total	815	1,014	$88,764,198	223	224	$31,892,481	517	537	$123,161,994

Source: U.S. Census Bureau 2000.

Table C-42 — Labor Force and Unemployment, 1990, 2000, and 2006 (Manhattan Campus Site)

Year	Geary County				Pottawatomie County				Riley County			
	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	11,403	10,793	610	5.3	11,062	10,679	383	3.5	34,894	33,690	1,204	3.5
2000	11,631	11,072	559	4.8	9,596	9,283	313	3.3	31,532	30,611	921	2.9
1990	10,768	9,937	831	7.7	8,343	7,917	426	5.1	28,188	27,019	1,169	4.1

Year	Area Total				Kansas			
	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	57,359	55,162	2,197	3.8	1,466,009	1,400,172	65,837	4.5
2000	52,759	50,966	1,793	3.4	1,405,104	1,351,987	53117	3.8
1990	47,299	44,873	2,426	5.1	1,263,525	1,208,676	54,849	4.3

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, 1990, 2000, and 2006 data.

Table C-43 — Journey-to-Work Patterns, 2000 (Manhattan Campus Site)

Residence County	Work County	Workers	Percent
Geary Co. KS	Geary Co. KS	7,985	59.5
Geary Co. KS	Riley Co. KS	4,238	31.6
Geary Co. KS	Dickinson Co. KS	376	2.8
Geary Co. KS	Pottawatomie Co. KS	131	1.0
Geary Co. KS	San Bernardino Co. CA	101	0.8
Pottawatomie Co. KS	Pottawatomie Co. KS	4,847	53.8
Pottawatomie Co. KS	Riley Co. KS	2,694	29.9
Pottawatomie Co. KS	Shawnee Co. KS	751	8.3
Pottawatomie Co. KS	Geary Co. KS	181	2.0
Pottawatomie Co. KS	Wabaunsee Co. KS	88	1.0
Riley Co. KS	Riley Co. KS	28,129	81.3
Riley Co. KS	Geary Co. KS	2,013	5.8
Riley Co. KS	Pottawatomie Co. KS	1,821	5.3
Riley Co. KS	San Bernardino Co. CA	734	2.1
Riley Co. KS	Shawnee Co. KS	506	1.5

Source: U.S. Census Bureau, 2000 County to County Worker Flow Files.

Table C-44 — Top Five Industry Employers by Number of Jobs (Manhattan Campus Site)

	Geary	Pottawatomie	Riley	Total Study Area
1	Government and government enterprises	Retail trade	Government and government enterprises	Government and government enterprises
2	Retail trade	Government and government enterprises	Retail trade	Retail trade
3	Transportation and warehousing	Manufacturing	Health care and social assistance	Accommodation and food services
4	Accommodation and food services	Construction	Accommodation and food services	Other services, except public administration
5	Professional and technical services	Farm	Other services, except public administration	Construction

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.

Table C-45 — Employment by Industry, 2005 (Manhattan Campus Site)

Industry	Employment (total number of jobs) 2005				Employment (total percentage of jobs) 2005			
	Geary	Pottawatomie	Riley	Area Total	Geary	Pottawatomie	Riley	Area Total
Farm	287	956	531	1,774	1.1	6.5	1.5	2.3
Forestry, fishing, related activities, and other[a]	(D)	(D)	(D)	NA	(D)	(D)	(D)	NA
Mining	(D)	(D)	36	NA	(D)	(D)	(D)	NA
Utilities	(D)	(D)	(D)	NA	(D)	(D)	(D)	NA
Construction	647	1,205	1,484	3,336	2.5	8.2	4.2	4.4
Manufacturing	708	1,364	1,056	3,128	2.8	9.2	3.0	4.1
Wholesale trade	(D)	396	663	NA	(D)	2.7	1.0	NA
Retail trade	2,017	2,176	3,845	8,038	7.9	14.7	10.8	10.6
Transportation and warehousing	1,194	(D)	(D)	NA	4.7	(D)	(D)	NA
Information	231	404	511	1,146	0.9	2.7	1.4	1.5
Finance and insurance	330	579	1,398	2,307	1.3	3.9	3.9	3.0
Real estate and rental and leasing	450	(D)	880	NA	1.8	(D)	2.5	NA
Professional and technical services	967	(D)	1,140	NA	3.8	(D)	3.2	NA
Management of companies and enterprises	(D)	(D)	170	NA	(D)	(D)	0.5	NA
Administrative and waste services	(D)	765	1,138	NA	(D)	5.2	3.2	NA
Educational services	129	(D)	699	NA	0.5	(D)	2.0	NA
Health care and social assistance	877	(D)	3,325	NA	3.5	(D)	9.3	NA
Arts, entertainment, and recreation	119	307	448	874	0.5	2.1	1.3	1.2
Accommodation and food services	990	446	3,164	4,600	3.9	3.0	8.9	6.1
Other services, except public administration	723	773	2,152	3,648	2.8	5.2	6.0	4.8
Government and government enterprises	14,800	1,420	12,716	28,936	58.1	9.6	35.7	38.1
Total Number of Jobs	25,456	14,792	35,626	75,874				

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a]This includes agriculture and forestry support industries.

Table C-46 — Major Employers in the Region of Study (Manhattan Campus Site)

Geary County	Pottawatomie County	Riley County
USD – Geary County	Jeffery Energy Center	Auth-Florence Manufacturing
FootLocker, Inc.	Custom Wood Products	Parker-Hannifin Corporation
Con-Agra Foods	Parker-Hannifin Corporation	Manko Window Systems
Wal-Mart	Manko Window Systems	McCall Patterns, Inc.
Geary Community Hospital	McCall Patterns, Inc.	PepsiCo Beverage and Foods
Valley View Care Center	PepsiCo Beverage and Foods	GTM Sportswear
Konza Prairie Community Health	GTM Sportswear	City of Manhattan
City of Junction City	Dick Edwards	Riley County
Geary County	Wal-Mart	Farm Bureau & Affiliated Services
Kaw Valley Engineering	Caterpillar, Inc.	Flint Hills Job Corps Center

Source: http://www.fortrileyconnection.com/index.htm.

Table C-47 — Top Five Industry Employers by Total Compensation Paid (Manhattan Campus Site)

	Geary	Pottawatomie	Riley	Total Study Area
1	Government and government enterprises	Manufacturing	Government and government enterprises	Government and government enterprises
2	Transportation and warehousing	Government and government enterprises	Health care and social assistance	Retail trade
3	Retail trade	Retail trade	Retail trade	Manufacturing
4	Professional and technical services	Construction	Finance and insurance	Construction
5	Manufacturing	Administrative and waste services	Construction	Other services, except public administration

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.

Table C-48 — Employment Compensation by Industry, 2005 (Manhattan Campus Site)

Industry	Employment (total wages - thousands of dollars) 2005				Employment (total wages - percent) 2005			
	Geary	Pottawatomie	Riley	Area Total	Geary	Pottawatomie	Riley	Area Total
Farm	1,940	3,876	2,431	8,247	0.2	1.3	0.2	0.3
Forestry, fishing, related activities, and other[a]	(D)	(D)	(D)	NA	(D)	(D)	(D)	NA
Mining	(D)	(D)	(D)	NA	(D)	(D)	(D)	NA
Utilities	(D)	(D)	(D)	NA	(D)	(D)	(D)	NA
Construction	17,937	24,944	49,239	92,120	1.4	8.2	4.1	3.3
Manufacturing	28,079	62,408	39,017	129,504	2.2	20.6	3.2	4.7
Wholesale trade	(D)	10,492	27,329	37,821	(D)	3.5	2.3	NA
Retail trade	32,233	32,714	71,617	136,564	2.5	10.77	5.9	4.9
Transportation and warehousing	37,397	(D)	(D)	NA	3.0	(D)	(D)	NA
Information	9,223	14,557	14,871	38,651	0.7	4.8	1.2	1.4
Finance and insurance	7,823	7,170	49,760	64,753	0.6	2.4	4.1	2.3
Real estate and rental and leasing	2,737	(D)	10,444	NA	0.2	(D)	0.9	NA
Professional and technical services	32,019	(D)	31,652	NA	2.5	(D)	2.6	NA
Management of companies and enterprises	(D)	(D)	11,023	NA	(D)	(D)	0.9	NA
Administrative and waste services	(D)	15,590	20,867	NA	(D)	5.1	1.7	NA
Educational services	1,883	(D)	14,356	NA	0.2	(D)	1.2	NA
Health care and social assistance	15,611	(D)	108,402	NA	1.2	(D)	9.0	NA
Arts, entertainment, and recreation	723	1,390	3,780	5,893	0.1	0.46	0.3	0.2
Accommodation and food services	9,576	3,541	35,258	48,375	0.8	1.2	2.9	1.7
Other services, except public administration	10,374	8,698	48,949	68,021	0.8	2.9	4.1	2.5
Government and government enterprises	1,034,226	49,022	657,360	1,740,608	81.6	16.1	54.5	62.7
Total Compensation of Employees	1,266,758	303,651	1,205,507	2,775,916				

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a]This includes agriculture and forestry support industries.

Table C-49 — Agriculture and Hunting Industries in Study Area and Other Surrounding Counties, 2006 (Manhattan Campus Site)

Industry	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)
	Geary			Pottawatomie			Riley			Clay		
Agriculture, Forestry, Fishing, & Hunting	37.318	199	1.677	115.760	930	6.753	54.737	591	7.218	85.069	753	4.791
(Percentage of Total)	(1.599)	(0.783)	(0.121)	(8.162)	(8.138)	(2.044)	(1.743)	(1.626)	(0.544)	(16.923)	(11.602)	(4.532)
Animal Production[a]	28.122	148	1.424	80.625	470	2.600	30.513	197	0.992	42.763	290	2.826
(Percentage of Total)	(1.205)	(0.583)	(0.103)	(5.684)	(4.113)	(0.787)	(0.971)	(0.542)	(0.075)	(8.507)	(4.468)	(2.673)
Hunting and Trapping[a]	0.082	1	0.000	0.164	2	0.000	0.103	1	0.000	0.194	2	0.000
(Percentage of Total)	(0.004)	(0.004)	(0.000)	(0.012)	(0.018)	(0.000)	(0.003)	(0.003)	(0.000)	(0.039)	(0.031)	(0.000)
Total (for all industries)	2,334.258	25,406	1,384.727	1,418.331	11,428	330.325	3,140.865	36,342	1,326.672	502.668	6,490	105.725
	Washington			Wabaunsee			Marshall			Area Total		
Agriculture, Forestry, Fishing & Hunting	138.420	1,275	5.426	79.610	2,947	5.333	116.395	786	1.921	627.309	7,481	33.119
(Percentage of Total)	(31.567)	(34.357)	(8.177)	(29.893)	(60.033)	(10.229)	(13.003)	(11.511)	(0.974)	(6.973)	(7.865)	(0.956)
Animal Production[a]	98.500	854	4.644	63.440	2,273	4.402	58.209	335	1.331	402.172	4,567	18.219
(Percentage of Total)	(22.463)	(23.013)	(6.998)	(23.821)	(46.303)	(8.443)	(6.503)	(4.906)	(0.675)	(4.471)	(4.802)	(0.526)
Hunting and Trapping[a]	0.188	2	0.000	0.000	0	0.000	4.471	42	0.000	5.202	50	0.000
(Percentage of Total)	(0.043)	(0.054)	(0.000)	(0.000)	(0.000)	(0.000)	(0.499)	(0.615)	(0.000)	(0.058)	(0.053)	(0.000)
Total (for all industries)	438.490	3,711	66.360	266.315	4,909	52.137	895.125	6,828	197.273	8,996.052	95,114	3,463.219

Source: MIG 2006.

[a]These values are included in the total value of Agriculture and Hunting industries.

Table C-50 — Livestock Proximal to Proposed NBAF Site (Manhattan Campus Site)

County	No. Herds	No. Livestock	No. Poultry Farms	No. Poultry
Riley	262	46,431	100	4,575
Washington	523	155,747	33	14,338
Clay	333	55,616	58	4,068
Geary	139	41,601	53	12,260
Wabaunsee	379	75,753	63	3,974
Pottawatomie	589	91,424	94	151,483
Marshall	562	75,935	70	1,776
Total	2,787	542,507	471	192,474

Source: DHS 2007.

Table C-51 — Income and Poverty, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2000 (Manhattan Campus Site)

	City of Manhattan		Riley County		Geary County		Pottawatomie County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Income										
Median Household Income, 1999	$30,463	NA	$32,042	NA	$31,917	NA	$40,176	NA	$33,627	NA
Per Capita Income, 1999	$16,566	NA	$16,349	NA	$16,199	NA	$17,785	NA	$16,550	NA
Poverty										
Population for Whom Poverty Status Is Determined[a]	39,179	100.0	53,798	100.0	27,261	100.0	17,940	100.0	98,999	100.0
Population With Income in 1999 Below Poverty Level	9,475	24.2	11,063	20.6	3,294	12.1	1,749	9.8	16,106	16.3

Sources: U.S. Census Bureau 2000. Study area total Median Household and Per Capita Income from ESRI BIS weighted average.
[a]Includes most population groups except for Group Quarters (e.g., barracks, dormitories, nursing homes, prisons, etc.).

Table C-52 — Population, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 1990-2012 (Manhattan Campus Site)

	Population				Compound Annual Growth Rate (CAGR) Percent[a]			
	1990	2000	2007	2012	1990 - 2000	2000 - 2007	2007 - 2012	1990 - 2012
City of Manhattan	43,386	44,831	46,163	47,156	0.3	0.4	0.4	0.4
Riley County	67,139	62,843	64,919	66,390	−0.7	0.5	0.5	−0.1
Geary County	30,453	27,947	26,034	24,792	−0.9	−1.0	−1.0	−0.9
Pottawatomie County	16,128	18,209	19,984	21,372	1.2	1.3	1.4	1.3
Study Area Total	113,720	108,999	110,937	112,554	−0.4	0.3	0.3	−0.1
Kansas	2,477,574	2,688,418	2,811,114	2,901,178	0.8	0.6	0.6	0.7

Source: U.S. Census Bureau 1990-2000. 2007 and 2012 population forecasts: ESRI BIS.

[a]The CAGR is a simplified estimate that measures the growth of the population as if it had grown at a steady single rate on an annually compounded basis.

Table C-53 — Population by Ethnicity and Race, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2000 (Manhattan Campus Site)

	City of Manhattan		Riley County		Geary County		Pottawatomie County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
White Alone	39,130	87.3	53,281	84.8	17,923	64.1	17,539	96.3	88,743	81.4
Non-Hispanic White	38,278	85.4	51,954	82.7	17,187	61.5	17,288	94.9	86,429	79.3
Hispanic White	852	1.9	1,327	2.1	736	2.6	251	1.4	2,314	2.1
Non-White Alone	5,701	12.7	9,562	15.2	10,024	35.9	670	3.7	20,256	18.6
Black or African American Alone	2,179	4.9	4,325	6.9	6,157	22.0	121	0.7	10,603	9.7
American Indian and Native Alaskan Alone	214	0.5	395	0.6	210	0.8	107	0.6	712	0.7
Asian Alone	1,764	3.9	2,022	3.2	883	3.2	59	0.3	2,964	2.7
Native Hawaiian and Other Pacific Islander	33	0.1	105	0.2	115	0.4	1	0.0	221	0.2
Other[a]	1,511	3.4	2,715	4.3	2,659	9.5	382	2.1	5,756	5.3
Total	44,831	100.0	62,843	100.0	27,947	100.0	18,209	100.0	108,999	100.0
Minority Population Total[b]	6,553	14.6	10,889	17.3	10,760	38.5	921	5.1	22,570	20.7
Hispanic Population Total	1,564	3.5	2,872	4.6	2,362	8.5	411	2.3	5,645	5.2

Source: U.S. Census Bureau 2000.

[a]The Other category includes the census categories "some other race alone" and "two or more races."

[b]The total minority population includes all those who have classified themselves as Black or African American, Hispanic (White and Non-White), Asian Alone, American Indian or Alaskan Native, Native Hawaiian and Other Pacific Islander, and Others.

Table C-54 — Age Profile, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2000 (Manhattan Campus Site)

	City of Manhattan		Riley County		Geary County		Pottawatomie County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5 Years	2,083	4.7	3,586	5.7	2,635	9.4	1,351	7.4	7,572	7.0
5 to 9 Years	1,836	4.1	3,166	5.0	2,286	8.2	1,450	8.0	6,902	6.3
10 to 14 Years	1,998	4.5	3,187	5.1	2,124	7.6	1,574	8.6	6,885	6.3
15 to 18 Years	2,578	5.8	3,681	5.9	1,661	5.9	1,280	7.0	6,622	6.1
19 to 24 Years	16,166	36.1	19,885	31.6	3,368	12.1	1,120	6.2	24,373	22.4
25 to 34 Years	6,293	14.0	9,504	15.1	4,251	15.2	2,123	11.7	15,878	14.6
35 to 49 Years	6,565	14.6	9,661	15.4	5,819	20.8	4,247	23.3	19,727	18.1
50 to 64 Years	3,820	8.5	5,444	8.7	3,169	11.3	2,613	14.4	11,226	10.3
65 Years and Above	3,492	7.8	4,729	7.5	2,634	9.4	2,451	13.5	9,814	9.0
Total	44,831	100.0	62,843	100.0	27,947	100.0	18,209	100.0	108,999	100.0

Source: U.S. Census Bureau 2000.

Table C-55 — Educational Attainment, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2000 (Manhattan Campus Site)

	City of Manhattan		Riley County		Geary County		Pottawatomie County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than Ninth Grade	386	1.9	571	1.9	708	4.5	409	3.6	1,688	3.0
9th to 12th Grade	649	3.2	1,237	4.2	1,494	9.5	825	7.2	3,556	6.3
High School Graduate	3,698	18.2	6,591	22.5	4,726	30.0	4,278	37.4	15,595	27.6
Some College, No Degree	4,841	23.9	7,421	25.3	4,851	30.8	2,763	24.2	15,035	26.6
Associate Degree	933	4.6	1,642	5.6	1,267	8.1	564	4.9	3,473	6.1
Bachelor's Degree	4,993	24.6	6,350	21.6	1,738	11.0	1,762	15.4	9,850	17.4
Graduate or Professional Degree	4,784	23.6	5,546	18.9	960	6.1	840	7.3	7,346	13.0
Total	20,284	100.0	29,358	100.0	15,744	100.0	11,441	100.0	56,543	100.0

Source: U.S. Census Bureau.

Table C-56 — Housing Units by Occupancy, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2007 (Manhattan Campus Site)

	City of Manhattan		Riley County		Geary County		Pottawatomie County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	18,940	100.0	25,155	100.0	11,494	100.0	8,127	100.0	44,776	100.0
Occupied Housing Units	17,958	94.8	23,514	93.5	9,884	86.0	7,481	92.1	40,879	91.3
Owner Occupied Housing Units	8,110	42.8	11,468	45.6	5,238	45.6	5,980	73.6	22,686	50.7
Renter Occupied Housing Units	9,848	52.0	12,046	47.9	4,646	40.4	1,501	18.5	18,193	40.6
Vacant Housing Units	982	5.2	1,641	6.5	1,610	14.0	646	8.0	3,897	8.7

Source: 2007 population forecasts: ESRI BIS.

Table C-57 — Housing Units by Structure Type, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2000 (Manhattan Campus Site)

	City of Manhattan		Riley County		Geary County		Pottawatomie County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	17,707	100.0	23,397	100.0	11,959	100.0	7,311	100.0	42,667	100.0
1, Detached	8,146	46.0	11,567	49.4	6,597	55.2	5,847	80.0	24,011	56.3
1, Attached	936	5.3	1,474	6.3	611	5.1	52	0.7	2,137	5.0
2	1,329	7.5	1,474	6.3	463	3.9	124	1.7	2,061	4.8
3 or 4	1,024	5.8	1,229	5.3	956	8.0	122	1.7	2,307	5.4
5 to 9	1,404	7.9	1,759	7.5	971	8.1	45	0.6	2,775	6.5
10 to 19	2,368	13.4	2,451	10.5	242	2.0	74	1.0	2,767	6.5
20+	1,750	9.9	1,773	7.6	223	1.9	14	0.2	2,010	4.7
Mobile Home	750	4.2	1,670	7.1	1,896	15.9	1,023	14.0	4,589	10.8
Other	17,707	100.0	23,397	100.0	11,959	100.0	7,311	100.0	42,667	100.0

Source: U.S. Census Bureau 2000.

Table C-58 — Median Housing Value, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2000-2007[a] (Manhattan Campus Site)

	City of Manhattan			Riley County			Geary County			Pottawatomie County		
	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR
Median Housing Value	$93,702	$133,663	5.2%	$89,100	$126,466	5.1%	$65,710	$91,837	4.9%	$80,366	$111,924	4.9%

Source: U.S. Census Bureau 2000. 2007 population forecasts: ESRI BIS.
CAGR = Compound Annual Growth Rate.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-59 — Housing Value, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2007[a] (Manhattan Campus Site)

	City of Manhattan		Riley County		Geary County		Pottawatomie County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$50,000	645	8.0	1,308	11.4	919	17.5	1,120	18.7	3,347	14.8
$50,000 - $99,000	1,447	17.8	2,281	19.9	2,011	38.4	1,394	23.3	5,686	25.1
$100,000 - $149,999	2,798	34.5	3,622	31.6	1,502	28.7	1,929	32.3	7,053	31.1
$150,000 - $199,999	1,764	21.8	2,204	19.2	456	8.7	742	12.4	3,402	15.0
$200,000 - $299,999	1,022	12.6	1,332	11.6	255	4.9	554	9.3	2,141	9.4
$300,000 -$499,999	314	3.9	539	4.7	85	1.6	178	3.0	802	3.5
$500,000+	121	1.5	182	1.6	10	0.2	63	1.1	255	1.1
Total	8,111	100.0	11,468	100.0	5,238	100.0	5,980	100.0	22,686	100.0

Source: 2007 population forecasts: ESRI BIS.
[a]Specified owner-occupied housing units.

