APPENDIX A: DESCRIPTION OF CALCULATIONS

A.1 Unit Conversions

The following unit conversions are used as necessary to convert various agricultural products to the required units. The conversion of live weight to dressed weight used USDA information on averages for each. The calculation to obtain a conversion fraction is found in the spreadsheet file uploaded to COLD.

Table A-1: Various Conversion Factors

Material	Conversion	Units	Reference
Goat Milk	3.895	Kg/gallon	4 (App. F)
Barley for grain	21.772	Kg/bushel	4 (App. F)
Buckwheat	21.772	Kg/bushel	4 (App. F)
Corn grain	25.401	Kg/bushel	4 (App. F)
Oats grain	14.515	Kg/bushel	4 (App. F)
Rye grain	25.401	Kg/bushel	4 (App. F)
Sorghum grain	25.401	Kg/bushel	4 (App. F)
Wheat	27.216	Kg/bushel	4 (App. F)
Emmer Spelt	18.144	Kg/bushel	4 (App. F)
Chicken	8.15	Lb live wt	5
Chicken	0.7350	Cook/live wt	103
Cow	0.6125	Dressed/live wt	104
Hog	0.7488	Dressed/live wt	105
Sheep	0.6791	Dressed/live wt	106
Eggs	30	Oz/dozen	64
	0.45359237	Kg/Lb	62
	640	Acre/mi^2	62

A.2 Sector Geographic Data

As required by Regulatory Guide 4.2 (Reference 2), sections 2.1.2.1 and 2.1.2.2, the 50 mile radius circle is centered on the proposed site with concentric circles drawn at distances of 1, 2, 3, 4, 5, 10, 20, 30, 40, and 50 miles. Each circle is divided in to 22.5˚ sectors centered on one of the 16 compass points (e.g. north, north-northeast, northeast, etc.), with each sector referenced to true north.

The area within each sector is calculated with the following equation

$$A(mi^2) = \frac{\pi}{16} * \left(R_2^2 - R_1^2\right)$$

R_2 = Outer radius of circle, miles

R_1 = Inner radius of circle, miles

16 accounts for faction of circle subtended by 22.5°

The area for each 22.5˚ sector for each radius is shown in Table A-2, below.

Table A-2: Sector Areas

Outer Radius (mi)	1	2	3	4	5
Area (mi^2)	0.1963	0.5890	0.9817	1.374	1.767
Outer Radius (mi)	10	20	30	40	50
Area (mi^2)	14.726	58.905	98.175	137.44	176.71

The sectors are shown on a map of the proposed site in Figure A-1 and Figure A-2, below. The sectors converge at the centerline of containment, which is at N 41° 05' 21.18", W 76° 09' 57.34", which is 972 feet north and 300 feet west of the previous location [Reference 102]. The county lines are shown in Figure A-1, but the county names must be taken from Figure A-3.

All of the land is assumed to be available for agriculture. The small fraction taken by the Susquehanna river is ignored, as are all man-made structures such as the nearby Susquehanna Units 1 and 2, or the towns and cities.

Figure A-1: Site Map with Sectors to 50 Miles

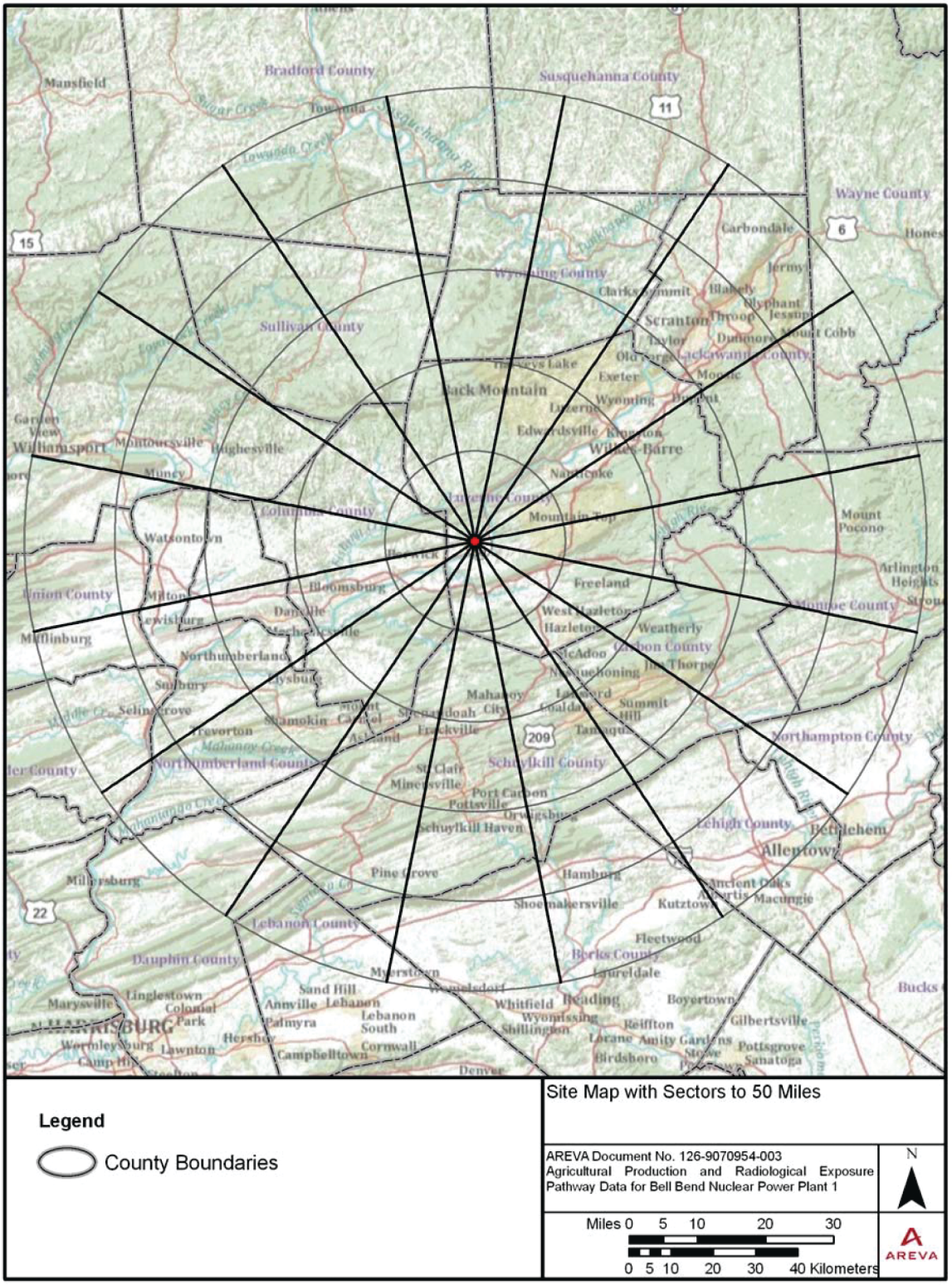


Figure A-2: Site Map with Sectors to 5 Miles