Table C-60 — Median Rent, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 1990-2000[a] (Manhattan Campus Site)

	City of Manhattan			Riley County			Geary County			Pottawatomie County		
	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR
Median Rent	$323	$419	2.6%	$323	$413	2.5%	$283	$356	2.3%	$219	$347	4.7%

Source: U.S. Census Bureau 1990-2000.
CAGR = Compound Annual Growth Rate.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-61 — Contract Rent, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2000[a] (Manhattan Campus Site)

	City of Manhattan		Riley County		Geary County		Pottawatomie County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$200	484	5.1	585	5.5	437	10.7	172	14.0	1,194	7.5
$200 - $499	5,704	60.4	6,558	61.7	3,157	77.3	881	71.9	10,596	66.5
$500 - $749	2,330	24.7	2,502	23.5	373	9.1	139	11.4	3,014	18.9
$750 - $999	697	7.4	746	7.0	77	1.9	26	2.1	849	5.3
$1,000+	236	2.5	236	2.2	38	0.9	7	0.6	281	1.8
Total	484	5.1	585	5.5	437	10.7	172	14.0	1,194	7.5

Source: U.S. Census Bureau 2000.

[a]Specified renter occupied housing units

Table C-62 — Annual New Privately Owned Residential Building Permits, City of Manhattan, Riley County, Geary County, and Pottawatomie County, Kansas, 2005 (Manhattan Campus Site)

	City of Manhattan			Riley County			Geary County			Pottawatomie County		
	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost
Single Family	231	231	$36,147,571	287	287	$43,418,813	61	61	$7,919,394	237	237	$34,520,131
Two Family	11	22	$3,135,512	11	22	$3,135,512	0	0	$0	8	16	$2,600,000
Three and Four Family	0	0	$0	0	0	$0	0	0	$0	1	3	$200,000
Five or More Family	6	98	$7,551,357	6	98	$7,551,357	0	0	$0	2	10	$400,000
Total	248	351	$46,834,440	304	407	$54,105,682	61	61	$7,919,394	248	266	$37,720,131

Source: U.S. Census Bureau 2000.

Table C-63 — Labor Force and Unemployment, 1990, 2000, and 2006
(Flora Industrial Park Site)

	Hinds County				Madison County				Yazoo County			
Year	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	121,971	114,956	7,015	5.8	44,140	42,065	2,075	4.7	10,060	9,176	884	8.8
2000	122,444	116,003	6,441	5.3	39,319	37,616	1,703	4.3	10,735	9,937	798	7.4
1990	127,685	120,467	7,218	5.7	26,707	25,277	1,430	5.4	9,342	8,679	663	7.1

	Area Total				Mississippi			
Year	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	176,171	166,197	9,974	5.7	1,307,354	1,218,667	88,687	6.8
2000	172,498	163,556	8,942	5.2	1,314,158	1,239,861	74,297	5.7
1990	163,734	154,423	9,311	5.7	1,175,752	1,085,424	90,328	7.7

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, 1990, 2000, and 2006 data.

Table C-64 — Journey-to-Work Patterns, 2000
(Flora Industrial Park Site)

Residence County	Work County	Workers	Percent
Hinds Co. MS	Hinds Co. MS	85,060	79.2
Hinds Co. MS	Rankin Co. MS	10,090	9.4
Hinds Co. MS	Madison Co. MS	7,279	6.8
Hinds Co. MS	Warren Co. MS	1,655	1.5
Hinds Co. MS	Copiah Co. MS	546	0.5
Madison Co. MS	Hinds Co. MS	15,906	45.6
Madison Co. MS	Madison Co. MS	14,922	42.8
Madison Co. MS	Rankin Co. MS	2,521	7.2
Madison Co. MS	Yazoo Co. MS	271	0.8
Madison Co. MS	Holmes Co. MS	123	0.4
Yazoo Co. MS	Yazoo Co. MS	6,262	68.8
Yazoo Co. MS	Hinds Co. MS	1,224	13.5
Yazoo Co. MS	Madison Co. MS	732	8.0
Yazoo Co. MS	Rankin Co. MS	264	2.9
Yazoo Co. MS	Warren Co. MS	132	1.5

Source: U.S. Census Bureau, 2000 County to County Worker Flow Files.

Table C-65 — Employment by Industry, 2005 (Flora Industrial Park Site)

	Employment (total number of jobs) 2005				Employment (total percentage of jobs) 2005			
Industry	Hinds	Madison	Yazoo	Area Total	Hinds	Madison	Yazoo	Area Total
Farm	1,130	760	846	2,736	0.7	1.3	9.1	1.1
Forestry, fishing, related activities, and other[a]	336	276	(D)	NA	0.2	0.5	(D)	NA
Mining	1,077	439	(D)	NA	0.6	0.8	(D)	NA
Utilities	1,024	46	78	1,148	0.6	0.1	0.8	0.5
Construction	7,575	3,081	308	10,964	4.4	5.3	3.3	4.6
Manufacturing	6,105	9,302	863	16,270	3.6	16.1	9.3	6.8
Wholesale trade	5,898	1,917	291	8,106	3.4	3.3	3.1	3.4
Retail trade	16,898	7,538	874	25,310	9.8	13.1	9.4	10.6
Transportation and warehousing	3,986	1,324	169	5,479	2.3	2.3	1.8	2.3
Information	3,526	1,102	56	4,684	2.1	1.9	0.6	2.0
Finance and insurance	8,615	3,921	338	12,874	5.0	6.8	3.6	5.4
Real estate and rental and leasing	5,212	2,542	157	7,911	3.0	4.4	1.7	3.3
Professional and technical services	11,793	4,032	218	16,043	6.9	7.0	2.3	6.7
Management of companies and enterprises	2,846	763	(D)	NA	1.7	1.3	(D)	NA
Administrative and waste services	9,904	3,283	(D)	NA	5.8	5.7	(D)	NA
Educational services	4,616	1,532	(D)	NA	2.7	2.7	(D)	NA
Health care and social assistance	18,481	3,519	(D)	NA	10.7	6.1	(D)	NA
Arts, entertainment, and recreation	2,335	706	58	3,099	1.4	1.2	0.6	1.3
Accommodation and food services	10,594	4,597	436	15,627	6.2	8.0	4.7	6.5
Other services, except public administration	9,867	2,517	739	13,123	5.7	4.4	8.0	5.5
Government and government enterprises	40,388	4,546	2,115	47,049	23.5	7.9	22.7	19.7
Total Number of Employees	172,206	57,743	9,299	239,248				

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a]This includes agriculture and forestry support industries.

Table C-66 — Top Five Industry Employers by Number of Jobs (Flora Industrial Park Site)

	Hinds	Madison	Yazoo	Total Study Area
1	Government and government enterprises	Manufacturing	Government and government enterprises	Government and government enterprises
2	Health care and social assistance	Retail trade	Retail trade	Retail trade
3	Retail trade	Accommodation and food services	Manufacturing	Manufacturing
4	Professional and technical services	Government and government enterprises	Farm	Professional and technical services
5	Accommodation and food services	Professional and technical services	Other services, except public administration	Accommodation and food services

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.

Table C-67 — Major Employers in the Region of Study (Flora Industrial Park Site)

Hinds County	Madison County	Yazoo County
Baptist Hospital/Express Care	Johnson Controls, Inc.	Hood Packaging Corp.
Baptist Medical Ctr.	L-3 Vertex Aerospace	Kilby Brake Fisheries
Central Mississippi Medical Ctr.	Mc Rae's	King's Daughters Hospital
Delphi Packard Electric Systems	Nissan North America, Inc.	Simmons Farm Raised Catfish
Health Department	Trillium International	Talport Industries
Heart Center At Baptist	Vocational Rehabilitation	Terra Industries
Hinds Community College	Wal-Mart	Terra Industries
Mississippi Baptist Medical Ctr.		Triad Nitrogen, Inc.
St. Dominic Hospital		Yazoo City Health & Rehab Ctr.
St. Dominic-Jackson Memorial Hospital		
State Health Department		
University Hospitals & Clinics		
University of MS Medical School		
University Surgery Assoc.		
U.S. Veterans Medical Ctr.		

Source: Mississippi Department of Employment Security, Workforce Information Database – available at http://www.Mdes.Ms.Gov/Wps/Portal#Null..

Table C-68 — Top Five Industry Employers by Total Compensation Paid (Flora Industrial Park Site)

	Hinds	Madison	Yazoo	Total Study Area
1	Government and government enterprises	Manufacturing	Government and government enterprises	Government and government enterprises
2	Health care and social assistance	Government and government enterprises	Manufacturing	Manufacturing
3	Professional and technical services	Finance and insurance	Retail trade	Finance and insurance
4	Finance and insurance	Retail trade	Wholesale trade	Retail trade
5	Retail trade	Professional and technical services	Finance and insurance	Professional and technical services

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.

Table C-69 — Employment Compensation by Industry, 2005 (Flora Industrial Park Site)

	Employment (total wages - thousands of dollars) 2005				Employment (total wages - percent) 2005			
Industry	Hinds	Madison	Yazoo	Area Total	Hinds	Madison	Yazoo	Area Total
Farm	5,257	2,121	6,329	13,707	0.1	0.1	2.5	0.2
Forestry, fishing, related activities, and other[a]	3,337	4,983	(D)	NA	0.1	0.3	(D)	NA
Mining	18,443	12,128	(D)	NA	0.3	0.7	(D)	NA
Utilities	103,408	1,785	4,457	109,650	1.6	0.1	1.7	1.3
Construction	219,428	99,690	2,083	321,201	3.5	5.3	0.8	3.8
Manufacturing	348,044	512,592	46,274	906,910	5.5	27.3	18.1	10.7
Wholesale trade	324,671	103,469	13,948	442,088	5.1	5.5	5.5	5.2
Retail trade	435,409	162,244	14,649	612,302	6.9	8.7	5.7	7.2
Transportation and warehousing	139,999	40,617	1,974	182,590	2.2	2.2	0.8	2.2
Information	186,084	47,340	2,120	235,544	2.9	2.5	0.8	2.8
Finance and insurance	446,827	181,948	11,362	640,137	7.0	9.7	4.5	7.6
Real estate and rental and leasing	66,206	25,278	768	92,252	1.0	1.4	0.3	1.1
Professional and technical services	461,515	147,326	2,367	611,208	7.3	7.9	0.9	7.2
Management of companies and enterprises	225,169	46,883	(D)	NA	3.6	2.5	(D)	NA
Administrative and waste services	169,885	67,139	(D)	NA	2.7	3.6	(D)	NA
Educational services	108,305	29,455	(D)	NA	1.7	1.6	(D)	NA
Health care and social assistance	774,142	92,750	(D)	NA	12.2	5.0	(D)	NA
Arts, entertainment, and recreation	27,077	7,124	277	34,478	0.4	0.4	0.1	0.4
Accommodation and food services	147,236	62,554	4,034	213,824	2.3	3.3	1.6	2.5
Other services, except public administration	181,836	44,678	9,038	235,552	2.9	2.4	3.5	2.8
Government and government enterprises	1,959,142	183,279	99,800	2,242,221	30.9	9.8	39.1	26.4
Total Compensation of Employees	6,351,420	1,875,383	255,497	8,482,300				

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a]This includes agriculture and forestry support industries.

Table C-70 — Agriculture and Hunting Industries in Study Area and Other Surrounding Counties, 2006 (Flora Industrial Park Site)

Industry	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)
	Hinds			Madison			Yazoo			Attala			Holmes		
Agriculture and Hunting	70.631	845	7.952	53.152	771	6.334	129.641	1,180	9.710	38.946	755	8.837	71.471	856	7.284
(Percentage of Total)	(0.414)	(0.517)	(0.119)	(0.391)	(1.402)	(0.315)	(8.389)	(8.935)	(3.383)	(4.453)	(8.456)	(4.787)	(9.537)	(9.580)	(4.581)
Animal Production[a]	20.444	276	3.157	4.963	89	0.217	17.597	337	0.823	8.097	240	1.394	4.171	64	0.186
(Percentage of Total)	(0.120)	(0.169)	(0.047)	(0.036)	(0.162)	(0.011)	(1.139)	(2.552)	(0.287)	(0.926)	(2.688)	(0.755)	(0.557)	(0.716)	(0.117)
Hunting and Trapping[a]	0.191	2	0.001	0.000	0	0.000	0.229	2	0.000	0.000	0	0.000	0.000	0	0.000
(Percentage of Total)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.015)	(0.015)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Total (for all industries)	17,063.6	163,400	6,696.9	13,602.2	54,990	2,012.9	1,545.4	13,206	287.0	874.6	8,929	184.6	749.4	8,935	159.0
	Leake			Rankin			Scott			8 County Total					
Agriculture and Hunting	215.071	1,039	21.050	151.905	706	15.994	280.715	661	8.802	1,011.532	6,813	85.963			
(Percentage of Total)	(18.845)	(9.611)	(10.269)	(1.922)	(1.050)	(0.654)	(11.080)	(3.428)	(1.946)	(2.227)	(1.964)	(0.691)			
Animal Production[a]	173.976	648	12.433	92.302	387	1.376	257.738	460	7.841	579.288	2,501	27.427			
(Percentage of Total)	(15.244)	(5.994)	(6.066)	(1.168)	(0.575)	(0.056)	(10.173)	(2.386)	(1.733)	(1.276)	(0.721)	(0.220)			
Hunting and Trapping[a]	0.000	0	0.000	0.000	0	0.000	0.000	0	0.000	0.420	4	0.001			
(Percentage of Total)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)			
Total (for all industries)	1,141.3	10,811	205.0	7,905.4	67,253	2,446.4	2,533.5	19,283	452.3	45,415.3	346,807	12,444.2			

Source: MIG 2006.

[a]These values are included in the total value of 'Agriculture and Hunting' industries.

Table C-71 — Livestock Proximal to Proposed NBAF Site (Flora Industrial Park Site)

County	No. Herds	No. Livestock	No. Poultry Farms	No. Poultry
Madison	324	191,448	140	2,675
Yazoo	231	13,370	83	6,760
Attala	268	10,533	95	279,024
Hinds	624	35,300	253	968,459
Rankin	424	18,231	272	5,035,340
Scott	450	23,639	288	31,600,000
Leake	440	20,270	253	11,100,000
Holmes	238	11,765	97	1,477
Total	2,999	324,556	1,481	48,993,735

Source: DHS 2007.

Table C-72 — Income and Poverty, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2000 (Flora Industrial Park Site)

	Town of Flora		Madison County		Hinds County		Yazoo County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Income										
Median Household Income, 1999	$38,077	NA	$46,970	NA	$33,991	NA	$24,795	NA	$35,753	NA
Per Capita Income, 1999	$16,075	NA	$23,469	NA	$17,785	NA	$12,062	NA	$18,529	NA
Poverty										
Population for Whom Poverty Status Is Determined[a]	1,531	100.0	72,569	100.0	241,595	100.0	25,778	100.0	341,473	100.0
Population With Income in 1999 Below Poverty Level	387	25.3	10,155	14.0	48,193	20.0	8,214	31.9	66,949	19.6

Sources: U.S. Census Bureau 2000 Study area total Median Household and Per Capita Income from ESRI BIS weighted average.
[a]Includes most population groups except for Group Quarters (e.g., barracks, dormitories, nursing homes, prisons, etc.).

Table C-73 — Population, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 1990-2012 (Flora Industrial Park Site)

	Population				Compound Annual Growth Rate (CAGR) Percent[a]			
	1990	2000	2007	2012	1990 - 2000	2000-2007	2007-2012	1990-2012
Town of Flora	1,478	1,546	1,797	2,034	0.5	2.2	2.5	1.5
Madison County	53,794	74,674	91,779	106,313	3.3	3.0	3.0	3.1
Hinds County	254,441	250,800	251,503	252,576	−0.1	0.0	0.1	−0.0
Yazoo County	25,506	28,149	29,683	29,588	1.0	0.8	−0.1	0.7
Study Area Total	333,741	353,623	372,965	388,477	0.6	0.8	0.8	0.7
Mississippi	2,573,216	2,844,658	2,969,306	3,072,081	1.0	0.6	0.7	0.8

Source: U.S. Census Bureau 2000. 2007 and 2012 population forecasts: ESRI BIS.

[a]The CAGR is a simplified estimate that measures the growth of the population as if it had grown at a steady single rate on an annually compounded basis.

Table C-74 — Population by Ethnicity and Race, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2000 (Flora Industrial Park Site)

	Town of Flora		Madison County		Hinds County		Yazoo County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
White Alone	882	57.1	45,021	60.3	93,584	37.3	12,593	44.7	151,199	42.8
Non-Hispanic White	879	56.9	44,613	59.7	92,804	37.0	11,558	41.1	148,976	42.1
Hispanic White	3	0.2	408	0.6	780	0.3	1,035	3.7	2,223	0.6
Non-White Alone	664	43.0	29,653	39.7	157,216	62.7	15,556	55.3	202,426	57.2
Black or African American Alone	650	42.0	27,987	37.5	153,297	61.1	15,189	54.0	196,474	55.6
American Indian and Native Alaskan Alone	10	0.7	83	0.1	307	0.1	56	0.2	446	0.1
Asian Alone	0	0.0	973	1.3	1,507	0.6	102	0.4	2,582	0.7
Native Hawaiian and Other Pacific Islander	0	0.0	16	0.0	29	0.0	1	0.0	46	0.0
Other[a]	4	0.3	594	0.8	2,076	0.8	208	0.7	2,878	0.8
Total	1,546	100.0	74,674	100.0	250,800	100.0	28,149	100.0	353,625	100.0
Minority Population Total[b]	667	43.1	30,061	40.3	157,996	63.0	16,591	58.9	204,649	57.9
Hispanic Population Total	5	0.3	742	1.00	1,978	0.8	1,233	4.4	3,953	1.1

Source: U.S. Census Bureau 2000.

[a]The Other category includes the census categories "some other race alone" and "two or more races."

[b]The total minority population includes all those who have classified themselves as Black or African American, Hispanic (White and Non-White), Asian Alone, American Indian or Alaskan Native, Native Hawaiian and Other Pacific Islander, and Others.

Table C-75 — Age Profile, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2000 (Flora Industrial Park Site)

	Town of Flora		Madison County		Hinds County		Yazoo County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5 Years	137	8.9	5,851	7.8	18,672	7.4	2,095	7.4	26,618	7.5
5 to 9 Years	134	8.7	6,085	8.2	19,677	7.9	2,269	8.1	28,031	7.9
10 to 14 Years	111	7.2	6,054	8.1	19,407	7.7	2,254	8.0	27,715	7.8
15 to 18 Years	95	6.1	4,492	6.0	16,765	6.7	1,852	6.6	23,109	6.5
19 to 24 Years	121	7.8	5,578	7.5	25,972	10.4	2,309	8.2	33,859	9.6
25 to 34 Years	238	15.4	11,181	15.0	34,918	13.9	3,821	13.6	49,920	14.1
35 to 49 Years	315	20.4	18,540	24.8	54,866	21.9	6,297	22.4	79,703	22.5
50 to 64 Years	227	14.7	9,622	12.9	33,010	13.2	3,752	13.3	46,384	13.1
65 Years and Above	168	10.9	7,271	9.7	27,513	11.0	3,500	12.4	38,284	10.8
Total	1,546	100.0	74,674	100.0	250,800	100.0	28,149	100.0	353,623	100.0

Source: U.S. Census Bureau 2000.

Table C-76 — Educational Attainment, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2000 (Flora Industrial Park Site)

	Town of Flora		Madison County		Hinds County		Yazoo County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than Ninth Grade	75	8.4	2,995	6.4	9,113	6.1	2,469	14.3	14,577	6.8
9th to 12th Grade	151	16.9	4,951	10.6	20,371	13.6	3,585	20.7	28,907	13.5
High School Graduate	283	31.6	8,558	18.3	32,911	21.9	5,369	31.0	46,838	21.9
Some College, No Degree	214	23.9	9,702	20.7	37,573	25.0	3,137	18.1	50,412	23.5
Associate Degree	40	4.5	2,823	6.0	9,451	6.3	712	4.1	12,986	6.1
Bachelor's Degree	101	11.3	12,110	25.9	25,775	17.2	1,420	8.2	39,305	18.3
Graduate or Professional Degree	32	3.6	5,634	12.1	15,093	10.0	616	3.6	21,343	10.0
Total	896	100.0	46,773	100.0	150,287	100.0	17,308	100.0	214,368	100.0

Source: U.S. Census Bureau 2000.

Table C-77 — Housing Units by Occupancy, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2000 (Flora Industrial Park Site)

	Town of Flora		Madison County		Hinds County		Yazoo County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	726	100.0	36,256	100.0	104,992	100.0	10,234	100.0	151,482	100.0
Occupied Housing Units	691	95.2	34,381	94.8	93,583	89.1	9,264	90.5	137,228	90.6
Owner-Occupied Housing Units	558	76.9	24,422	67.4	59,857	57.0	6,382	62.4	90,661	59.9
Renter-Occupied Housing Units	133	18.3	9,959	27.5	33,726	32.1	2,882	28.2	46,567	30.7
Vacant Housing Units	35	4.8	1,875	5.2	11,409	10.9	970	9.5	14,254	9.4

Source: U.S. Census Bureau 2000.

Table C-78 — Housing Units by Structure Type, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2000 (Flora Industrial Park Site)

	Town of Flora		Madison County		Hinds County		Yazoo County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	597	100.0	28,781	100.0	100,287	100.0	10,015	100.0	139,083	100.0
1, Detached	397	66.5	19,915	69.2	68,699	68.5	6,724	67.1	95,338	68.6
1, Attached	5	0.8	666	2.3	3,350	3.3	160	1.6	4,176	3.0
2	2	0.3	439	1.5	3,429	3.4	262	2.6	4,130	3.0
3 or 4	66	11.1	1,552	5.4	5,411	5.4	383	3.8	7,346	5.3
5 to 9	47	7.9	1,896	6.6	6,504	6.5	439	4.4	8,839	6.4
10 to 19	0	0.0	869	3.0	2,187	2.2	29	0.3	3,085	2.2
20+	1	0.2	1,245	4.3	6,677	6.7	157	1.6	8,079	5.8
Mobile Home	79	13.2	2,140	7.4	3,954	3.9	1,854	18.5	7,948	5.7
Other	0	0.0	59	0.2	76	0.1	7	0.1	142	0.1

Source: U.S. Census Bureau 2000.

Table C-79 — Median Housing Value and Median Rent, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2000-2007[a] (Flora Industrial Park Site)

	Town of Flora			Madison County			Hinds County			Yazoo County		
	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR
Median Housing Value	$67,949	$98,021	5.4%	$110,907	$149,898	4.4%	$72,100	$94,645	4.0%	$49,448	$71,102	5.3%

Source: U.S. Census Bureau 2000. 2007 population forecasts: ESRI BIS.
CAGR = Compound Annual Growth Rate.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-80 — Housing Value, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2007[a] (Flora Industrial Park Site)

	Town of Flora		Madison County		Hinds County		Yazoo County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$50,000	99	17.8	2,789	11.4	8,858	14.8	2,048	32.1	13,695	15.1
$50,000 - $99,000	189	33.9	4,231	17.3	23,447	39.2	2,376	37.2	30,054	33.2
$100,000 - $149,999	96	17.2	5,197	21.3	14,703	24.6	1,197	18.8	21,097	23.3
$150,000 - $199,999	45	8.1	3,901	16.0	5,224	8.7	369	5.8	9,494	10.5
$200,000 - $299,999	63	11.3	4,204	17.2	4,602	7.7	254	4.0	9,060	10.0
$300,000 - $499,999	47	8.4	2,839	11.6	2,055	3.4	120	1.9	5,014	5.5
$500,000+	18	3.2	1,252	5.1	958	1.6	18	0.3	2,228	2.5
Total	557	100.0	24,413	100.0	59,847	100.0	6,382	100.0	90,642	100.0

Source: 2007 population forecasts: ESRI BIS.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-81 — Median Rent, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 1990-2000[a] (Flora Industrial Park Site)

	Town of Flora			Madison County			Hinds County			Yazoo County		
	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR
Median Rent	$172	$307	6.0%	$355	$507	3.6%	$292	$405	3.3%	$125	$227	6.5%

Source: U.S. Census Bureau 1990-2000.
CAGR = Compound Annual Growth Rate.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-82 — Contract Rent, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2000[a] (Flora Industrial Park Site)

	Town of Flora		Madison County		Hinds County		Yazoo County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$200	47	33.3	938	12.7	4,906	15.9	1,044	43.5	6,888	16.9
$200 - $499	84	59.6	2,665	36.2	17,752	57.4	1,254	52.2	21,671	53.3
$500 - $749	8	5.7	2,873	39.0	7,112	23.0	78	3.3	10,063	24.7
$750 - $999	2	1.4	418	5.7	801	2.6	12	0.5	1,231	3.0
$1,000+	0	0.0	470	6.4	338	1.1	13	0.5	821	2.0
Total	141	100.0	7,364	100.0	30,909	100.0	2,401	100.0	40,674	100.0

Source: U.S. Census Bureau 2000.
[a]Specified renter-occupied housing units.

Table C-83 — Annual New Privately Owned Residential Building Permits, Town of Flora, Madison County, Hinds County, and Yazoo County, Mississippi, 2005 (Flora Industrial Park Site)

	Town of Flora			Madison County			Hinds County			Yazoo County		
	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost
Single Family	2	2	$290,000	1,182	1,182	$249,163,590	629	629	$71,898,168	4	4	$267,380
Two Family	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Three and Four Family	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Five or More Family	0	0	$0	0	0	$0	0	0	$0	0	0	$0
Total	2	2	$290,000	1,182	1,182	$249,163,590	629	629	$71,898,168	4	4	$267,380

Source: U.S. Census Bureau 2000.

Table C-84 — Labor Force and Unemployment, 1990, 2000, and 2006 (Umstead Research Farm Site)

	Durham County				Granville County				Vance County			
Year	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	135,753	130,415	5,338	3.9	24,395	23,111	1,284	5.3	18,934	17,501	1,433	7.6
2000	122,130	118,511	3,619	3.0	22,502	21,507	995	4.4	20,240	18,853	1,387	6.9
1990	102,622	99,844	2,778	2.7	19,766	18,848	918	4.6	20,483	18,803	1,680	8.2

	Wake County				Area Total				North Carolina			
Year	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	426,125	410,618	15,507	3.6	605,207	581,645	23,562	3.9	4,464,878	4,250,622	214,256	4.8
2000	366,028	357,153	8,875	2.4	530,900	516,024	14,876	2.8	4,123,821	3,969,240	154,581	3.7
1990	255,989	249,436	6,553	2.6	398,860	386,931	11,929	3.0	3,497,582	3,352,169	145,413	4.2

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, 1990, 2000, and 2006 data.

Table C-85 — Journey-to-Work Patterns, 2000 (Umstead Research Farm Site)

Residence County	Work County	Workers	Percent
Durham Co. NC	Durham Co. NC	84,262	74.9
Durham Co. NC	Wake Co. NC	13,929	12.4
Durham Co. NC	Orange Co. NC	9,262	8.2
Durham Co. NC	Granville Co. NC	1,410	1.3
Durham Co. NC	Johnston Co. NC	409	0.4
Granville Co. NC	Granville Co. NC	10,957	53.5
Granville Co. NC	Durham Co. NC	4,609	22.5
Granville Co. NC	Wake Co. NC	2,489	12.1
Granville Co. NC	Vance Co. NC	1,026	5.0
Granville Co. NC	Orange Co. NC	249	1.2
Vance Co. NC	Vance Co. NC	12,561	70.1
Vance Co. NC	Granville Co. NC	2,347	13.1
Vance Co. NC	Wake Co. NC	1,175	6.6
Vance Co. NC	Durham Co. NC	542	3.0
Vance Co. NC	Franklin Co. NC	377	2.1
Wake Co. NC	Wake Co. NC	272,432	80.5
Wake Co. NC	Durham Co. NC	43,351	12.8
Wake Co. NC	Johnston Co. NC	4,050	1.2
Wake Co. NC	Orange Co. NC	3,552	1.0
Wake Co. NC	Franklin Co. NC	2,430	0.7

Source: U.S. Census Bureau, 2000 County to County Worker Flow Files.

Table C-86 — Top Five Industry Employers by Number of Jobs (Umstead Research Farm Site)

	Durham	Granville	Vance	Wake	Total Study Area
1	Manufacturing	Government and government enterprises	Government and government enterprises	Government and government enterprises	Government and government enterprises
2	Health care and social assistance	Manufacturing	Retail trade	Retail trade	Retail trade
3	Professional and technical services	Retail trade	Health care and social assistance	Professional and technical services	Professional and technical services
4	Government and government enterprises	Construction	Manufacturing	Administrative and waste services	Manufacturing
5	Retail trade	Administrative and waste services	Accommodation and food services	Construction	Administrative and waste services

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.

Table C-87 — Employment by Industry, 2005 (Umstead Research Farm Site)

	Employment (total number of jobs) 2005					Employment (total percentage of jobs) 2005				
Industry	Durham	Granville	Vance	Wake	Area Total	Durham	Granville	Vance	Wake	Area Total
Farm	200	909	403	1,231	2,743	0.1	3.7	2.1	0.2	0.4
Forestry, fishing, related activities, & other [a]	(D)	145	(D)	1,312	NA	(D)	0.6	(D)	0.3	NA
Mining	(D)	(L)	(D)	399	NA	(D)	(L)	(D)	0	NA
Utilities	(D)	(D)	(D)	(D)	NA	(D)	(D)	(D)	(D)	NA
Construction	7,986	1,371	961	37,603	47,921	3.8	5.6	4.9	7.4	6.3
Manufacturing	32,435	5,566	2,361	22,716	63,078	15.3	22.8	12.1	4.5	8.3
Wholesale trade	6,880	290	733	21,740	29,643	3.3	1.2	3.8	4.3	3.9
Retail trade	16,469	1,844	2,812	57,069	78,194	7.8	7.6	14.4	11.2	10.2
Transportation and warehousing	(D)	(D)	(D)	(D)	NA	(D)	(D)	(D)	(D)	NA
Information	3,574	104	186	18,543	22,407	1.7	0.4	1.0	3.7	2.9
Finance and insurance	7,710	325	383	19,248	27,666	3.6	1.3	2.0	3.8	3.6
Real estate and rental and leasing	6,285	477	659	22,566	29,987	3.0	2.0	3.4	4.4	3.9
Professional and technical services	22,421	506	393	47,962	71,282	10.6	2.1	2.0	9.4	9.3
Management of companies & enterprises	1,789	39	82	9,920	11,830	0.9	0.2	0.4	2.0	1.6
Administrative and waste services	13,031	1,126	1,001	37,646	52,804	6.2	4.6	5.1	7.4	6.9
Educational services	14,083	(D)	132	9,914	NA	6.7	(D)	0.7	2.0	NA
Health care and social assistance	32,079	(D)	2,428	36,864	NA	15.2	(D)	12.4	7.3	NA
Arts, entertainment, and recreation	3,127	140	199	9,110	12,576	1.5	0.6	1.0	1.8	1.7
Accommodation and food services	11,774	961	1,524	33,650	47,909	5.6	3.9	7.8	6.6	6.3
Other services, except public administration	9,501	1,109	907	25,865	37,382	4.5	4.5	4.6	5.1	4.9
Government and government enterprises	18,745	7,668	3,342	83,202	112,957	8.9	31.4	17.1	16.4	14.8
Total Number of Jobs	211,588	24,423	19,533	508,662	764,206					

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
(L) = Less than 10 jobs, but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a] This includes agriculture and forestry support industries.

Table C-88 — Employment Compensation by Industry, 2005 (Umstead Research Farm Site)

	Employment (total wages - thousands of dollars) 2005					Employment (total wages - percent) 2005				
Industry	Durham	Granville	Vance	Wake	Area Total	Durham	Granville	Vance	Wake	Area Total
Farm	994	5,410	3,173	10,170	19,747	0.0	0.62	0.6	0.1	0.1
Forestry, fishing, related activities, & other [a]	(D)	2,462	(D)	48,296	NA	(D)	0.28	(D)	0.2	NA
Mining	(D)	0	(D)	96,839	NA	(D)	0.00	(D)	0	NA
Utilities	(D)	(D)	(D)	(D)	NA	(D)	(D)	(D)	(D)	NA
Construction	256,288	28,591	22,476	1,499,643	1,806,998	2.2	3.30	4.0	7.0	5.2
Manufacturing	3,821,439	298,273	92,830	1,563,209	5,775,751	33.0	34.39	16.6	7.3	16.7
Wholesale trade	622,402	9,590	30,953	1,659,628	2,322,573	5.4	1.11	5.5	7.7	7
Retail trade	362,502	40,291	65,097	1,519,392	1,987,282	3.1	4.65	11.6	7.1	5.8
Transportation and warehousing	(D)	(D)	(D)	(D)	NA	(D)	(D)	(D)	(D)	NA
Information	208,783	2,677	6,234	1,486,253	1,703,947	1.8	0.31	1.1	6.9	4.9
Finance and insurance	502,598	6,318	10,536	1,041,279	1,560,731	4.4	0.73	1.9	4.8	4.5
Real estate and rental and leasing	87,286	2,652	6,336	376,094	472,368	0.8	0.31	1.1	1.8	1
Professional and technical services	1,391,791	7,771	8,003	2,589,410	3,996,975	12.0	0.90	1.4	12.0	12
Management of companies & enterprises	202,037	2,001	4,766	702,272	911,076	1.8	0.23	0.9	3.3	3
Administrative and waste services	334,839	19,817	20,341	1,059,532	1,434,529	2.9	2.29	3.6	4.9	4
Educational services	533,163	(D)	2,648	228,362	NA	4.6	(D)	0.5	1.1	NA
Health care and social assistance	1,509,956	(D)	84,828	1,489,278	NA	13.1	(D)	15.2	6.9	NA
Arts, entertainment, and recreation	28,494	628	3,201	122,613	154,936	0.3	0.07	0.6	0.6	0.5
Accommodation and food services	222,474	11,271	18,322	568,998	821,065	1.9	1.30	3.3	2.7	2.4
Other services, except public administration	214,833	16,893	17,075	616,859	865,660	1.9	1.95	3.1	2.9	2.5
Government and government enterprises	1,134,127	369,935	127,288	4,204,268	5,835,618	9.8	42.66	22.8	19.6	16.9
Total Compensation of Employees	11,564,423	867,224	559,600	21,503,108	34,494,355					

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a] This includes agriculture and forestry support industries.

Table C-89 — Major Employers in the Region of Study (Umstead Research Farm Site)

Durham		Granville		Vance		Wake	
Company	Employees	Company	Employees	Company	Employees	Company	Employees
Duke University	1,000+	State of North Carolina	1,000+	Vance County Schools	1,000+	State of North Carolina	1,000+
International Business Machines	1,000+	Revlon Consumer Products Corp.	1,000+	Wal-Mart Associates, Inc.	500-999	Wake County Public Schools	1,000+
Durham Public Schools	1,000+	Granville County Schools	1,000+	Maria Parham Hospital	500-999	NC State University at Raleigh	1,000+
GlaxoSmithKline	1,000+	U.S. Department of Justice	1,000+	Vance Granville Community College	250-499	Wake Medical Center	1,000+
Blue Cross & Blue Shield of NC, Inc.	1,000+	Solectron Usa, Inc.	250-499	County of Vance	250-499	Sas Institute, Inc.	1,000+
Cisco Systems, Inc.	1,000+	Altec Industries, Inc.	250-499	Royal Home Fashions, Inc.	250-499	County of Wake	1,000+
Nortel Networks, Inc.	1,000+	Granville Medical Center	250-499	Handcrafted Homes LLC	250-499	City of Raleigh	1,000+
City of Durham	1,000+	County of Granville	250-499	City of Henderson	250-499	Rex Healthcare	1,000+
VA Medical Center	1,000+	Certain-Teed Corporation	250-499	Saint Gobain Containers	100-249	Wal-Mart Associates, Inc.	1,000+
Research Triangle Institute	1,000+	Athol Manufacturing Corporation	100-249	Air Technologies	100-249	NC Dept. of Transportation	1,000+
Durham County	1,000+	Rha-Nc Operations, Inc.	100-249	Pacific Coast Feather Company	100-249	U.S. Postal Service	1,000+
Duke University Health Systems, Inc.	1,000+	Newton Instrument Co., Inc.	100-249	Food Lion LLC	100-249	Food Lion LLC	1,000+
State of North Carolina	1,000+	Clayton Mobile Homes	100-249	Staffmark LLC East	100-249	Harris Teeter, Inc.	1,000+
Lenovo (United States), Inc.	1,000+	Bandag Center	100-249	Corporate Express	100-249	Progress Energy Carolinas	1,000+
Cree Research, Inc.	1,000+	Ideal Fastener Corporation	100-249	NC Dept. of Transportation	100-249	Target Stores Div.	1,000+
Environmental Protection Agency	1,000+	Gate Precast Company	100-249	Advantage Care In Home Services, Inc.	100-249	Y M C A	1,000+
A W North Carolina, Inc.	1,000+	South Village	100-249	M R Williams, Inc. T/A	100-249	State of North Carolina	1,000+
Quintiles, Inc.	500-999	Food Lion LLC	100-249	The Iams Company (A Corp.)	100-249	First Citizens Bank & Trust Co.	1,000+
Laboratory Corp. of America Holdings	500-999	Wal-Mart Associates, Inc.	100-249	Management and Training Corp.	100-249	United Parcel Service, Inc.	1,000+
U.S. Dept. of Health & Human Services	500-999	Manpower Temporary Services	100-249	Lowes Home Centers, Inc.	100-249	Wake Technical Community College	1,000+

Table C-89 — Major Employers in the Region of Study (Umstead Research Farm Site) (Continued)

Durham		Granville		Vance		Wake	
Company	Employees	Company	Employees	Company	Employees	Company	Employees
Wal-Mart Associates, Inc.	500-999	Palletone of North Carolina, Inc.	100-249	Clayton Mobile Homes	100-249	State Employees Credit Union, Inc.	1,000+
Verizon South, Inc.	500-999	Lace Lastics Co., Inc.	100-249	Britthaven, Inc.	100-249	Time Warner Entertainment Advance	1,000+
Durham Technical Community College	500-999	Santa Fe Natural Tobacco Co., Inc.	100-249	State of North Carolina	100-249	Manpower Temporary Services	1,000+
Kroger Limited Partnership	500-999	Bailey Farms, Inc.	100-249	State of North Carolina	100-249	American Airlines, Inc.	1,000+
Biomerieux	500-999	Granville Management Corporation	100-249	Senior Citizens Home, Inc.	100-249	Lowes Home Centers, Inc.	1,000+

Source: Employment Security Commission of North Carolina September 2006 Employment Data – available at http://jobs.esc.state.nc.us/lmi/largest/largest.pdf.

Table C-90 — Top Five Industry Employers by Total Compensation Paid (Umstead Research Farm Site)

	Durham	Granville	Vance	Wake	Total Study Area
1	Manufacturing	Government and government enterprises	Government and government enterprises	Government and government enterprises	Government and government enterprises
2	Health care and social assistance	Manufacturing	Manufacturing	Professional and technical services	Manufacturing
3	Professional and technical services	Retail trade	Health care and social assistance	Wholesale trade	Professional and technical services
4	Government and government enterprises	Construction	Retail trade	Manufacturing	Wholesale trade
5	Wholesale trade	Administrative and waste services	Wholesale trade	Retail trade	Retail trade

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.

Table C-91 — Agriculture and Hunting Industries in Study Area and Other Surrounding Counties, 2006 (Umstead Research Farm Site)

Industry	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)
	Granville			Durham			Vance			Wake			Franklin		
Agriculture and Hunting	52.1	572	8.7	24.7	404	12.1	20.5	374	4.3	175.7	2,160	60.3	69.3	904	15.3
(Percentage of Total)	(1.327)	(2.495)	(0.865)	(0.068)	(0.194)	(0.112)	(1.106)	(2.028)	(0.746)	(0.253)	(0.384)	(0.254)	(3.323)	(5.160)	(3.275)
Animal Production[a]	6.1	73	1.8	2.3	59	0.4	1.6	50	0.2	15.0	235	1.2	16.0	385	3.3
(Percentage of Total)	(0.155)	(0.318)	(0.178)	(0.006)	(0.028)	(0.003)	(0.087)	(0.271)	(0.036)	(0.022)	(0.042)	(0.005)	(0.767)	(2.197)	(0.702)
Hunting and Trapping[a]	1.1	10	0.0	1.6	14	0.0	2.6	23	0.0	8.3	74	0.0	0.8	7	0.0
(Percentage of Total)	(0.027)	(0.044)	(0.001)	(0.004)	(0.007)	(0.000)	(0.143)	(0.125)	(0.000)	(0.012)	(0.013)	(0.000)	(0.040)	(0.040)	(0.000)
Total (for all industries)	3,928.0	22,922	1,003.8	36,461.5	208,714	10,851.8	1,853.5	18,440	570.7	69,358.6	562,856	23,755.1	2,084.5	17,521	467.6

	Person			Halifax, VA			Mecklenburg, VA			8 County Total		
Agriculture and Hunting	21.9	387	4.4	42.1	1,070	9.2	82.7	1,011	13.8	488.9	6,882	128.1
(Percentage of Total)	(1.213)	(2.738)	(0.914)	(1.877)	(6.177)	(1.723)	(5.928)	(6.337)	(3.234)	(0.410)	(0.784)	(0.336)
Animal Production[a]	5.9	148	1.5	10.3	391	3.5	11.4	209	2.0	68.6	1,550	13.8
(Percentage of Total)	(0.325)	(1.047)	(0.307)	(0.457)	(2.257)	(0.649)	(0.821)	(1.310)	(0.460)	(0.058)	(0.177)	(0.036)
Hunting and Trapping[a]	0.2	1	0.0	4.5	38	0.0	10.0	81	0.5	29.2	248	0.5
(Percentage of Total)	(0.009)	(0.007)	(0.000)	(0.201)	(0.219)	(0.000)	(0.718)	(0.508)	(0.111)	(0.025)	(0.028)	(0.001)
Total (for all industries)	1,803.2	14,133	484.8	2,242.0	17,323	532.2	1,394.6	15,954	425.8	119,125.8	877,863	38,091.8

Source: MIG 2006.

[a] These values are included in the total value of Agriculture and Hunting industries.

Table C-92 — Livestock Proximal to Proposed NBAF Site (Umstead Research Farm Site)

County	No. Herds	No. Livestock	No. Poultry Farms	No. Poultry
Granville	301	16,674	229	10,673
Halifax	460	31,693	150	33,865
Mecklenburg	355	24,054	107	103,959
Person	197	22,583	99	20,094
Durham	101	4,611	162	10,269
Wake	270	13,835	513	338,329
Franklin	238	40,263	198	457,200
Vance	77	2,346	90	926,070
Total	1,999	156,059	1,548	1,900,459

Source: DHS 2007.

Table C-93 — Income and Poverty, Town of Butner, Durham County, Granville County, Vance County, and Wake County, North Carolina, 2000 (Umstead Research Farm Site)

	Town of Butner		Granville County		Durham County		Vance County		Wake County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Income												
Median Household Income, 1999	$40,341	NA	$39,965	NA	$43,337	NA	$31,301	NA	$54,988	NA	$50,396	NA
Per Capita Income, 1999	$15,174	NA	$17,118	NA	$23,156	NA	$15,897	NA	$27,004	NA	$25,115	NA
Poverty												
Population for Whom Poverty Status Is Determined [a]	3,573	100.0	42,923	100.0	213,558	100.0	42,232	100.0	609,489	100.0	908,202	100.0
Population With Income in 1999 Below Poverty Level	188	5.3	5,009	11.7	28,557	13.4	8,659	20.5	47,685	7.8	89,910	9.9

Sources: U.S. Census Bureau.

[a] Includes most population groups except for Group Quarters (e.g., barracks, dormitories, nursing homes, prisons, etc.).

Table C-94 — Population by Ethnicity and Race, Town of Butner, Granville County, Durham County, Vance County, and Wake County, North Carolina, 2000 (Umstead Research Farm Site)

	Town of Butner		Granville County		Durham County		Vance County		Wake County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
White Alone	2,814	48.6	29,459	60.7	113,698	50.9	20,709	48.2	454,544	72.4	618,410	65.6
Non-Hispanic White	2,757	47.6	28,777	59.3	107,371	48.1	19,894	46.3	439,160	70.0	595,202	63.1
Hispanic White	57	1.0	682	1.4	6,327	2.8	815	1.9	15,384	2.5	23,208	2.5
Non-White Alone	2,978	51.4	19,039	39.3	109,616	49.1	22,245	51.8	173,302	27.6	324,202	34.4
Black or African American Alone	2,622	45.3	16,943	34.9	88,109	39.5	20,749	48.3	123,820	19.7	249,621	26.5
American Indian and Native Alaskan Alone	40	0.7	222	0.5	660	0.3	85	0.2	2,152	0.3	3,119	0.3
Asian Alone	37	0.6	176	0.4	7,350	3.3	167	0.4	21,249	3.4	28,942	3.1
Native Hawaiian and Other Pacific Islander	0	0.0	9	0.0	79	0.0	13	0.0	212	0.0	313	0.0
Other [a]	279	4.8	1,689	3.5	13,418	6.0	1,231	2.9	25,869	4.1	42,207	4.5
Total	5,792	100.0	48,498	100.0	223,314	100.0	42,954	100.0	627,846	100.0	942,612	100.0
Minority Population Total [b]	3,035	52.4	19,721	40.7	115,943	51.9	23,060	53.7	188,686	30.1	347,410	36.9
Hispanic Population Total	264	4.6	1,951	4.0	17,039	7.6	1,957	4.6	33,985	5.4	54,932	5.8

Source: U.S. Census Bureau 2000.

[a]The Other category includes the census categories "some other race alone" and "two or more races."

[b]The total minority population includes all those who have classified themselves as Black or African American, Hispanic (White and Non-White), Asian Alone, American Indian or Alaskan Native, Native Hawaiian and Other Pacific Islander, and Others.

Table C-95 — Population, Town of Butner, Granville County, Durham County, Vance County, and Wake County, North Carolina, 1990-2012 (Umstead Research Farm Site)

	Population				Compound Annual Growth Rate (CAGR) Percent[a]			
	1990	2000	2007	2012	1990 - 2000	2000 - 2007	2007 - 2012	1990 - 2012
Town of Butner	4,177	5,792	6,401	6,597	3.3	1.4	0.6	2.1
Granville County	38,345	48,498	56,182	60,189	2.4	2.1	1.4	2.1
Durham County	181,835	223,314	254,733	274,815	2.1	1.9	1.5	1.9
Vance County	38,892	42,954	43,762	44,102	1.0	0.3	0.2	0.6
Wake County	423,352	627,846	811,478	975,327	4.0	3.7	3.8	3.9
Total Study Area	682,424	942,612	1,166,155	1,354,433	3.3	3.1	3.0	3.2
North Carolina	6,628,637	8,049,313	9,068,106	9,873,032	2.0	1.7	1.7	0.7

Source: U.S. Census Bureau 1990-2000. 2007 and 2012 population forecasts: ESRI BIS.

[a] The CAGR is a simplified estimate that measures the growth of the population as if it had grown at a steady single rate on an annually compounded basis.

Table C-96 — Age Profile, Town of Butner, Granville County, Durham County, Vance County, and Wake County, North Carolina, 2000 (Umstead Research Farm Site)

	Town of Butner		Granville County		Durham County		Vance County		Wake County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5 Years	295	5.1	2,997	6.2	15,492	6.9	3,021	7.0	45,142	7.2	66,652	7.1
5 to 9 Years	303	5.2	3,378	7.0	14,672	6.6	3,504	8.2	46,090	7.3	67,644	7.2
10 to 14 Years	309	5.3	3,351	6.9	13,683	6.1	3,301	7.7	43,320	6.9	63,655	6.8
15 to 18 Years	243	4.2	2,364	4.8	10,690	4.8	2,406	5.6	31,512	5.0	46,972	5.0
19 to 24 Years	1,083	18.7	3,638	7.5	25,312	11.3	3,221	7.5	58,447	9.3	90,618	9.6
25 to 34 Years	856	14.8	7,536	15.5	42,336	19.0	6,050	14.1	113,409	18.1	169,331	18.0
35 to 49 Years	1,371	23.7	12,137	25.0	50,644	22.7	9,395	21.9	162,038	25.8	234,214	24.9
50 to 64 Years	830	14.3	7,552	15.6	28,911	13.0	6,641	15.5	81,516	13.0	124,620	13.2
65 Years and Above	502	8.7	5,545	11.4	21,574	9.7	5,415	12.6	46,372	7.4	78,906	8.4
Total	5,792	100.0	48,498	100.0	223,314	100.0	42,954	100.0	627,846	100.0	942,612	100.0

Source: U.S. Census Bureau 2000.

Table C-97 — Population 25+ Educational Attainment, Town of Butner, Durham County, Granville County, Vance County, and Wake County, North Carolina, 2000 (Umstead Research Farm Site)

	Town of Butner		Granville County		Durham County		Vance County		Wake County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than Ninth Grade	804	22.4	3,342	10.2	9,365	6.5	3,367	12.3	15,158	3.8	32,036	5.2
9th to 12th Grade	457	12.8	5,465	16.7	15,142	10.5	5,374	19.6	27,928	6.9	54,366	8.9
High School Graduate	858	24.0	11,143	34.1	27,605	19.2	9,367	34.2	71,648	17.8	120,621	19.8
Some College, No Degree	790	22.1	6,008	18.4	25,558	17.8	4,726	17.3	80,950	20.1	118,032	19.3
Associate Degree	326	9.1	2,435	7.5	8,406	5.9	1,591	5.8	30,768	7.6	43,526	7.1
Bachelor's Degree	233	6.5	3,048	9.3	32,700	22.7	2,039	7.5	119,389	29.6	157,409	25.8
Graduate or Professional Degree	115	3.2	1,200	3.7	25,028	17.4	896	3.3	57,640	14.3	84,879	13.9
Total	3,583	100.0	32,641	100.0	143,804	100.0	27,360	100.0	403,481	100.0	610,869	100.0

Source: U.S. Census Bureau 2000.

Table C-98 — Housing Units by Occupancy, Town of Butner, Durham County, Granville County, Vance County, and Wake County, North Carolina, 2007 (Umstead Research Farm Site)

	Town of Butner		Granville County		Durham County		Vance County		Wake County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,628	100.0	20,898	100.0	112,573	100.0	19,267	100.0	339,776	100.0	492,514	100.0
Occupied Housing Units	1,576	96.8	19,577	93.7	103,282	91.8	16,825	87.3	314,505	92.6	454,189	92.2
Owner-Occupied Housing Units	1,118	68.7	14,944	71.5	57,503	51.1	11,404	59.2	211,565	62.3	295,416	60.0
Renter-Occupied Housing Units	458	28.1	4,633	22.2	45,779	40.7	5,421	28.1	102,940	30.3	158,773	32.2
Vacant Housing Units	52	3.2	1,321	6.3	9,291	8.3	2,442	12.7	25,271	7.4	38,325	7.8

Source: 2007 population forecasts: ESRI BIS.

Table C-99 — Housing Units by Structure Type, Town of Butner, Durham County, Granville County, Vance County, and Wake County, North Carolina, 2000 (Umstead Research Farm Site)

	Town of Butner		Granville County		Durham County		Vance County		Wake County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	1,481	100.0	17,896	100.0	95,452	100.0	18,196	100.0	258,953	100.0	390,497	100.0
1, Detached	879	59.4	11,112	62.1	54,462	57.1	11,032	60.6	158,185	61.1	234,791	60.1
1, Attached	19	1.3	177	1.0	5,084	5.3	311	1.7	16,217	6.3	21,789	5.6
2	86	5.8	409	2.3	4,682	4.9	692	3.8	5,671	2.2	11,454	2.9
3 or 4	67	4.5	409	2.3	5,385	5.6	401	2.2	12,051	4.7	18,246	4.7
5 to 9	202	13.6	402	23	8,255	8.7	357	2.0	20,802	8.0	29,816	7.6
10 to 19	15	1.0	74	0.4	8,383	8.8	58	0.3	18,924	7.3	27,439	7.0
20+	23	1.6	182	1.0	7,648	8.0	288	1.6	12,813	5.0	20,931	5.4
Mobile Home	190	12.8	5,119	28.6	1,547	1.6	5,050	27.8	14,210	5.5	25,926	6.6

Source: U.S. Census Bureau 2007.

Table C-100 — Median Housing Value, Town of Butner, Granville County, Durham County, Vance County, and Wake County, North Carolina, 2000-2007[a] (Umstead Research Farm Site)

	Town of Butner			Granville County			Durham County			Vance County			Wake County		
	2000	2007	CAGR	2007	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR
Median Housing Value	$92,500	$120,588	3.9%	$88,097	$132,152	6.0%	$128,297	$183,277	5.2%	$70,834	$106,522	6.0%	$156,161	$215,260	4.7%

Source: U.S. Census Bureau 2000. 2007 population forecasts: ESRI BIS.
CAGR = Compound Annual Growth Rate.
[a] Specified owner-occupied and renter-occupied housing units.

Table C-101 — Housing Value, Town of Butner, Granville County, Durham County, Vance County, and Wake County, North Carolina, 2007[a] (Umstead Research Farm Site)

	Town of Butner		Granville County		Durham County		Vance County		Wake County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$50,000	315	28.13	1,902	12.7	1,353	2.4	2,162	18.96	10,105	4.78	15,522	5.25
$50,000 - $99,000	161	14.4	3,032	20.3	5,299	9.2	3,072	26.9	9,059	4.3	20,462	6.9
$100,000 - $149,999	293	26.2	4,008	26.8	14,763	25.7	3,215	28.2	34,472	16.3	56,458	19.1
$150,000 - $199,999	204	18.2	2,572	17.2	11,799	20.5	1,172	10.3	40,518	19.2	56,061	19.0
$200,000 - $299,999	134	12.0	2,361	15.8	16,684	29.0	1,148	10.1	64,406	30.4	84,599	28.6
$300,000 - $499,999	13	1.2	835	5.6	5,512	9.6	466	4.1	37,880	17.9	44,693	15.1
$500,000+	0	0.0	234	1.6	2,081	3.6	169	1.5	15,125	7.2	17,609	6.0
Total	1,120	100.0	14,944	100.0	57,491	100.0	11,404	100.0	211,565	100.0	295,404	100.0

Source: 2007 population forecasts: ESRI BIS.
[a] Specified owner-occupied housing units.

Table C-102 — Median Rent, Town of Butner, Granville County, Durham County, Vance County, and Wake County, North Carolina, 1990-2000 (Umstead Research Farm Site)

	Town of Butner			Granville County			Durham County			Vance County			Wake County		
	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR
Median Rent	$264	$455	5.6%	$207	$352	5.5%	$355	$561	4.7%	$181	$301	5.2%	$392	$631	4.9%

Sources: U.S. Census Bureau 1990-2000.
CAGR = Compound Annual Growth Rate.

Table C-103 — Contract Rent, Town of Butner, Granville County, Durham County, Vance County, and Wake County, North Carolina, 2000 [a] (Umstead Research Farm Site)

	Town of Butner		Granville County		Durham County		Vance County		Wake County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$200	35	7.4	682	19.3	2,673	6.8	1,145	24.9	3,017	3.8	7,517	5.9
$200 - $499	271	56.9	2,194	62.2	13,012	33.0	3,129	68.0	16,302	20.5	34,637	27.2
$500 - $749	134	28.2	497	14.1	16,039	40.6	273	5.9	39,274	49.3	56,083	44.1
$750 - $999	28	5.9	117	3.3	5,927	15.0	48	1.0	15,753	19.8	21,845	17.2
$1,000+	8	1.7	37	1.1	1,840	4.7	5	0.1	5,335	6.7	7,217	5.7
Total	476	100.0	3,527	100.0	39,491	100.0	4,600	100.0	79,681	100.0	127,299	100.0

Source: U.S. Census Bureau 2000.
[a] Specified renter-occupied housing units.

Table C-104 — Annual New Privately Owned Residential Building Permits Granville County, Durham County, Vance County, and Wake County, North Carolina, 2005 (Umstead Research Farm Site)

	Granville County			Durham County			Vance County			Wake County		
	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost
Single Family	549	549	$76,915,355	2,176	2,176	$360,722,007	118	118	$18,511,207	1,861	1,861	$523,636,158
Two Family	1	2	$80,000	22	44	$5,145,158	0	0	$0	0	0	$0
Three and Four Family	0	0	$0	4	12	$905,320	0	0	$0	0	0	$0
Five or More Family	4	27	$2,953,340	15	106	$8,282,679	0	0	$0	24	1,048,000	
Total	554	578	$79,948,695	2,217	2,338	$375,055,164	118	118	$18,511,207	1,862	1,885	$524,684,158

Source: U.S. Census Bureau 2000.

Table C-105 — Labor Force and Unemployment, 1990, 2000, and 2006 (Texas Research Park Site)

	Bexar County				Medina County			
Year	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	741,154	706,362	34,792	4.7	20,172	19,246	926	4.6
2000	660,930	633,957	26,973	4.1	17,932	17,216	716	4.0
1990	562,078	520,505	41,573	7.4	11,668	11,028	640	5.5
	Area Total				Texas			
Year	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate	Civilian Labor Force	No. Employed	No. Unemployed	Unemployed Rate
2006	761,326	725,608	35,718	4.7	11,466,911	10,902,308	564,603	4.9
2000	678,862	651,173	27,689	4.1	10,322,674	9,872,294	450,380	4.4
1990	573,746	531,533	42,213	7.4	8,575,947	8,025,336	550,611	6.4

Source: Bureau of Labor Statistics, Local Area Unemployment Statistics, 1990, 2000 and 2006 data.

Table C-106 — Journey-to-Work Patterns, 2000 (Texas Research Park Site)

Residence County	Work County	Workers	Percent
Bexar Co. TX	Bexar Co. TX	581,796	95.7
Bexar Co. TX	Guadalupe Co. TX	4,591	0.8
Bexar Co. TX	Comal Co. TX	4,382	0.7
Bexar Co. TX	Travis Co. TX	2,570	0.4
Bexar Co. TX	Kendall Co. TX	1,734	0.3
Medina Co. TX	Medina Co. TX	7,769	49.0
Medina Co. TX	Bexar Co. TX	6,658	42.0
Medina Co. TX	Atascosa Co. TX	462	2.9
Medina Co. TX	Frio Co. TX	214	1.3
Medina Co. TX	Uvalde Co. TX	122	0.8
Medina Co. TX	Comal Co. TX	72	0.5

Source: U.S. Census Bureau, 2000 County to County Worker Flow Files.

Table C-107 — Top Five Industry Employers by Number of Jobs (Texas Research Park Site)

	Bexar	Medina	Total Study Area
1	Government and government enterprises	Government and government enterprises	Government and government enterprises
2	Retail trade	Farm	Retail trade
3	Health care and social assistance	Retail trade	Accommodation and food services
4	Accommodation and food services	Construction	Construction
5	Administrative and waste services	Other services, except public administration	Finance and insurance

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.

Table C-108 — Employment by Industry, 2005 (Texas Research Park Site)

	Employment (total number of jobs) 2005			Employment (total percentage of jobs) 2005		
Industry	Bexar	Medina	Area Total	Bexar	Medina	Area Total
Farm	3,250	2,268	5,518	0.4	15.2	0.6
Forestry, fishing, related activities, & other [a]	526	197	723	0.1	1.3	0.1
Mining	4,873	170	5,043	0.5	1.1	0.5
Utilities	296	88	384	0.0	0.6	0.0
Construction	60,379	1,077	61,456	6.6	7.2	6.6
Manufacturing	38,550	592	39,142	4.2	4.0	4.2
Wholesale trade	27,677	315	27,992	3.0	2.1	3.0
Retail trade	99,748	1,586	101,334	10.9	10.6	10.9
Transportation and warehousing	23,817	187	24,004	2.6	1.3	2.6
Information	22,259	124	22,383	2.4	0.8	2.4
Finance and insurance	60,726	579	61,305	6.6	3.9	6.6
Real estate and rental and leasing	36,645	543	37,188	4.0	3.6	4.0
Professional and technical services	55,485	540	56,025	6.1	3.6	6.0
Management of companies and enterprises	7,851	(D)	NA	0.9	(D)	NA
Administrative and waste services	66,826	(D)	NA	7.3	(D)	NA
Educational services	16,361	(D)	NA	1.8	(D)	NA
Health care and social assistance	93,461	(D)	NA	10.2	(D)	NA
Arts, entertainment, and recreation	16,371	141	16,512	1.8	0.9	1.8
Accommodation and food services	75,505	968	76,473	8.3	6.5	8.2
Other services, except public administration	47,604	998	48,602	5.2	6.7	5.2
Government and government enterprises	157,290	3,030	160,320	17.2	20.3	17.2
Total Number of Jobs	915,500	14,944	930,444			

Source: Bureau of Economic Analysis, Regional Economic Accounts CA25.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a] This includes agriculture and forestry support industries.

Table C-109 — Major Employers in the Region of Study (Texas Research Park Site)

Company	Business/Product	Employees
H.E.B. Food Stores	Super Market Chain	14,588
USAA	Insurance	14,258
AT&T	Telecommunications	6,500
Wachovia	Contact Center and Banking Services	3,200
Citibank	U.S. Customer Service Center	3,000
Southwest Research Institute	Applied Research	3,000
Valero Energy	Oil Refining & Gasoline Mktg.	3,000
Cardell Kitchen & Bath Cabinetry	Custom Wood Cabinets Mfrs.	2,493
West Teleservices	Customer Contact Center	2,366
JP Morgan Chase	Contact Center and Banking Services	2,300
QVC Network, Inc.	Contact Center	2,200
Toyota Motor Mfg. Texas	Truck Manufacturing Plant	2,000
Frost National Bank	Banking Service	1,986
Washington Mutual	Financial Services	1,900
Boeing Aerospace Support Center	Aircraft Maintenance Facility	1,850
Kinetic Concepts, Inc. (KCI)	Specialty Medical Products	1,800
Caremark Prescription Service	National Pharmacy	1,520
Capital Group Companies	Mutual Funds and Investments	1,450
DPT Laboratories	Manufacturing of RX and OTC Prod.	1,400
Martin Marietta Materials Southwest	Construction Aggregate	1,400

Source: The Greater San Antonio Chamber of Commerce, 2006 Largest Employers Directory, The San Antonio Business Journal, and by contact with company representatives.

Table C-110 — Top Five Industry Employers by Total Compensation Paid (Texas Research Park Site)

	Bexar	Medina	Total Study Area
1	Government and government enterprises	Government and government enterprises	Government and government enterprises
2	Finance and insurance	Retail trade	Finance and insurance
3	Health care and social assistance	Manufacturing	Retail trade
4	Retail trade	Finance and insurance	Professional and technical services
5	Professional and technical services	Other services, except public administration	Manufacturing

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.

Table C-111 — Employment Compensation by Industry, 2005 (Texas Research Park Site)

	Employment (total wages - thousands of dollars) 2005			Employment (total wages - percent) 2005		
Industry	Bexar	Medina	Area Total	Bexar	Medina	Area Total
Farm	21,042	6,465	27,507	0.1	2.4	0.1
Forestry, fishing, related activities, and other [a]	3,225	2,651	5,876	0.0	1.0	0.0
Mining	249,314	3,896	253,210	0.7	1.5	0.7
Utilities	2,762	4,338	7,100	0.0	1.6	0.0
Construction	1,776,490	11,880	1,788,370	5.2	4.4	5.2
Manufacturing	1,782,292	18,206	1,800,498	5.2	6.8	5.2
Wholesale trade	1,492,237	8,133	1,500,370	4.4	3.0	4.4
Retail trade	2,408,011	27,241	2,435,252	7.1	10.1	7.1
Transportation and warehousing	963,908	1,885	965,793	2.8	0.7	2.8
Information	1,295,813	4,820	1,300,633	3.8	1.8	3.8
Finance and insurance	3,338,040	14,403	3,352,443	9.8	5.4	9.8
Real estate and rental and leasing	537,608	1,881	539,489	1.6	0.7	1.6
Professional and technical services	2,386,359	5,865	2,392,224	7.0	2.2	7.0
Management of companies and enterprises	759,067	(D)	NA	2.2	(D)	NA
Administrative and waste services	1,465,289	(D)	NA	4.3	(D)	NA
Educational services	409,062	(D)	NA	1.2	(D)	NA
Health care and social assistance	3,308,499	(D)	NA	9.7	(D)	NA
Arts, entertainment, and recreation	283,756	785	284,541	0.8	0.3	0.8
Accommodation and food services	1,365,521	11,540	1,377,061	4.0	4.3	4.0
Other services, except public administration	911,250	13,215	924,465	2.7	4.9	2.7
Government and government enterprises	9,328,255	110,691	9,438,946	27.4	41.2	27.5
Total Number of Employees	34,087,800	269,022	34,356,822			

Source: Bureau of Economic Analysis, Regional Economic Accounts CA06.
(D) = Not shown to avoid disclosure of confidential information but the estimates for this item are included in the totals.
NA = Partial total due to undisclosed information.
[a] This includes agriculture and forestry support industries.

Table C-112 — Agriculture and Hunting Industries in Study Area and Other Surrounding Counties, 2006 (Texas Research Park Site)

Industry	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)	Industry Output ($ Millions)	Total Jobs	Total Employee Compensation ($ Millions)
	Bexar			Medina			Atascosa			Bandera			Comal		
Agriculture and Hunting	174.709	3,102	34.129	81.001	2,050	6.871	111.074	1,729	14.076	19.809	764	2.505	19.842	719	1.954
(Percentage of Total)	(0.153)	(0.337)	(0.093)	(7.568)	(15.818)	(2.361)	(7.213)	(12.206)	(3.825)	(4.840)	(15.075)	(2.614)	(0.400)	(1.591)	(0.136)
Animal Production[a]	35.850	656	1.082	44.317	1,087	2.308	59.998	994	1.647	14.084	621	1.021	11.094	507	0.213
(Percentage of Total)	(0.031)	(0.071)	(0.003)	(4.141)	(8.387)	(0.793)	(3.896)	(7.017)	(0.448)	(3.441)	(12.253)	(1.065)	(0.224)	(1.122)	(0.015)
Hunting and Trapping[a]	4.522	30	0.278	0.000	0	0.000	11.092	35	2.671	1.150	7	0.154	2.631	12	0.495
(Percentage of Total)	(0.004)	(0.003)	(0.001)	(0.000)	(0.000)	(0.000)	(0.720)	(0.247)	(0.726)	(0.281)	(0.138)	(0.161)	(0.053)	(0.027)	(0.034)
Total (for all industries)	114,331.9	919,287	36,728.2	1,070.3	12,960	291.0	1,540.0	14,165	368.0	409.3	5,068	95.8	4,954.5	45,192	1,437.3

	Guadalupe			Kendall			Wilson			8 County Total		
Agriculture and Hunting	86.610	2,242	6.967	19.154	1,241	1.976	88.514	2,375	5.982	600.713	14,222	74.460
(Percentage of Total)	(1.852)	(6.436)	(0.588)	(1.227)	(8.698)	(0.447)	(7.109)	(21.793)	(2.954)	(0.463)	(1.346)	(0.183)
Animal Production[a]	43.659	1,044	1.096	11.870	1,013	0.591	63.612	1,560	3.289	284.484	7,482	11.247
(Percentage of Total)	(0.934)	(2.997)	(0.093)	(0.761)	(7.100)	(0.134)	(5.109)	(14.315)	(1.624)	(0.219)	(0.708)	(0.028)
Hunting and Trapping[a]	0.659	5	0.000	0.473	3	0.050	3.970	36	0.007	24.497	128	3.655
(Percentage of Total)	(0.014)	(0.014)	(0.000)	(0.030)	(0.021)	(0.011)	(0.319)	(0.330)	(0.003)	(0.019)	(0.012)	(0.009)
Total (for all industries)	4,676.1	34,835	1,184.1	1,560.8	14,268	441.7	1,245.1	10,898	202.5	129,787.9	1,056,673	40,748.8

Source: MIG 2006.

[a] These values are included in the total value of Agriculture and Hunting industries.

Table C-113 — Livestock Proximal to Proposed NBAF Site (Texas Research Park Site)

County	No. Herds	No. Livestock	No. Poultry Farms	No. Poultry
Bexar	1,823	58,410	1,011	26,194
Kendall	815	33,554	208	7,296
Bandera	630	23,983	253	2,682,663
Medina	1,529	73,909	360	8,733
Atascosa	1,344	92,413	344	41,141
Wilson	1,839	94,654	285	11,476
Comal	684	18,120	262	7,279
Guadalupe	1,896	64,846	507	3,626,597
Total	10,560	459,889	3,230	6,411,379

Source: DHS 2007.

Table C-114 — Income and Poverty, City of San Antonio, Bexar County, and Medina County, Texas, 2000 (Texas Research Park Site)

	City of San Antonio		Bexar County		Medina County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Income								
Median Household Income, 1999	$36,237	NA	$38,358	NA	$36,063	NA	$38,277	NA
Per Capita Income, 1999	$17,487	NA	$18,363	NA	$15,210	NA	$18,276	NA
Poverty								
Population for Whom Poverty Status is Determined[a]	1,122,736	100.0	1,359,271	100.0	37,545	100.0	1,396,816	100.0
Population With Income in 1999 Below Poverty Level	193,731	17.3	215,736	15.9	5,794	15.4	221,530	15.9

Sources: U.S. Census Bureau 2000.
[a]Includes most population groups except for Group Quarters (e.g., barracks, dormitories, nursing homes, prisons, etc.).

Table C-115 — Population, City of San Antonio, Bexar County, and Medina County, Texas, 1990-2012 (Texas Research Park Site)

	Population				Compound Annual Growth Rate (CAGR) Percent[a]			
	1990	2000	2007	2012	1990 - 2000	2000 - 2007	2007 - 2012	1990 - 2012
San Antonio	999,585	1,144,646	1,259,735	1,359,835	1.4	1.4	1.5	1.4
Bexar County	1,185,394	1,392,931	1,588,786	1,736,397	1.6	1.9	1.8	1.8
Medina County	27,312	39,304	43,993	47,301	3.7	1.6	1.5	2.5
Study Area Total	1,212,706	1,432,235	1,632,779	1,783,698	1.7	1.9	1.8	1.8
Texas	16,986,510	20,851,820	23,986,432	26,358,319	2.1	2.0	1.9	2.0

Source: U.S. Census Bureau 2000. 2007 and 2012 population forecasts: ESRI BIS.
[a]The CAGR is a simplified estimate that measures the growth of the population as if it had grown at a steady single rate on an annually compounded basis.

Table C-116 — Population by Ethnicity and Race, City of San Antonio, Bexar County, and Medina County, Texas, 2000 (Texas Research Park Site)

	City of San Antonio		Bexar County		Medina County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
White Alone	774,708	67.7	959,122	68.9	31,200	79.4	990,323	69.2
Non-Hispanic White	364,357	31.8	496,245	35.6	19,919	50.7	516,165	36.0
Hispanic White	410,351	35.9	462,877	33.2	11,281	28.7	474,159	33.1
Non-White Alone	369,938	32.3	433,809	31.1	8,104	20.6	441,914	30.9
Black or African American Alone	78,120	6.8	100,025	7.2	866	2.2	100,891	7.0
American Indian and Native Alaskan Alone	9,584	0.8	11,193	0.8	269	0.7	11,462	0.8
Asian Alone	17,934	1.6	22,437	1.6	130	0.3	22,567	1.6
Native Hawaiian and Other Pacific Islander	1,067	0.1	1,452	0.1	19	0.1	1,471	0.1
Other[a]	263,233	23.0	298,702	21.4	6,820	17.4	305,522	21.3
Total	1,144,646	100.0	1,392,931	100.0	39,304	100.0	1,432,237	100.0
Minority Population Total[b]	780,289	68.2	896,686	64.4	19,385	49.3	916,072	64.0
Hispanic Population Total	671,394	58.7	757,033	54.4	11,281	28.7	768,315	53.6

Source: U.S. Census Bureau 2000.

[a]The Other category includes the census categories "some other race alone" and "two or more races."

[b]The total minority population includes all those who have classified themselves as Black or African American, Hispanic (White and Non-White), Asian Alone, American Indian or Alaskan Native, Native Hawaiian and Other Pacific Islander, and Others.

Table C-117 — Age Profile, City of San Antonio, Bexar County, and Medina County, Texas, 2000 (Texas Research Park Site)

	City of San Antonio		Bexar County		Medina County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Under 5 Years	92,446	8.1	109,948	7.9	2,817	7.2	112,765	7.9
5 to 9 Years	91,849	8.0	111,759	8.0	3,171	8.1	114,930	8.0
10 to 14 Years	89,113	7.8	109,498	7.9	3,318	8.4	112,816	7.9
15 to 18 Years	70,728	6.2	87,274	6.3	2,592	6.6	89,866	6.3
19 to 24 Years	105,907	9.3	126,589	9.1	2,787	7.1	129,376	9.0
25 to 34 Years	177,842	15.5	210,317	15.1	5,334	13.6	215,651	15.1
35 to 49 Years	249,403	21.8	308,260	22.1	8,557	21.8	316,817	22.1
50 to 64 Years	147,996	12.9	184,888	13.3	5,850	14.9	190,738	13.3
65 Years and Above	119,362	10.4	144,398	10.4	4,878	12.4	149,276	10.4
Total	1,144,646	100.0	1,392,931	100.0	39,304	100.0	1,432,236	100.0

Source: U.S. Census Bureau 2000.

Table C-118 — Educational Attainment, City of San Antonio, Bexar County, and Medina County, Texas, 2000 (Texas Research Park Site)

	City of San Antonio		Bexar County		Medina County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Less than Ninth Grade	86,799	12.5	95,962	11.3	3,641	14.8	186,402	11.9
9th to 12th Grade	86,764	12.5	99,918	11.8	3,206	13.0	189,888	12.1
High School Graduate	168,209	24.2	206,345	24.3	8,231	33.4	382,785	24.4
Some College, No Degree	163,203	23.5	203,214	23.9	5,189	21.1	371,606	23.7
Associate Degree	40,367	5.8	51,111	6.0	1,077	4.4	92,555	5.9
Bachelor's Degree	95,761	13.8	121,669	14.3	2,288	9.3	219,718	14.0
Graduate or Professional Degree	54,919	7.9	70,785	8.3	997	4.1	126,701	8.1
Total	696,022	100.0	849,004	100.0	24,629	100.0	1,569,655	100.0

Source: U.S. Census Bureau 2000.

Table C-119 — Housing Units by Occupancy, City of San Antonio, Bexar County, and Medina County, Texas, 2007 (Texas Research Park Site)

	City of San Antonio		Bexar County		Medina County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	481,091	100.0	599,438	100.0	16,723	100.0	616,161	100.0
Occupied Housing Units	445,438	92.6	556,250	92.8	14,497	86.7	570,747	92.6
Owner-Occupied Housing Units	264,251	54.9	351,140	58.6	11,721	70.1	362,861	58.9
Renter-Occupied Housing Units	181,187	37.7	205,110	34.2	2,776	16.6	207,886	33.7
Vacant Housing Units	35,653	7.4	43,188	7.2	2,226	13.3	45,414	7.4

Source: 2007 population forecasts: ESRI BIS.

Table C-120 — Housing Units by Structure Type, City of San Antonio, Bexar County, and Medina County, Texas, 2000 (Texas Research Park Site)

	City of San Antonio		Bexar County		Medina County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Total	433,108	100.0	521,359	100.0	14,826	100.0	536,185	100.0
1, Detached	278,800	64.4	343,108	65.8	9,217	62.2	352,325	65.7
1, Attached	14,726	3.4	17,075	3.3	127	0.9	17,202	3.2
2	10,278	2.4	10,966	2.1	101	0.7	11,067	2.1
3 or 4	21,622	5.0	24,136	4.6	410	2.8	24,546	4.6
5 to 9	29,548	6.8	31,375	6.0	102	0.7	31,477	5.9
10 to 19	24,443	5.6	25,594	4.9	42	0.3	25,636	4.8
20+	44,850	10.4	48,433	9.3	140	0.9	48,573	9.1
Mobile Home	8,399	1.9	19,967	3.8	4,538	30.6	24,505	4.6
Other	442	0.1	705	0.1	149	1.0	854	0.2

Source: U.S. Census Bureau 2000.

Table C-121 — Median Housing Value, City of San Antonio, Bexar County, and Medina County, Texas, 2000-2007[a] (Texas Research Park Site)

	City of San Antonio			Bexar County			Medina County		
	2000	2007	CAGR	2000	2007	CAGR	2000	2007	CAGR
Median Housing Value	$67,470	$97,712	5.4%	$71,789	$105,637	5.7%	$65,862	$97,372	5.7%

Source: U.S. Census Bureau 2000. 2007 population forecasts: ESRI BIS.
CAGR = Compound Annual Growth Rate.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-122 — Housing Value, City of San Antonio, Bexar County, and Medina County, Texas, 2007[a] (Texas Research Park Site)

	City of San Antonio		Bexar County		Medina County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$50,000	35,492	13.4	43,501	12.4	2,627	22.4	46,128	12.7
$50,000 - $99,000	101,086	3836	120,687	34.4	3,413	29.1	124,100	34.2
$100,000 - $149,999	63,729	24.1	85,525	24.4	2,457	21.0	87,982	24.3
$150,000 - $199,999	28,613	10.8	42,351	12.1	1,265	10.8	43,616	12.0
$200,000 - $299,999	21,782	8.2	34,070	9.7	1,260	10.8	35,330	9.7
$300,000 - $499,999	9,134	3.5	16,713	4.7	495	4.2	17,208	4.7
$500,000+	4,357	1.7	8,232	2.3	204	1.7	8,436	2.3

Source: 2007 population forecasts: ESRI BIS.
[a]Specified owner-occupied housing units.

Table C-123 — Median Rent, City of San Antonio, Bexar County, and Medina County, Texas, 1990-2000[a] (Texas Research Park Site)

	City of San Antonio			Bexar County			Medina County		
	1990	2000	CAGR	1990	2000	CAGR	1990	2000	CAGR
Median Rent	$311	$474	4.3%	$317	$479	4.2%	$221	$351	4.7%

Source: U.S. Census Bureau 1990-2000.
CAGR = Compound Annual Growth Rate.
[a]Specified owner-occupied and renter-occupied housing units.

Table C-124 — Contract Rent, City of San Antonio, Bexar County, and Medina County, Texas, 2000[a] (Texas Research Park Site)

	City of San Antonio		Bexar County		Medina County		Study Area Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
<$200	14,282	7.9	14,902	8.3	374	17.3	15,276	8.4
$200 - $499	76,962	42.6	83,784	46.4	1,417	65.5	85,201	46.6
$500 - $749	53,591	29.7	59,975	33.2	310	14.3	60,285	33.0
$750 - $999	12,526	6.9	14,890	8.2	35	1.6	14,925	8.2
$1,000+	5,645	3.1	7,105	3.9	26	1.2	7,131	3.9
Total	14,282	7.9	14,902	8.3	374	17.3	15,276	8.4

Source: U.S. Census Bureau 2000.
[a]Specified renter-occupied housing units.

Table C-125 — Annual New Privately Owned Residential Building Permits, City of San Antonio, Bexar County, and Medina County, Texas, 2005 (Texas Research Park Site)

	City of San Antonio			Bexar County			Medina County		
	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost	Buildings	Units	Construction Cost
Single Family	8,266	8,266	$1,194,405,545	9,558	9,558	$1,409,546,211	43	43	$4,335,859
Two Family	80	160	$11,237,402	80	160	$11,237,402	0	0	$0
Three and Four Family	22	88	$5,098,148	26	104	$5,658,148	0	0	$0
Five or More Family	331	6,662	$541,711,244	349	6,970	$552,060,464	0	0	$0
Total	8,699	15,176	$1,752,452,339	10,013	16,792	$1,978,502,225	43	43	$4,335,859

Source: U.S. Census Bureau 2000.

NATIONAL BIO AND AGRO-DEFENSE FACILITY

Science and Technology Directorate/Office of National Laboratories

US DEPARTMENT OF HOMELAND SECURITY NATIONAL BIO AND AGRO-DEFENSE FACILITY

APPENDIX D

POTENTIAL ECONOMIC CONSEQUENCES OF PATHOGEN RELEASES FROM THE PROPOSED NBAF

JUNE 2008

U.S. DEPARTMENT OF HOMELAND SECURITY

POTENTIAL ECONOMIC CONSEQUENCES OF PATHOGEN RELEASES FROM THE PROPOSED NATIONAL BIO- AND AGRO-DEFENSE FACILITY (NBAF)

D.1 INTRODUCTION AND BACKGROUND

The proposal to construct the NBAF at the current location[1] of the Plum Island Animal Disease Center (PIADC) or at one of five other alternative sites on the U.S. mainland poses a different set of health and economic risks than does the current facility. Although the construction of a technologically advanced NBAF should further reduce the probability of a pathogen release to the surrounding environment compared to the existing facility, the proposed facility would have an expanded research mission to include the study of pathogens that could adversely affect livestock, wildlife, and possibly human health. An accidental release of these pathogens could have economic consequences. Furthermore, compared to the existing PIADC, a potential release of pathogens from a mainland facility might more readily affect commercial livestock, wildlife, and possibly human populations, depending on the alternative site's proximity to livestock-producing areas and the density of human populations. Under some scenarios, a pathogen release could cause a major disruption to the United States Agricultural Economy. In particular, the accidental release of pathogens from the proposed research facility could have significant economic impacts if commercial livestock were exposed or if the pathogen were to infect wildlife used for sporting consumption or which could become endemic reservoirs of disease to domesticated animals, wildlife, or humans beings.

The potential for economic losses under a worst case scenario is non-trivial. An outbreak of foot and mouth disease (FMD) in Britain during 2001, for example, resulted in GDP losses of approximately £2.5 billion ($5 billion)[2]. Economic losses extended well beyond the livestock sector; the tourist sector was particularly adversely affected because large swaths of the rural country side, where tourist frequent, were quarantined. In the U.S., secondary industries such as transportation would be adversely impacted. The U.S. could experience even larger losses if an FMD outbreak were to occur here. The U.S. is a larger country with an integrated and mobile livestock industry. A recent study by researchers at Kansas State University, for example, estimated an outbreak of FMD could cost the State of Kansas alone nearly a billion dollars[3]. A multi-state outbreak would obviously increase the magnitude of economic losses beyond this estimate.

The release of other pathogens to be studied at the proposed research facility could have the potential to damage regional economies, and possibly the national economy, if rapid containment is not achieved. A concern would be the short-term effects of an outbreak as well as potential long-term effects to the economy if the pathogen were to become permanently established in the environment resulting in an epidemic or chronic disease capable of affecting livestock and possibly human populations.

This technical appendix utilizes a case study and literature review approach for assessing the potential economic damage to the U.S. economy if one of the pathogens proposed for study at the NBAF were to be released into the surrounding environment. The appendix does not assess the probability of accidental release or evaluate the cause of release (e.g., accidental release or bioterrorism); these assessments are thoroughly evaluated in Section 3.14. Instead, this technical appendix provides a review of relevant studies and research regarding economic costs of previous outbreaks of the pathogens being evaluated or simulations having been performed by academic researchers or agencies. To the extent feasible, the current study applies these event outcomes to the regional characteristics of each proposed alternative site to assess their relative economic vulnerability to possible pathogen releases from the NBAF. In short, the conclusions of this technical appendix are derived from a review of the publicly available literature on disease outbreaks. No risk or economic modeling has been performed, although the characteristics of the relevant economic regions of

[1] Under one proposed alternative, the new facility could still be located on Plum Island but not necessarily on the current physical site of the PIADC.
[2] Blake, Sinclair, Sugiyarto: *The Economy-Wide Effects of Foot and Mouth Disease in the UK Economy.* Nottingham University Business School (not dated).
[3] K-State Researchers Predict That an Outbreak of Foot-And-Mouth Disease Could Cost Kansas Nearly a Billion Dollars, Nov. 27, 2007; http://www.smartmoney.com/news/pr/index.cfm?story=pr-20071127-002647-1604.

influence are used to distinguish, where possible, the magnitude of losses among the different alternative sites.

Although the NBAF would study a number of pathogens determined as high priority by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service and the Department of Homeland Security, only three pathogens are evaluated for this appendix.

- Foot and mouth disease virus (FMDV)
- Rift Valley fever virus (RVFV)
- Nipah virus (NiV)

The diseases caused by these three pathogens sufficiently cover the spectrum of outcomes likely to occur if any of the pathogens to be studied at the proposed NBAF were to release to the surrounding areas and infect animal and human populations.

FMD is the most well known and documented of the three diseases. FMD is not a threat to human populations, except as a laboratory acquired infection (LAI). There have been 40 human cases noted since 1921. FMD does not transmit from human to human. It has the capacity to wreak havoc on the livestock economy in countries where outbreaks have occurred. In the United States, effective vigilance programs have prevented any FMD outbreaks on the mainland since the 1920s. The recent events in England, however, can serve as case studies for evaluating the potential for this disease to adversely impact the agricultural sector.

NiV and RVF viruses also pose potential threats to both livestock and human populations. Unlike FMD, human infection with these viruses can result in relatively high morbidity and mortality rates[4] [5] [6]. Recent outbreaks of RVF in eastern Africa and Saudi Arabia resulted in hundreds of deaths and huge losses to the livestock sector[7]. There is great concern among public health officials and agricultural research scientists that the RVF virus could become rapidly established in the United States, resulting in endemic infections with greater morbidity and mortality than the West Nile Virus. Although there have been no recorded cases of RVF in the United States, its introduction through inadvertent importation of infected mosquitoes, or as the result of bioterrorism, poses real threats to the public health and the economy.

NiV, first detected in Malaysia in 1999, has also resulted in the hospitalization and death of infected humans, but like RVF, no infections have yet been reported in the United States. NiV likely poses a smaller threat than the other two viruses because its only known vector does not occur in the Western hemisphere, but much remains to be learned about its epidemiology. It is still believed that the release of this pathogen under certain conditions could cause a variety of economic losses in the surrounding areas.

The remainder of this appendix presents for each of the three pathogens a review of the literature on how past FMD, RVF, and Nipah outbreaks have affected animal and human populations and the economic impacts of these outbreaks. Based on this literature and specific case studies, the analysis will generate a range of potential economic impacts and compare the relative economic vulnerability of the six alternative sites, based on proximity and size of commercial livestock industry, prevalence of sport hunting region, climate, and the density of human populations for the two pathogens that cause human morbidity and mortality. It must be emphasized that the analysis is based on the available literature and that no new studies or modeling have been performed in support of this appendix[8].

[4] CDC: Update: outbreak of Rift Valley fever – Saudi Arabia, August – November, 2000. *MMWR* 49(43):982-985, Nov. 3, 2000.
[5] Eaton BT, Broder CC, Middleton D, Wang C: Hendra and Nipah viruses: different and dangerous. *Nature Reviews, Microbiology* 4:23-35; 2006
[6] CDC: Rift Valley fever outbreak – Kenya, November 2006 – January 2007. *MMWR 56*(04): 73-6; Feb 02, 2007.
[7] *Benefits and Costs of Compliance of Sanitary Regulations in Livestock Markets: the Case of Rift Valley Fever in Ethiopia.* A. Nin Pratt, P. Bonnet, M. Jabbar, S. Ehui, C. de Haan; April 2004.
[8] Lawrence Livermore National Laboratory (LLNL) at the request of DHS, evaluated the potential impact of an FMD release at the 6 candidate sites using an existing model and a limited set of assumptions. The results of this preliminary study are summarized at the end of the FMD section.

D.2 FOOT AND MOUTH DISEASE

Description

FMD is caused by an aphthovirus of the family *Picornaviridae.* It is a viral disease affecting livestock (i.e., all cloven-hoofed animals including cattle, pigs, sheep, goats, deer, and bison) causing fever and blisters on the feet, mouth, teats, and coronary bands and is spread from one infected animal to another either directly or indirectly. The disease rarely affects humans—historically only as a laboratory-acquired infection.

The disease was recognized in the 16th century but the causative agent first identified as a virus in 1897 by Friedrich Loeffler, a German bacteriologist. After World War II, the disease spread throughout the world and was no longer confined to a select few countries. In the mid-1990s, endemic areas included Asia, Africa, and parts of South America except for Chile, which was disease free[9]. New Zealand is disease free and in fact, has never seen a case of FMD on its shores[10]. Most countries in the EU are declared FMD free and have stopped FMD vaccination.

FMD is, perhaps, widely known for the devastation it caused to the livestock and associated industries in the U.K. in 2001. This outbreak caused great economic losses to the livestock/agribusiness industry and the rural tourism industry. The outbreak also caused the cancellation of many farm and livestock-related events, sports and leisure activities, and the postponement of the general election for a month. People entering and leaving farms were required to have their shoes and vehicles disinfected. These biosecurity and export controls helped contain the out break to the U.K. and prevent the spread to other countries, such as Ireland. Since 2001, there have been other confirmed cases of FMD and two suspected cases of FMD in the U.K.; however, these cases did not result in large-scale outbreaks and were stemmed through the previous educational outreach for early reporting and through culling and quarantine of all livestock in these areas.

[9] March 2002, *Foot and Mouth Disease (www.doh.wa.gov/ehp/ts/zoo/foot-and-mouth-disease.pdf).* Washington State Department of Health.
[10] Biosecurity New Zealand: New Zealand remains vigilant following UK Foot and Mouth case, August 4, 2007. http://www.biosecurity.govt.nz/media/04-08-07/foot-and-mouth. Accessed April 20, 2008.

Signs

The average incubation period of the virus is generally 2-14 days, but this can vary. Signs of the disease include:

- A high temperature that drops after 2 to 3 days
- Lameness with a reluctance to move
- Sticky and foaming saliva
- Blisters and ruptured vesicles on mouth, nose, tongue, teats, and coronary bands
- An abrupt drop in the milk flow of infected cows
- Spontaneous abortion
- Reduced food intake
- Swelling of the testicles in mature males
- Weight loss

These signs are seen in other diseases similar to FMD, such as vesicular stomatis, bluetongue, bovine viral diarrhea, and foot rot in cattle and other animals. Animals with these signs must be tested to rule out FMD, which poses far more danger to the health of the herd and the livestock in the surrounding area. There are cases where animals may be carriers of the virus and thus are able to spread the disease. These carrier animals have recovered from the disease.

Cattle are particularly susceptible since they may acquire the virus through airborne particles or through direct contact with the virus. Because of a variable length in the incubation time, animals may not show clinical signs for several days. The clinical evolution of the disease, from infection (or first sign) to recovery, is *on average* 20 days for cattle and 13-14 days for pigs and sheep, The ultimate fate of many infected animals is isolation and slaughter, resulting in direct economic losses. Exports of meat are banned. Slaughtering occurs even though 95% of animals recover within 3 weeks with little or no treatment. Slaughter of infected animals occurs to reduce the spreading of the disease and to regain trading status with other countries, thus restoring some economic balance.

Pigs are vulnerable to the disease, although the clinical signs are somewhat different. Blisters are more severe in the hoof areas of pigs rather than cattle, but pigs tend to experience fewer mouth blisters. Pigs are considered amplifying hosts because they concentrate the virus in their respiratory secretions, resulting in a high concentration of aerosolized virus particles, which could potentially contribute to the transmission between susceptible animals. Whereas cattle can shed the virus from 6 to 24 months, pigs carry it for only short periods. Ultimately, despite these differences, the fate of infected pigs is the same as for cattle: isolation and slaughter[11].

FMD Around the World

FMD has historically been widespread around the world, but the largest outbreak of FMD in an FMD-free country occurred in the U.K. in 2001, in which 2,000 animals were infected by the Type O Pan Asia strain, and more than 6.6 million animals had to be slaughtered. (It should be remembered less than one-third of those animals actually had the disease, but in-contact animals were depopulated to stop the progression of the disease.) This outbreak was the largest one in recorded history. It was so extensive because the time between infection of the animals and detection of the disease was delayed. Additional delays occurred because of delayed mitigation efforts. The most recent confirmed case of FMD in the U.K. in August of 2007 was believed to have been associated with an accidental pathogen release from the Pirbright site into a water drainage system[12].

The last of nine recorded outbreaks of FMD in the United States occurred in 1929 in California. Other outbreaks have occurred in Africa, South America, Asia, and parts of Europe. North America, most of

[11] D. Bickett-Weddle. Foot and Mouth Disease (Presentation); *Center for Food Security at Iowa State University, 2006.*
[12] Health and Safety Executive, *Final Report on Potential Breaches of Biosecurity at the Pirbright Site 2007*, September 7, 2007. www.hse.gov.uk/news/archive/07aug/finalreport.pdf

Europe, Central America, Australia, and New Zealand have been confirmed FMD free, although some minor outbreaks have previously occurred in these countries.

The World Organization for Animal Health (OIE) specifies countries to be in one of three disease states:

- FMD present with or without vaccination,
- FMD free with vaccination, and
- FMD free without vaccination.

Countries want to gain and maintain the third classification because this means that they are at low risk and have the greatest access to export markets. Risks to the U.S. continue to occur because of its large livestock industry which is susceptible to the disease. FMD is still causing problems in other parts of the world, especially South East Asia, making preparedness essential to the prevention of an outbreak in the U.S. However, the U.S. livestock industry faces several differences versus the industry in the U.K. Some of those differences, which may be strengths and some may be vulnerabilities, include:

- High concentration of livestock due to intensive U.S. animal husbandry practices in certain areas throughout the country potentially facilitating the speed of disease spread.
- Lack of disease knowledge among some agricultural producers or failure to report disease outbreaks. Sometimes this fear of reporting is from lack of knowledge; sometimes it is because of fear of the economic losses associated with slaughtering and/or quarantine.

Transmissibility

Some strains of the FMD virus (FMDV) are more easily transmitted by aerosol than other strains. Consequently, the virus may be transmitted by aerosol transmission by spreading from infected animal(s) to uninfected animal(s). Transmission can also occur through physical contact. Sheep and often goats have very mild clinical signs and may spread the disease easily because of failure to recognize the disease. Cattle can spread the virus to other animals for up to 4 days before any signs begin to show. Pigs are the predominant source of aerosol generation and tend to shed a high quantity of the virus once they have been infected (although for shorter time periods than cattle). The virus is more easily transmitted in situations where there is high animal density and high mobility of human beings and animals. Nonetheless, despite their high production of aerosol laden FMD, pigs are the more resistant to contracting the infection than are cattle or sheep[13].

Transmission of FMDV may be through ingestion, direct contact, or aerosols. Transmission through ingestions or direct contract requires far greater volumes of the virus. The virus can also be carried by a variety of hosts not susceptible to the disease such as human foot traffic, feed trucks, and birds, dogs, cats, and rodents, etc. The virus has been found in garbage, especially where there is infected uncooked meat. In the U.S., it is illegal to feed uncooked garbage to swine. Therefore, the laws in the U.S. would reduce the risk of FMDV transmission associated with garbage. The virus is susceptible to drops in pH. When an infected animal dies, there is a drop in the pH of the body and the virus dies. FMDV may survive for a short time in bone marrow and lymph nodes after rigor mortis, until the pH drops below 6.0.

An affected animal can recover and may remain a carrier and transmitter of the virus. Cattle have been observed to be carriers for up to 3 years, sheep for 9 months, goats for 4 months, and 5 years for the American

[13] A.I. Donaldson & S. Alexandersen, *Predicting the Spread of Foot and Mouth Disease by Airborne Virus, Rev. sci. tech. Off. int. Epiz.*, 2002, 21 (3), 569-575

buffalo[14]. With the currently available vaccine, animals that are vaccinated or immune animals exposed to infection may also become carriers. New vaccines are in development to change this paradigm.

FMDV spreads via:

- Contaminated vehicles used to transport animals
- People wearing contaminated clothing after interacting with animals
- Uncooked, illegal garbage and infected raw meat fed to susceptible animals
- Importing infected animals
- Contaminated water sources shared by infected and susceptible animals
- Use of infected semen from an infected animal for artificial insemination

Virulence

FMD is an airborne aphtovirus within the *Picornaviridae* family, first identified in 1897. The viruses of this family are small (25-30 nm), non-enveloped icosahedral viruses that contain single-stranded RNA genetic material. There are seven serotypes (A, O, C, SAT1, SAT2, SAT3, and Asia1) of the virus and once an animal is infected, if it survives it may become a carrier of that particular strain for a period of time. These serotypes show regionality, with O being the most common strain.

Response Options to Outbreak and Prevention Measures

FMD is one of the most difficult animal diseases to control. Containment via movement controls and eradication are the ultimate goals of responding to an FMD outbreak and are currently the only measures that can be used to quickly reacquire FMD-free status. As noted earlier, in almost all cases throughout history, infected animals have been depopulated. This is primarily for economic reasons—studies[15] have shown in areas where eradication is a possibility, it is more cost-effective to depopulate affected herds than to treat them since treatment is only palliative. Other studies[16] have shown that the use of highly efficacious vaccines may be a cost-effective strategy for FMD control if there are no plans to depopulate any animals. New vaccines in development may make vaccination a more attractive alternative. Even though an FMD outbreak would cause death to only about 5% of the animals infected, it causes abortion, debilitation, rapid weight loss, and significant reduction in production of milk in cows, all representing significant economic losses to livestock producers. Most young animals that do survive develop myocarditis (inflammation of the heart muscle), which can lead to eventual death. Additionally, rehabilitation time compared to the animal's life span on the farm is too long for nursing back to health to be cost-effective. In any case, any country experiencing an outbreak would be subject to a total ban on its exports, suggesting eradication by slaughter may be necessary to regain a trading status. During an FMD outbreak, there are a large number of animals to dispose of and if handled appropriately, risks of further spreading and can be minimized.

One possible prevention measure is vaccination. However, vaccination provides immunity to the virus for only 6 months in most cases (and it is not certain if this immunity is complete). One reason for this is the virus's high variability as it continually evolves and mutates, and there is large variation between serotypes. Therefore, vaccines must be strain specific. So it is costly to vaccinate a large number of animals twice a year. Vaccination also has trade implications. New vaccines in development may eliminate the trade barriers and reduce the number of animals needing slaughter, but those developments are not available at the time of this writing.

[14] Donaldson, A.I.: *Epidemiology of Foot-and-Mouth Disease: the Current Situation and New Perspectives*, ACIAR proceedings (50), Canberra, 1994, pp. 9-15.
[15] Randolph, T.F., et al.: The economic impact of foot and mouth disease control and eradication in the Philippines. *Rev Sci Tech*, December 2000, 21(3):645-661.
[16] Bates, T.W., Carpenter, T.E., Thurmond, M.C.: Benefit-cost analysis of vaccination and preemptive slaughter as a means of eradicating foot and mouth disease. *American Journal of Veterinary Research*. July 2003, 64(7):805-812.

Potential Impact to Food Chain and Economic Impacts

An outbreak of FMD would have severe impacts to the economy and food chain due to disease control measures, and temporary export bans of meat and animal products. In the 2001 U.K. outbreak, for example, an estimated 4 million animals were slaughtered for disease control, and 2.6 million for livestock welfare. Also, with movement restrictions, healthy animals normally sent to market are forced to be retain at the production site, resulting in higher costs to the producer.

Additional affects are related to income lost due to export bans and price changes in the domestic market. Products that would normally have been sold overseas have to be sold on the domestic market, thus increasing the domestic supply. This increased supply coupled with assumed lower demand puts downward pressure on prices. Losses associated with reduced milk production both during and after the 2001 U.K. outbreak were approximately £35 million ($70 million). In the 2001 U.K. outbreak, the rural tourism industry was also greatly affected. However, the U.S. tourism industry is not based on similar recreation activities. Other related industries that could be negatively affected in economic terms include meat processing, feed, inter-industry trade and transportation, and meat by-product industries. The estimated total effects of FMD on the United Kingdom's GDP in 2001 were estimated at £2.5 billion ($5 billion), or about a 0.3% decline[17].

Several studies[18] have been done to estimate the potential economic impacts that would arise from an FMD outbreak in the U.S. and various states. Projected impacts to the U.S. livestock industry of an FMD outbreak similar in scale to the 2001 U.K. outbreak have been estimated to range from $10 billion to $30 billion[19]. Losses at the state level would vary; depending on the size and composition of the state's livestock industry. In California, for example, an FMD outbreak could cost its agriculture sector between $8.5 billion and $9 billion depending on the severity of the outbreak[20].

Site-Specific Economic Risks

The economic effects of an FMD outbreak are caused mainly by the costs associated with trade bans imposed on affected countries, and from the culling and quarantining of affected animals and herds. Government costs to implement control measures are a third potential source of major costs associated with an FMD outbreak. If an accidental release of this pathogen occurred in a densely populated livestock area, there is the possibility of economic consequences. However, this pathogen only affects cloven-hoofed animals. If infected animals are identified quickly, large-scale outbreaks can be prevented, thus lowering the economic risks.

Nonetheless, the costs of an outbreak are likely to be substantial. One modeling study by researchers at Kansas State University found that an FMD outbreak could cost the Kansas livestock industry nearly $1 billion[21]. This study presents three release scenarios; an FMD outbreak that develops within a cow-calf herd, an outbreak that develops within a medium sized feedlot, and an outbreak that is simultaneously introduced to five large feedlots. Regional economic losses of $36 million, $199 million, and $945 million respectively, are anticipated to arise from the outbreak scenarios described. Livestock movement, meat processing, and trade, would come to a complete halt if there were an outbreak in the state. The Economic Research Service of the USDA, in a study of the economic impact of Foreign Animal Disease evaluated how an outbreak of FMD would affect the agricultural sector. The study simulated an outbreak of FMD using the North American

[17] Blake, Sinclair, Sugiyarto. *The Economy-Wide Effects of Foot and Mouth Disease in the UK Economy.* Nottingham University Business School (not dated).
[18] Ekboir, Javier M. *Potential Impact of Foot-and-Mouth Disease in California: The role and contribution of animal health surveillance and monitoring services.* UC Davis Agricultural Issues Center, 1999; Pendell, Dustin; Leatherman, John; Schroeder, Ted; Alward, Gregory. *The Economic Impacts of Foot-and-Mouth Disease Outbreak: A Regional Analysis.* Selected paper prepared for presentation at the Western Agricultural Economics Association Annual Meeting, Portland, OR, July 29-August 1, 2007.
[19] Thompson, D., P. Muriel, D. Russell, P. Osborne, A. Bromley, M. Rowland, S. Creigh-Tyte, C. Brown: Economic Costs of the Foot and Mouth Disease Outbreak in the United Kingdom in 2001. *Revue Scientifique et Technique de l'Office International des Epizooties* 21:675-687, 2002. *Backgrounder: Foot and mouth disease.* http://www.avma.org/reference/backgrounders/fmd_bgnd.asp.
[20] Ekboir, Javier M. *Potential Impact of Foot-and-Mouth Disease in California: The role and contribution of animal health surveillance and monitoring services.* UC Davis Agricultural Issues Center, 1999.
[21] Kansas State University (November 29, 2007). Foot-and-Mouth Disease Could Cost Kansas Nearly a Billion Dollars. *Science Daily*.

Animal Disease Spread Model (NAADSM) and then linked the results of that model with USDA's quarterly models to project economic impacts to the agricultural sector over 16 quarters[22] Total losses to capital and management over 16 quarters was estimated to range between $2.773 billion and $4.062 billion. The losses are largely attributable to lower prices for meat. This is because the ensuing trade embargoes would increase the overall supply to domestic consumers; the model assumes that trade bans would have a greater influence on supply to the domestic market than would the culling of herds. The model assumed that all U.S exports of animal meat (beef, pork, and lamb), as well as exports of live animals (cattle, swine, lambs and sheep), are halted during the full quarters of the outbreak and for one quarter of the last case is detected.

In a separate, but limited study performed by the Lawrence Livermore National Laboratory (LLNL) for the DHS, the economic costs of an FMD outbreak were estimated for the six candidate sites. LLNL conducted both a qualitative analysis of an aerosol release from the six proposed NBAF sites as well as an analysis of seven scenarios related to the potential impact of an FMDV release in the vicinity of each of the six candidate sites. The qualitative assessment of the aerosol release indicated that New York would have the lowest impact and Kansas the highest impact.

For the economic impact scenarios evaluated that involved a single initial outbreak, economic impacts in Kansas and North Carolina were the largest, while outbreaks initiated in New York resulted in the smallest impacts.

The LLNL study assumed that once the first FMD case is detected a series of baseline control measures are implemented without resource constraints. These control measures include: contact reductions for direct and indirect contacts in designated control zones; stoppage of all interstate movement of livestock out of the affected states; closing of all sales yards within designated contact zones, trace-back and trace forward of direct contacts for one generation; slaughter of confirmed infected hers after a species-dependent delay, no pre-emptive depopulation of non-infected herds; and no vaccination.

Despite these implementation of these control measures, which are assumed to limit the duration of the outbreaks to 51 days or less, the FMD outbreaks result in foreign trade bans lasting up to 185 days. It is these bans that predominate projected economic impacts for all of the sites.

As seen in the table D.2-1, total projected impacts for Kansas would reach $4.2 billion compared to a $2.8 billion loss from an outbreak originating in New York. Losses accruing to foreign trade bans are $2.7 and $3.1 billion, respectively for New York and Kansas outbreaks, respectively, a relatively small difference.. However, because of the size of the livestock sector in the state of Kansas, industry disruption costs would exceed $1 billion compared to only $31 million in New York. The total costs of out breaks at the other sites would range of $3.35 billion in Georgia to $4.1 billion in Texas. Losses resulting from disruption to facilities operating in the affected states accounts for most of the differences in total cost. In short, it is the size of the livestock industry in the affect state that serves as the main discriminator among the candidate sites in terms of economic losses.

[22] Philip L. Paarlberg, Ann Hillberg Seitzinger, John G. Lee, and Kenneth H. Mathews, Jr.(May 2008) The Economic Impact of Foreign Animal Disease/ERR-57, Economic Research Service/USDA

TABLE D.2-1 — Estimated Impacts from an Accidental Release of FMDV at Candidates Sites for the Proposed NABF

Proposed NBAF Site	Duration of Surveillance (Days)	Duration of foreign trade bans (days)	Value of foreign trade lost ($ million)	Industry Disruption loss ($M)	Direct costs ($M)	Total Costs ($M)
Georgia	47	185	3,100	154	94	3,350
Kansas	51	189	3,100	1,001	97	4,200
Mississippi	47	185	3,100	216	94	3,400
North Carolina	47	185	3,000	430	94	3,500
New York	44	182	2,700	31	93	2,800
Texas	46	184	3,100	940	93	4,100

D.3 RIFT VALLEY FEVER

Description of Pathogen

Rift Valley fever, a zoonotic disease, is one of the World Organization for Animal Health (OIE) Listed Diseases requiring urgent notification[23]. First isolated in 1930 in the Rift Valley of Kenya, RVF has since reached epidemic proportions in eastern Africa, emerging irregularly in Kenya every 3 to 10 years. The first human cases of RVF were not reported until 1951, when an estimated 20,000 persons were infected during an epizootic of cattle and sheep in South Africa. Reported RVF events came exclusively from sub-Saharan Africa until 1977-1978, when approximately 18,000 persons were infected and 598 deaths were reported in Egypt[24]. More recently, RVF outbreaks have occurred in Yemen, Saudi Arabia, Sudan, and Tanzania, although, to date, no cases in animals or humans have been reported in North America or Europe.

The pathogen causing the illness is an arbovirus, which belongs to the *Phlebovirus* genus in the *Bunyaviridae* family. The RVF virus in animals is primarily vectored by mosquitoes of the genus *Aedes*, although several other mosquito species endemic to the U.S. have been shown to be capable of transmitting the virus as well. In particular, certain species of *Culex* (e.g., *C territans, C. salinarius*) have also been shown experimentally to be capable vectors of RVF[25]. Other biting insects such as ticks and black flies appear to retain the capacity to reservoir and vector the disease during epidemics as well. Viral transmission to humans has also been reported through other mechanisms, including the handling of infected animal tissue during slaughtering or butchering, assisting with animal births, conducting veterinary procedures, or from the disposal of carcasses or fetuses. Accordingly, certain occupational groups such as herders, producers, slaughterhouse workers, and veterinarians are considered at a higher risk of infection than the general population. The virus infects humans through inoculation, for example, via a wound from an infected knife or through contact with broken skin, or through inhalation of aerosols produced during the slaughter of infected animals[26]. The aerosol mode of transmission has also led to infection in laboratory workers[27]. Nonetheless, the major outbreaks of human illness that have occurred in recent years have reached well beyond these populations of elevated risk, and the disease's dispersion during these outbreaks was certainly enhanced as the result of mosquito and/or other arthropod transmission of the virus.

[23] The World Organization for Animal Health (OIE) recently consolidated its list of notifiable diseases so that diseases formerly on the "A" and "B" lists are now on a single list. The overriding criterion for a disease to be listed is its potential for international spread. Other criteria include a capacity for significant spread within naïve populations and the zoonotic potential. Each criterion is linked to measurable parameters: if a disease fulfils at least one of these parameters, then it becomes notifiable. Previously, RVF was listed in the OIE "A List" which included 15 diseases that have a high potential for rapid spread, serious economic or public health consequences, and significant impact on the international trade of animals and animal products.

[24] Rift Valley Fever Virus; Working Group; 24-26 August 2004 Summary Report and Recommendations; ANSER; Arlington, VA.

[25] Gargan, et al. *Am J Trop Med Hyg* 38:440-446, 1988.

[26] World Health Organization: Rift Valley Fever Fact Sheet. September 2007. Available online at http://www.who.int/mediacentre/factsheets/fs207/en/. Accessed January 3, 2008.

[27] World Health Organization; ibid. 2007.

The sustainability of the virus in a given environment is significantly facilitated by transovarial transmission, whereby the offspring of infected mosquitoes are also infected. This attribute provides a durable mechanism for maintaining the virus in nature since the eggs of infected mosquitoes can survive for protracted periods, even under arid conditions. A RVF virus infection typically results in a significant viremia in the primary host, infection of secondary arthropod vector species, and collateral transmission to humans.[28]

Affected Populations

Animal Populations

RVF can affect many species of animals including domestic livestock such as cattle, sheep, goats, buffalo, camels, and non-domestic animals such as monkeys, gray squirrels, and other rodents. In Africa, where the RVF is endemic, cattle and sheep are considered the primary hosts for amplification of the virus. Viremia with moderate disease, however, has been reported in adult cats, dogs, horses, and some monkeys; however, severe disease can occur in newborn puppies and kittens. Rabbits, pigs, guinea pigs, chickens, and hedgehogs are resistant to the disease[29]. Information is limited on the possible role of wildlife in the maintenance and amplification of RVF in Africa[30]. Unlike WNV, which is also spread by mosquitoes and has become endemic in much of the United States, RVF does not affect wild or domesticated birds. Hence, these animals do not appear to play a role in the maintenance and dispersal of the virus in affected areas.

In animal populations, mortality rates are the highest for newly born lambs, adult sheep, and calves. The mortality rate for infected lambs can exceed 90%, with calves and adult sheep also suffering mortality rates of up to 70%.

In all infected animals in which the disease becomes clinical, the animal typically suffers fever, anorexia, and an overall weakness. The incubation period is 3 days for sheep, dogs, and cattle, and as little as 12 hours for lambs. For pregnant sheep and cattle, infection results in very high rates of abortion. For example, in reported outbreaks of RVF, abortion rates in introduced European breeds of sheep and cattle were found to range from 40% to 100% in Southern Africa and from 80% to 100% in Egypt in the 1977 epidemic[31]. Infected dairy cows suffer from a decrease in milk production[32].

Human Populations

RVF manifests itself in the vast majority of individuals that become infected. In fact, in contrast to West Nile Virus, which has no clinical manifestation in 80% of infected individuals, approximately 90% of humans infected with RVF virus show clinical signs of the disease. The overall mortality rate is approximately 1%, but persons infected with the RVF are much more likely to die than those infected with the WNV[33] [34] [35] [36].

For the 90% of infected humans manifesting signs, the disease can result in a mild form or a severe form of the disease. In either case, the incubation period for the disease is 2 to 6 days.

Individuals with a mild case of RVF typically experience the illness for a period of 4 to 7 days. The most common clinical signs include a sudden onset of flu-like fever, muscle pain, joint pain, and headache. Some

[28] Rift Valley Fever Virus; Working Group; 24-26 August 2004 Summary Report and Recommendations; ANSER; Arlington, VA.
[29] National Agricultural Biosecurity Center; Rift Valley Fever Fact Sheet, Kansas State University, 2007.
[30] Developing a Research Agenda and a Comprehensive National Prevention and Response Plan for Rift Valley Fever in the United States, Conference Summary. Seth C. Britch, Kenneth J. Linthicum, and the Rift Valley Fever Working Group. Volume 13, Number 8, August 2007.
*Gargan et al. *Am J Trop Med Hyg* 38:440-446, 1988.
[31] Rift Valley Fever Virus; Ramon Flick and Michèle Bouloy. *Current Molecular Medicine* 5:827-834, 2005.
[32] National Agricultural Biosecurity Center; Rift Valley Fever Fact Sheet, Kansas State University, 2007.
[33] CDC: Update: outbreak of Rift Valley fever – Saudi Arabia, August – November, 2000. *MMWR* 49(43):982-985, Nov. 3, 2000.
[34] *Bioterrorism and Emerging Infections Education; Rift Valley Fever*. University of Alabama, Available online at http://www.bioterrorism.uab.edu/EI/riftValley/summary.asp(1 of 3) Accessed Dec. 21, 2007.
[35] Eaton BT, Broder CC, Middleton D, Wang C: Hendra and Nipah viruses: different and dangerous. *Nature Reviews, Microbiology* 4:23-35; 2006
[36] CDC: Rift Valley fever outbreak – Kenya, November 2006 – January 2007. *MMWR 56*(04): 73-6; Feb 02, 2007.

patients develop neck stiffness, sensitivity to light, loss of appetite and vomiting; in these patients, the disease in its early stages may be mistaken for meningitis[37].

As in the case of WNV, a small percentage of infected individuals (1-3%) develop a much more severe form of the disease, which can result in long-term health problems and even death. In these severe cases, one of three different syndromes can develop 1) eye disease (0.5-2% of patients), 2) meningoencephalitis (less than 1%), or 3) hemorrhagic fever (less than 1%).

As described in the World Health Organization's fact sheet[38], these syndromes are characterized as follows:

- **Ocular form:** Typical signs associated with the mild form of the disease are accompanied by retinal lesions. The onset of the lesions in the eyes is usually 1-3 weeks after appearance of the first signs. Patients usually report blurred or decreased vision. The disease may resolve itself with no lasting effects within 10 to 12 weeks. However, when the lesions occur in the macula, 50% of patients will experience a permanent loss of vision. Death in patients with only the ocular form of the disease is uncommon.
- **Meningoencephalitis form:** The onset of the meningoencephalitis form of the disease usually occurs 1-4 weeks after the first signs of RVF appear. Clinical features include intense headache, loss of memory, hallucinations, confusion, disorientation, vertigo, convulsions, lethargy, and coma. Neurological complications can appear later (greater than 60 days). The death rate in patients who experience only this form of the disease is low, although residual neurological deficit, which may be severe, is common.
- **Hemorrhagic fever form:** The signs of this form of the disease appear 2-4 days after the onset of illness, and begin with evidence of severe liver impairment, such as jaundice. Subsequently, signs of hemorrhage then appear such as vomiting blood, passing blood in the feces, small to large areas of bleeding within the skin, bleeding from the nose or gums, heavy menstrual bleeding, and bleeding from venipuncture sites. The case-fatality ratio for patients developing the hemorrhagic form of the disease is high at approximately 50%. Death usually occurs 3-6 days after the onset of signs. The virus may be detectable in the blood for up to 10 days, in patients with the hemorrhagic jaundice form of RVF.

Potential Threat of Rift Valley Fever to the United States

Generalized Health Threat of RVF to the United States

As mentioned earlier, Rift Valley fever is listed on the World Organization for Animal Health's (OIE) notifiable disease list and was previously listed on the Organization's "A" list. There are a multitude of reasons for this placement. First, there are array of animals susceptible to the disease, including commercial livestock, domesticated household pets, and human beings. Second, the virus is effectively transmitted from mosquitoes to animals and from infected mosquitoes to their eggs. These transmission mechanisms under favorable climatic conditions can allow for a sufficient buildup of reservoir virus in a given location and set the stage for a major outbreak in resident animal and human populations. Because a variety of *Aedes* and *Culex* mosquito species, and other biting arthropods, can carry and transmit the disease, rapid and large-scale dispersal of RVF in the United States is possible. This is particularly true for the southern part of the United States (e.g., Florida and South Texas) where a large variety of mosquitoes capable of transmitting the disease are endemic[39].

A review of the epidemiology of the disease since it was first reported in 1930 and since the first human cases were diagnosed in 1951 shows the geographical range of natural transmission of RVF has been steadily increasing. Although it took approximately 50 years for the disease to appear in Egypt, it required just another 10 years for the disease to emerge in Saudi Arabia and Yemen. As noted in the RVF Working Group in 2004, "Regardless of how RVF may be introduced, the nature of its vector-borne epidemiology means that if it is

[37] World Health Organization, Rift Valley Fever Fact Sheet; September 2007.
[38] World Health Organization, Rift Valley Fever Fact Sheet; September 2007.
*CW Woods, et al. Emerging Infectious Diseases 8:138-44, 2002.
[39] Gargan et al.: *Am J Trop Med Hyg* 38:440-446, 1988.

not rapidly contained it would spread as rapidly as WNV, but with far more serious consequences"[40]. RVF can have a devastating effect on commercial livestock, due the high mortality rate of young infected animals and its effect on pregnant sheep and cattle.

Further exacerbating the threat of RVF is the fact that the disease is difficult to detect during the early stages of an outbreak. Often detection is confirmed only after large numbers of animals and human beings have already been infected and a large reservoir of virus has been built-up. This scenario would be particularly likely in the United States, where RVF detection in either the human or animal populations could be subject to much delay and misdiagnosis because neither physicians nor veterinarians in the U.S. would have any practical experience or little academic knowledge of the disease. Only limited testing and identification for the virus and disease are currently available. Hence, an investigation of a potential RVF outbreak outside of East Africa, Saudi Arabia, or Yemen would likely be initiated only after the occurrence of acute signs in a significant number of animals or human beings was observed. This awareness might arise only after the sudden death of a large number of lambs or the occurrence of an "animal abortion storm" in a region with favorable climatology for the principal vector[41].

Once an outbreak occurred, containment would have to be accomplished through vector control and quarantine and destruction of exposed livestock. Human infections would be further stemmed by ensuring that occupational hazards are minimized and workers who work with livestock are properly protected. Like WNV, however, if an outbreak were to occur it is quite possible the virus would become permanently established, with a constant increase in geographical extent, until much of the country would be affected. It is worth recalling the first outbreak of WNV occurred in New York City in 1999 and by the year 2005, human cases of WNV were reported in 43 states and the District of Columbia[42]. The disease is now considered firmly established in the United States with year to year variability in reported cases likely to be determined by annual weather patterns. For example, 2007 saw a decrease in reported WNV human cases in the Washington, DC. region from previous years largely because of unusually dry conditions throughout the summer and fall seasons. A return to more normally wet conditions could easily reverse this trend.

Generalized Economic Threat of RVF to the United States

The economic consequences of RVF could be significant if it became established. The impacts could encompass large economic losses to the livestock sector and economic losses due to morbidity and mortality of infected human beings. The latter costs would include costs of inpatient and outpatient treatment, loss of work productivity, and premature death of working persons. Other costs would involve public response measures, including vector control. Because RVF signs manifest themselves in a higher percentage of infected persons than does WNV and the disease kills a higher percentage of its victims, the per capita cost of RVF is likely to be higher than for WNV. To put this threat into context, it is helpful to review the economic costs of the WNV to the United States since the first outbreak in 1999. One study estimated the cost of invasive species to the United States economy and projected the annual economic cost of vector control and premature human deaths resulted in losses exceeding $1 billion per year[43].

Other studies have focused on economic losses due to specific outbreaks also indicate the high economic costs from WNV outbreaks. The range of costs on a per capita case is quite large depending on the outcome of the disease. For example, one study indicated that on average treatment costs for mild cases were approximately $200 (in 2003 dollars); treatment for neurological-invasive cases, $38,417; and cases requiring institutional care, $138,078[44].

[40] Rift Valley Fever Working Group, 2004, Op. Cit.
[41] Ibid, 2004.
[42] Center for Disease Control: West Nile Virus–Statistics, Surveillance and Control - Maps 2005.
[43] Aquatic Nuisance Species in the New York State Canal and Hudson River Systems and the Great Lakes Basin: An Economic and Environmental Assessment. David Pimentel; Environmental Management, Vol. 35, No. 5, pp. 692–701 2005.
[44] Cost-Effectiveness of Alternative Blood-Screening Strategies for West Nile Virus in the United States. Caroline T. Korves, Sue J. Goldie, Megan B. Murray. *PLoS Medicine* February 2006, Volume 3.

A retrospective study of the impacts of the WNV outbreak in Louisiana in 2002 gives further insight into the high costs of an outbreak[45]. Using conservative estimates on the number of individuals infected, since it was likely the disease at the time was being underreported, the authors estimated the economic cost of WNV to the state was about $20.1 million. This total included three categories of costs: 1) medical costs (inpatient and outpatient); 2) nonmedical costs, such as productivity losses caused by illness and premature death, costs of transportation for a patient to visit a health care provider, and childcare expenses; and 3) costs incurred by public health and other government agencies for epidemic control. When per capita costs were extrapolated to the U.S. as a whole, it was estimated that 2002 national costs attributed to the WNV approached $139.8 million. The national estimate does not include mosquito abatement and prevention costs (mosquito control capabilities vary tremendously from state to state), which accounted for approximately half of the costs in Louisiana. Other WNV outbreaks have caused significant morbidity and mortality in horse populations. One epidemic in Colorado and Nebraska is estimated to result in economic losses of about $2.75 million.

These WNV cost estimates are conservative and would likely be overtaken by RVF if that virus were to become established in the United States.

To get an idea of the magnitude of the potential economic threat of RVF to the United States, the Rift Valley Fever Working Group developed a scenario in which the virus is brought to the United States by a bioterrorist[46]. Under this scenario, the terrorist disperses the virus in an aerosol mist within stockyards strategically chosen in California, Louisiana, and New York. The scenario's projection of economic losses is based on approximately 400 to 600 sheep and 20 and 30 humans becoming initially infected by the action at each site. The scenario also assumes that the action occurs at the end of a wet spring, which would optimize dispersal of the virus via mosquitoes.

Based on these initial conditions, the scenario assumes some of the livestock are shipped across state lines, and within 5 days the infected animals have become sufficiently viremic to infect biting mosquitoes. In fact, by day 5, according to the scenario, RVF is effectively introduced into the local mosquito populations throughout California, Georgia, Louisiana, New York, and Pennsylvania. These mosquitoes in turn begin to infect local animal and human populations at each location. It is not until day 27, by which time the number of infected animals and humans have tripled, does the U.S. government identify the disease as RVF. This long delay in identifying and responding to the illness outbreak is attributable to the lack of experience of veterinarians and physicians in diagnosing RVF.

The scenario assumes cooling weather is the chief factor in quelling the epidemic but not until more than 12,000 animals have been infected and 1,029 humans are known to have been infected. By the end of the year, 114 human deaths are attributed to the attack, and individuals with permanent disease-related disability number in the hundreds. Most worrisome, the scenario projects it would only take 2 more years for the disease to appear in all 48 contiguous states. The economic impact to the country is estimated to exceed $50 billion due to losses in the livestock and related industries, public health, trade, and tourism sectors[47]. Presumably, economic losses would continue for years until an effective vaccine were developed so as to sufficiently reduce the reservoir of virus in susceptible populations.

The categories of losses to the livestock sector would include the cost of destruction of infected animals and the loss of exports, even though the loss would be a short-term issue. These loses alone could be huge. As noted earlier, the 2001 FMD outbreak in Britain resulted in a reduction in GDP of $5 billion. Outbreaks in eastern Africa in 1998 and 2000 demonstrate the enormity of losses resulting from livestock being infected

[45] West Nile Virus Economic Impact, Louisiana, 2002. Armineh Zohrabian, et. al. Emerging Infectious Diseases. Available online at http://www.cdc.gov/eid. Vol. 10, No.10, October 2004.
[46] Rift Valley Fever Working Group, 2004, Op. Cit.
[47] Because the effect of RVF on wildlife in the United States is not well understood, particularly those species consumed for sporting and subsistence activities, it is not possible to speculate on the potential economic losses to recreational hunting and other related sectors if the disease were to become established in this country.

with RVF. An export ban by Saudi Arabia and other Gulf countries on livestock products from Ethiopia led to a $136 million reduction in the affected region's GDP, a 36% reduction from the previous year[48].

The scenario created by the RVF Working Group represents a maximum credible event (MCE), one based on external actors bringing in highly concentrated suspensions of RVF virus and then dispersing the pathogen at strategic locations to maximize contamination and sustainability.

The release of the virus from one of the proposed research centers would not likely lead to such dire consequences in the short-term; although if the virus were to become established in the environment surrounding the facility, it would likely spread overtime to other areas, eventually causing the magnitude of losses projected for the bioterrorism scenario described above. Potential accidental release mechanisms (non-bioterrorism) could include escape of infected mosquitoes, escape of infected animals, and transmission from laboratory workers infected with the virus (a particularly remote possibility). Critical to establishment of the disease in the surrounding environment would be sufficiently large susceptible animal and mosquito populations so that a reservoir of virus could be built up over time to sustain and disperse the disease. Seasonal timing of the release would also matter, since a release of a small number of infected mosquitoes in the winter at a northern site could lead to the death of the insects before they are able to lay eggs or bite susceptible animals.

In sum, the release of the RVF virus into the uncontained environment could pose a significant risk to the U.S. commercial food chain as well as to the health of the human population. An outbreak, if not quickly identified and stopped could lead to rapid dispersal of the disease to livestock throughout the United States. Any outbreak would lead to the likely quarantine and destruction of exposed and infected livestock. Some nations would ban the export of U.S. meat products, which in 2006 totaled more than $4 billion. Damage to the livestock industry could be significant given the value of the major livestock (cattle, calves, hogs, and sheep). In the U.S., the beef industry alone was estimated at $95.9 billion in 2006[49].

Beyond damage to the U.S. livestock industry, the establishment of RVF would result in large public health costs for the treatment of symptomatic infections. Although the majority of cases would likely be mild with short-term ill effects to the patients, a small proportion of infected humans would suffer life-long disabling effects, while others would die. Additional economic costs would include loss of wages, reduced productivity, and public costs for vector eradication. Ultimately, the establishment of RVF prior to the availability of an inexpensive and efficacious vaccine could cost the U.S. hundred of millions to billions of dollars per year.

Comparison of Alternative Site's Economic Risks

Establishment of RVF would primarily rely on the amenability of the geographical location to a competent arthropod vector's (e.g., *Aedes* and *Culex* mosquito species) presence and the availability of susceptible viral hosts (animals and humans) to maintain a sufficiently large reservoir of virus for retransmission to biting mosquitoes.

The southern U.S. has a particularly high incidence of *Aedes albopictus*, an invasive mosquito species *A. albopictus* is known to be receptive in field conditions to three Flaviviruses (Dengue, West Nile, and Japanese Encephalitis), six Bunyaviruses (Jamestown Canyon, Keystone, LaCrosse, Potosi, Cache Valley, and Tensaw), and one Alphavirus (EEE)[50]. It also has been shown experimentally to be capable of transmitting

[48] Benefits and Costs of Compliance of Sanitary Regulations in Livestock Markets: the Case of Rift Valley Fever in Ethiopia. A. Nin Pratt, P. Bonnet, M. Jabbar, S. Ehui, C. de Haan, April 2004.
[49] USDA, National Agricultural Statistical Service: Quick Stats 2006. Available online at http://www.usda.gov/. Accessed January 8, 2008.
[50] Global Invasive Species Data Base, *Aedes albopictus.* Available online at http://www.issg.org/database/species/ecology.asp?fr=1&si=109. *Accessed January 8, 2008.*
**Rutgers – ref. available for Culex territans [sent as pdf].

RVF virus[51]. To date, *A. albopictus* has been found in locations as far north as Minnesota and is endemic in New Jersey counties adjacent to Long Island.

Kansas and New York State mosquito populations, in contrast, are composed of *Culex* species more so than *A. albopictus*, but, as noted earlier, *Culex* species such as *C. territans* and *C. salinarius* have been shown experimentally to be capable vectors of RVF virus.

From a sustainability perspective, there would be some differences in risk between the two more northern sites and the four southern sites. For example, if an infected mosquito of the genus *Aedes* were to escape from the NBAF, a winter escape from the New York or Kansas alternative site might pose somewhat lower risks due to the colder climates and smaller resident *Aedes* populations available for mating and propagation. In addition, a release during particularly cold conditions could lead to the demise of infected mosquitoes before they are able to lay infected eggs or transmit the virus. Overall, the climate and aquatic habitats available to escaping *Aedes* mosquitoes in the southern alternative sites would appear more amenable to sustaining an infected mosquito population.

The potential advantages of the northern sites, however, would diminish if the escaping infected mosquitoes were of the genus *Culex*. *Culex* species already are well-established in these northern areas and are known vectors of the West Nile virus. Hence, the released insects would have a large resident population available for mating and virus transmission purposes.

Under such conditions, the types of long-term economic consequences projected by the Rift Valley Fever Working Group could in fact materialize under a worse case scenario.

Another factor of discrimination among the various alternative sites in terms of economic vulnerability would be the site's proximity to large commercial livestock operations. With the exception of Plum Island, which has no livestock populations in the vicinity of the proposed site, livestock population densities of the counties containing the other five proposed sites are either between 10 and 20 livestock per square kilometer, or between 20 and 30 livestock per square kilometer. In terms of total livestock populations in the surrounding counties, the numbers range from 139,200 for the Athens, Georgia, site to 542,547 for the Manhattan, Kansas, site[52]. In none of the regions in which the alternative sites are located is agriculture among the top generators of jobs or earnings. From an agricultural economic perspective, the mainland sites are not significantly different from each other in terms of risk to the local economy. Plum Island's relative isolation from the surrounding environment, including its distance to livestock areas of any consequence and its prevailing seaward winds, would render that location a lower risk to the regional and national agricultural economy than the mainland sites.

Many of the alternative sites are located relatively close to human populations; for example, Athens is only about 60 miles from Atlanta, Georgia, which has a metropolitan population exceeding 5 million people. Similarly, the Texas site is located on the outskirts of the City of San Antonio, which in 2007 had a population approaching 2.6 million. The Plum Island site is near the New York City metropolitan area, but its location on an island reduces the likelihood of viral transmission to people or animals.

If in fact a release of an infected mosquito were to occur, its ability to infect animals and human beings would also depend on its ability to reach those hosts. Mosquitoes of different species have varying capacity to travel but in most cases the distances are quite limited. *A. aegypti*, in one study, was found to travel no more than 200 meters from the release point[53]. *Aedes albopictus* is believed to travel only short distances. However, strong winds could be capable of transporting mosquitoes beyond their normal daily range. Furthermore, because the eggs (at least one) of the vector species are infected, the next generation of mosquitoes will be

[51] Emerging Infectious Diseases, 1997.
[52] Department of Homeland Security; Biodefense Knowledge Center Rapid tracker, August 6, 2007.
[53] Russell, et. al.: Mark release-recapture study to measure dispersal of the mosquito *Aedes aegypti* in Cairns, Queensland, Australia. *Medical and Veterinary Entomology*, December 2005.

infected as well. Thus, it is possible that there could be gradual geographical spread of the virus with each new generation of infected mosquitoes.

The generally colder climate of Plum Island compared to the other alternative sites could reduce the ability of mosquitoes (particularly if the released mosquitoes were species of *Aedes*) or their offspring to survive and maintain the virus over time. Hence, from a human health economic perspective, Plum Island could pose a smaller threat compared to the other alternative sites. The other alternative sites are relatively similar in economic health risks, although establishment of infected mosquitoes in one of the southeastern sites could lead to a more rapid dispersal of the disease to larger human populations such as in the Atlanta or San Antonio areas and ultimately lead to a permanent reservoir of virus.

More importantly, the economic vulnerability to virus release is more closely associated with the amenability of the site to harbor RVF vectors such that a sustainable reservoir of virus is created. As described above, the main difference between the northern sites and the southern sites is that the climate and geography of the southern sites would facilitate a more rapid buildup of infected mosquito populations and hence a more rapid build-up of the virus reservoir. Plum Island's colder climate and greater isolation from susceptible human and animal populations could provide some margin of safety over the other alternative sites.

Nonetheless, it is likely to be the case that once an infected population becomes established, regardless of the location, the eventual spread of the disease to other parts of the country would be difficult, if not impossible, to prevent. Over time, the losses attributable to agriculture and related sectors and the economic costs of human illness would become significant and would likely exceed the very high annual costs currently associated with the West Nile Virus. These losses could ultimately reach the levels projected by the RVF Working Group in their bio-terrorism scenario; that is the release and establishment of RVF in the United States could lead to losses in the billions of dollars.

D.4 NIPAH VIRUS

Description of Pathogen

NiV, named after Kampung Sungai Nipah (Nipah River Village) where the first viral isolates were obtained, is a paramyxovirus of the genus *Henipavirus*[54]. The genus *Henipavirus* was created to accommodate NiVand the similar Hendra virus. The henipaviruses are distinguished from other paramyxoviruses based on nucleic acid sequences of their RNA genomes. NiV and Hendra virus are the only known paramyxoviruses with the ability to cause fatal disease in both animals and humans.

The first reported cases of NiV occurred in 1998 in Bangladesh among pigs, domestic animals, and humans working in close contact with the infected animals. Originally, the outbreak was mistakenly diagnosed as Japanese Encephalitis, which is common in Asia and displays many of the same signs as NiV. Mosquitoes spread Japanese Encephalitis to humans, and pigs are reservoirs of this disease. Yet NiV is spread through contact with infected human or animal oral nasal secretions or urine and originates from indirect contact with the reservoir host, the "flying fox" fruit bat (*Pteropus* genus). The fruit bats are asymptomatic, and it is still unknown how the *Pteropus* bats contract NiV; therefore, the sustainability of the virus is also unknown.

Affected Populations

Animal Populations

In almost all of the reported outbreaks in Malaysia, Singapore, India, and Bangladesh, pig farms have suffered in large numbers. A few infections have also been found in cats and dogs, and serologic evidence suggests

[54] Wong, Kum Thong, et al. (December 2002). Nipah Virus Infection: Pathology and Pathogenesis of an Emerging Paramyxoviral Zoonosis. *American Journal of Pathology* 161(6):2153-2167, 2002.

infection can occur in horses. Pigs have played a significant role in some outbreaks; however, not enough information is known about NiV to rule out possible future outbreaks in other types of animals. While forecasted models of the effect of a NiV outbreak in Australia demonstrate the spread of the disease could remain relatively contained, the outbreaks in Malaysia, Singapore, and Bangladesh were much larger due to weak government enforcement and information dissemination programs[55].

It is not well-known what the effect of NiV on wildlife populations has been. While it is entirely possible for any sort of animal to consume fruit fomites spit out by *Pteropus* bats, spread of the disease from animal to animal occurs (as far as it is known) through consumption or absorption of infected animal secretions. The spread of infection is more likely in areas where many animals share the same space.

Some recent research studies suggest that NiV could be vertically transmissible from mother to fetus[56,57.] Here, two cats, one pregnant female, and one male were inoculated with NiV and regulated closely. The results of the experiment found the male cat showed signs of a fever after day 7, while the pregnant cat's temperature remained relatively constant until peaking rapidly at day 12. Researchers believe pregnancy delays the progression to disease by one week because NiV infects the fetus first.

In the reported cases of pig infection, for pigs older than 4 weeks, morbidity rates were high while mortality was low[58]. While precise statistics are difficult to ascertain, morbidity rates are estimated at about 90% with a low mortality rate of 10%[59]. NiV is indiscriminate in its infection of all ages of pigs. Once a pig is infected, the virus spreads rapidly, yet the low mortality rate impairs a farmer's ability to detect that there is a problem.

At the first stage of introduction of NiV to a pig farm, an explosive outbreak occurs, and the pigs demonstrate signs of a respiratory disease, fever, and nervousness or depression. After a short period of time (1-2 weeks), the signs "settle down." The lingering signs are a chronic respiratory syndrome with 2.5% mortality, 10% loss in feed conversion efficiency, and 20% reduction in viable piglets[60].

Human Populations

NiV is classified as a Biosafety Level 4 organism. It appears to infect humans indiscriminately, regardless of age or prior health status. Outbreak incidents have occurred in regions where the Flying Fox bat of the *Pteropus* genus is present. Thus far, outbreaks have been isolated to Southeast Asia. Furthermore, human to human transmission for health workers has occurred when the basic precautions and sanitary measures for dealing with sick patients went unheeded[61,62,63,64].

As previously indicated, it is believed the fruit bats of the *Pteropus* genus are the reservoir source of NiV[65]. There are currently several hypotheses that try to explain the transmission of NiV from bats to livestock/humans[66]

[55] Lam, Sai-Kit. (March 19, 2002). Nipah Virus—a Potential Agent of Bioterrorism? *Antiviral Research* 57:113-119, 2003.
[56] Dimitrov, Dimiter S., Lin-Fa Wang. (2007).
[57] Mungall, Bruce A., et al. (March 26, 2007). Vertical Transmission and Fetal Replication of Nipah Virus in an Experimentally Infected Cat. *The Journal of Infectious Diseases* (196):812-816, 2007.
[58] World Organization for Animal Health (OIE) January 2004. Nipah Fact Sheet. Available online at http://www.cfsph.iastate.edu/Factsheets/pdfs/nipah.pdf. Accessed April 20, 2008.
[59] Garner, M.G., I.F. Whan, G.P. Gard, D. Phillips. (February 5, 2001). The Expected Economic Impact of Selected Exotic Diseases on the Pig Industry of Australia.*Rev. Sci. Tech. Off. Epiz.* 20(3):671-685, 2001.
[60] Garner, M.G., I.F. Whan, G.P. Gard, D. Phillips. (February 5, 2001).
[61] Lam, Sai-Kit. (March 19, 2002).
[62] Chadha, Mandeep S., et al. (February 2006). Nipah Virus-associated Encephalitis Outbreak, Siliguri, India. Centers for Disease Control. 12 (2).
[63] Hsu, Vincent P., et al. (December 2004). Nipah Virus Encephalitis Reemergence, Bangladesh. Emerging Infectious Diseases, the Centers for Disease Control. 10 (12) pp. 2082-2087, 2004.
[64] Luby, Stephen P. (December 2006). Foodborne Transmission of Nipah Virus, Bangladesh. Emerging Infectious Diseases, the Centers for Disease Control. 12 (12). pp. 1888-1894.
[65] Luby, Stephen P. (December 2006).
[66] Dimitrov, Dimiter S., Lin-Fa Wang. (2007). In Utero Transmission of Nipah Virus: Role Played by Pregnancy and Vertical Transmission in Henipavirus Epidemiology. *Journal of Infectious Diseases* (196):807-809, 2007.

1. Masticated pellets of virus-contaminated residual fruit pulp dropped by flying bats are consumed by susceptible livestock animals (pigs).
2. Urine from infected animals contaminates pastures or pig sties.
3. Infected fetal tissues or fluids contaminate pastures or sties and are ingested.
4. Fresh date palm sap consumed by humans was contaminated by infected fruit eating bats.
5. Slaughter of infected animals created aerosols that were infectious to humans via the respiratory route.

Based on the existing case studies, it appears person to person transmission can occur when caregivers absorb —orally or through cuts—the secretions of infected animals and humans. However, it appears routine health care precautions could easily prevent such contagion.

In the Malaysia and Singapore outbreaks of September 1998–May 1999, the outbreaks first spread from bats to pig farms. Animals interacting with these pigs, such as cats, dogs, and horses also contracted NiV. During the 35-week outbreak period, the virus was first detected in Kinta district and then spread to three other localities, including the largest pig-rearing area in Southeast Asia. Spreading occurred through the trade of infected, live pigs. NiV was contracted by 265 individuals directly associated with the pig industry, and the overall outbreak fatality level was 39.6%[67].

At first, many reports believed humans were dead-end hosts for NiV because the 265 infected individuals were almost all pig farmers or had contact with pigs on a regular basis[68]. However, it was later discovered that some hospital workers ignoring the basic precautions while handling infected patients did contract the disease, indicating NiV can spread from human to human through contact with the infected individual's secretions.

In the West Bengal, India, outbreak of January – February 2001, many more hospital workers and family members of infected patients contracted NiV through human to human contact. In this case, the first wave of infected humans did contract NiV through working amongst infected pigs. Again, through the examples of the case studies, while NiV seems to only be transmissible through direct contact with saliva or excrement of a sick, living animal or human, contact with such substances carries a high rate of infection[69].

The repeated outbreaks in Bangladesh in the winters of 2001, 2003, 2004, and 2005 demonstrate a new case of direct transmittance of NiV from bat to human, without an animal intermediary[70,71]. Through rigorous surveying and animal testing in a retrospective investigation of two outbreaks (2001 and 2003), it was confirmed there was no obvious zoonotic source of NiV in the Bangladesh cases.

Other investigations indicate there may have been a high correlation between consuming fresh date palm sap and contracting NiV. Date palm sap is commonly harvested in the wintertime and used as a cooking ingredient in traditional desserts. Harvesting requires strapping a receptacle to a date tree, and it is not uncommon for the harvesters to find bat droppings or even dead bats in and around the pots. It is hypothesized emerging infectious diseases such as NiV are primarily due to the encroachment of human populations onto wildlife habitats, or even human-imposed changes on the distribution of flora, such as introducing fruit tree farms to new regions[72]. While it is asserted that most fresh date palm sap is safe to drink, measures should be taken to ensure stricter health standards for the industry.

While morbidity rates are characteristically high in both animals and humans coming into contact with NiV through saliva or urine, case fatality rates vary by outbreak, ranging from 38% to 75% mortality[73]. It still

[67] Lam, Sai-Kit. (March 19, 2002).
[68] Garner, M.G., I.F. Whan, G.P. Gard, D. Phillips. (Feb. 5, 2001).
[69] Chadha, Mandeep S., et al. (Feb. 2006).
[70] Hsu, Vincent P., et al. (December 2004).
[71] Luby, Stephen P. (December 2006).
[72] Daszak, P., A.A. Cunningham, A.D. Hyatt. (2001).
[73] Chadha, Mandeep S., et al. (Feb. 2006).

remains to be discovered why some outbreaks have resulted in more deaths than others, yet speculation could point to the fact infected sample sizes vary widely. The largest outbreak in 1998-1999 spread to more than 250 people, of which about 40% died. In a study of 103 patients affected by this outbreak, mortality rates reached 41%, 40% recovered fully, and the other 19% continued to suffer from mild residual neurological signs[74].

Reporting of signs seems to vary widely by individual for each case, although there are some commonalities, such as shown below[75,76].

- Fever
- Severe fatigue
- Headache
- Nausea/vomiting
- Chills/rigors/seizures
- Pneumonia/respiratory failure
- Encephalitis
- Cranial nerve palsies; brain MRI abnormalities; vision loss
- Persistent behavioral/personality changes
- Coma

Recent research based on magnetic resonance imaging tested on 12 patients infected during the Malaysian/Singapore outbreaks showed the affect that NiV has on the brain. Unlike any other viral encephalitis diseases, NiV causes small lesions to form on the brain, which may impair different functions on each individual. For this small sample, two patients died during the study, while another 10 showed signs of recovering, although the residual neurological deficits varied by patient.

A review of 103 patients' hospital records in Malaysia found the average incubation period for NiV was 10 days (ranging from 1 to 32 days), and the first signs of signs were usually fever, headache, and sore throat[77]. Furthermore, for those 42 patients that died, the mean duration of illness, from onset of signs to death, was 16 days. In these fatal cases, the most telling signs before death were tachycardia and an abnormal "doll's-eye reflex," suggesting a severe brainstem involvement. Other autopsy results on 32 fatal human cases of NiV discovered from hospital records that the duration of illness for these patients averaged 9.5 days, ranging from 2 to 32 days[78].

Potential Threat of Nipah Virus to the United States

Generalized Health Threat of Nipah Virus to the United States

The *Pteropus* bat is absent from the Western Hemisphere, and therefore there is no vector to spread NiV outside of the proposed NBAF facility[79]. Even in areas prone to outbreak, the projected reach of a NiV epidemic would be very limited[80]. Improved health standards and practices also greatly curtail the NiV risk of spreading NiV among humans in the United States. Furthermore, the United States has the capacity to disseminate information and effectively quarantine infected farms in a quick, efficient manner.

[74] Chong, Heng Thay, et al. (December 2000). Nipah Encephalitis Outbreak in Malaysia, Clinical Features in Patients from Seremban. *Neurol J Southeast Asia* (5):61-67, 2000.
[75] Sejvar, James J., et al.: (2007). Long-Term Neurological and Functional Outcome in Nipah Virus Infection. *American Neurological Association* (62):235-242, 2007.
[76] Lim, Tchoyoson C.C., et al. (January 2002). Nipah Virus Encephalitis: Serial MR Study of an Emerging Disease. *Radiology*. 222 (1):219-226, 2002.
[77] Chong, Heng Thay, et al. (December 2000).
[78] Wong, Kum Thong, et al. (December 2002).
[79] Hall, L. & Richards, G. *Flying Foxes: Fruit and Blossom Bats of Australia* (University of New South Wales, Sydney, 2000). [As cited (and illustrated in figure 2) in Eaton BT et al, Hendra and Nipah viruses: different and dangerous. *Nature Reviews Microbiology*. Jan 4(1):23-35, 2006].
[80] Garner, M.G., I.F. Whan, G.P. Gard, D. Phillips. (Feb. 5, 2001).

Generalized Economic Threat of Nipah Virus to the United States

There have been no reported outbreaks of NiV in North America, and the reservoir host, the "Flying Fox" fruit bat of the *Pteropus* genus is not native to the Western Hemisphere. Nevertheless, an outbreak of NiV could potentially occur in North America through a bioterrorism threat, as reports show NiV can easily be produced in large quantities with the potential release to livestock or humans[81]. Another potential threat could be the importation of contaminated date palm sap, processed in developing countries such as Bangladesh[82]. Flying foxes are attracted to this sticky substance, and it is not uncommon for manufacturers to find bat excrement or even dead bats in and around the sap pots. When date palm sap is consumed raw, consumers run the risk of contracting NiV.

Prevention

In the unlikely scenario that NiV would become an endemic threat to North America through possibly the importation of contaminated livestock, in livestock industries, and especially the swine sector, the result could be a restructuring of industry production[83]. High costs due to endemic threats may create significant barriers to entry and crowd out smaller livestock farms so that only those producers best equipped to withstand external shocks will keep producing[84]. Increased costs due to potential threats include occupational health and safety testing, medical expenses for human clinical cases, and prevention programs such as nighttime surveillance for bats on the premises. However, if market shares of livestock industries increase, prices for consumers are predicted to stay relatively the same. There are currently no NiV endemic areas in the world; reported outbreaks have only affected relatively small regions and have been contained within two or three months[85,86,87].

Outbreak Containment

The 1998-1999 outbreaks in Malaysia affected 60% of Malaysian pig farms, which was eventually contained after 35 weeks by the culling of over 1 million pigs. It is estimated that 36,000 jobs were lost in addition to $120 million (U.S.) in exports[88]. Other job loss estimates cite that 8,500 workers were directly impacted by the outbreaks, while 9,400 workers in supporting industries and 300,000 workers in other related industries incurred costs or lost jobs[89]. This outbreak was exacerbated by the fact that despite government mandates, poor farmers continued to trade infected pigs between farms and on the black market to mitigate economic ruin. In order to convince farmers to turn over their pigs to the government for slaughter and burial, the Malaysian government and humanitarian fund organizations teamed up to compensate farmers for their full economic loss (this amount was not recorded). Yet many farmers found it difficult to amass the capital necessary to begin investing in livestock again (based on a 2002 account).

While the Malaysian and Singapore governments did not keep sufficient records of the overall direct or indirect economic impacts to their pig industry or human hospitalization costs, a hypothetical cost model was run to determine the impact of a NiV outbreak on the pig industry in the southern regions of Australia[90]. According to the government's AUSVETPLAN strategy, sites of infection would be immediately quarantined and zones requiring authorization for entrance would be established. It is assumed trade outside of the control area would continue as normal; however, public reactions would impact both domestic and international markets. Farms under quarantine would halt production for potentially 1 year, and these farms would also

[81] Lam, Sai-Kit. (March 19, 2002).
[82] Luby, Stephen P. (December 2006).
[83] Note: While all outbreaks have impacted pig industries, it is not possible to rule out potential outbreaks in other livestock industries, as the outbreak is spread from accidental ingestion of fruit fomites via infected bats.
[84] Garner, M.G., I.F. Whan, G.P. Gard, D. Phillips. (Feb. 5, 2001).
[85] Chadha, Mandeep S., et al. (Feb. 2006).
[86] Hsu, Vincent P., et al. (December 2004).
[87] Luby, Stephen P. (December 2006).
[88] Daszak, P., A.A. Cunningham, A.D. Hyatt. (2001).
[89] Lam, Sai-Kit. (March 19, 2002).
[90] Garner, M.G., I.F. Whan, G.P. Gard, D. Phillips. (Feb. 5, 2001).

incur the costs of eradicating the disease, which includes managing the quarantine, maintaining movement controls, conducting surveillance, performing mass slaughter and burial, and sanitizing the farm.

Yet compared to other diseases that could affect livestock industries, NiV's limited size epidemics caused lower losses. The main economic impact comes from a loss of export markets, which in turn floods the domestic market, thus lowering the price of the good in local markets. The following table presents the outcomes of one hypothetical mathematical model run 5,000 times.

Table D.4-1 — Expected Gross Income (U.S.$) of the National Pig Industry Following Disease Introductions and Proportional Opportunity Loss (in Parentheses)

Disease	Epidemic[a]	Endemic (per year)
None	590 million	590 million
Nipah Virus	571 million (3%)	589 million (0.1%)
Classical Swine Fever	536 million (9%)	527 million (11%)
Porcine Reproductive and Respiratory syndrome	553 million (6%)	558 million (5%)

Based on the average of two pig industry regions studied: Darling Downs (144 pig farms) and Northern Victoria (77 pig farms). 1 AU$=0.93 U.S.$

Hospitalization Costs

During the time of this study, it was assumed that humans were the end hosts of NiV; however, more recent outbreaks have demonstrated that not only can bats transmit NiV directly to humans, but also that NiV can also be spread human to human through contact with an infected patient's saliva or excretions[91,92,93,94,95]. Cases of nosocomial spread of infection (spread during hospitalization) have occurred as a result of staff members not taking the proper precautions when dealing with disease-infected patients. The potential costs from an outbreak being spread throughout a hospital is very minimal, provided that staff members take the necessary precautions to cover patients' mouths with a mask during transportation around the facility, handle excrement and urine with proper latex glove protection, and educate patients' visitors to avoid contact with bodily fluids.

According to analyses of hospitalized patients, the average hospitalization stay ranged from 2 to 30 days. For those patients who died as a result of contracting NiV, the average duration from the onset of signs to death was 9.5 days according to one report that studied 32 fatalities and 16 days according to another report that studied 103 patients where mortality rates were 41%[96]. There is no treatment as of yet for NiV, and signs seem to vary widely; however, small brain lesions causing neurological damage seem to be a key characteristic[97].

Comparison of Alternative Site's Economic Risks

The risk of an endemic outbreak of NiV in the United States does depend on the proximity of the NBAF facility to livestock. While NiV does not need to be directly transmitted by the *Pteropus* bat, as evidenced by the consumption of fresh palm date sap, only through a gross infraction or negligence on the part of the NBAF would NiV be able to travel from the facility to a farm to be consumed by closely penned livestock.

Of the proposed location sites, only Plum Island has no livestock populations in the vicinity of the proposed site. The other five locations have livestock population densities either between 10 and 20 livestock per

[91] Sejvar, James J., et al. (2007).
[92] Lam, Sai-Kit. (March 19, 2002).
[93] Chadha, Mandeep S., et al. (Feb. 2006).
[94] Hsu, Vincent P., et al. (December 2004).
[95] Luby, Stephen P. (December 2006).
[96] Wong, Kum Thong, et al. (December 2002).
[97] Sejvar, James J., et al. (2007).

kilometer or between 20 and 30 livestock per kilometer[98]. Total livestock populations range from 139,200 in Athens, Georgia, to 542,547 in Manhattan, Kansas. Plum Island's relative isolation from the surrounding environment including its distance to livestock areas renders the site location a lower risk to the regional and national agricultural economy. Yet again, there is a very low risk of the possibility of an release of NiV from the facility and its ingestion by livestock or humans.

[98] Department of Homeland Security. (August 6, 2007). *"Biodefense Knowledge Center, Rapid Tasker."*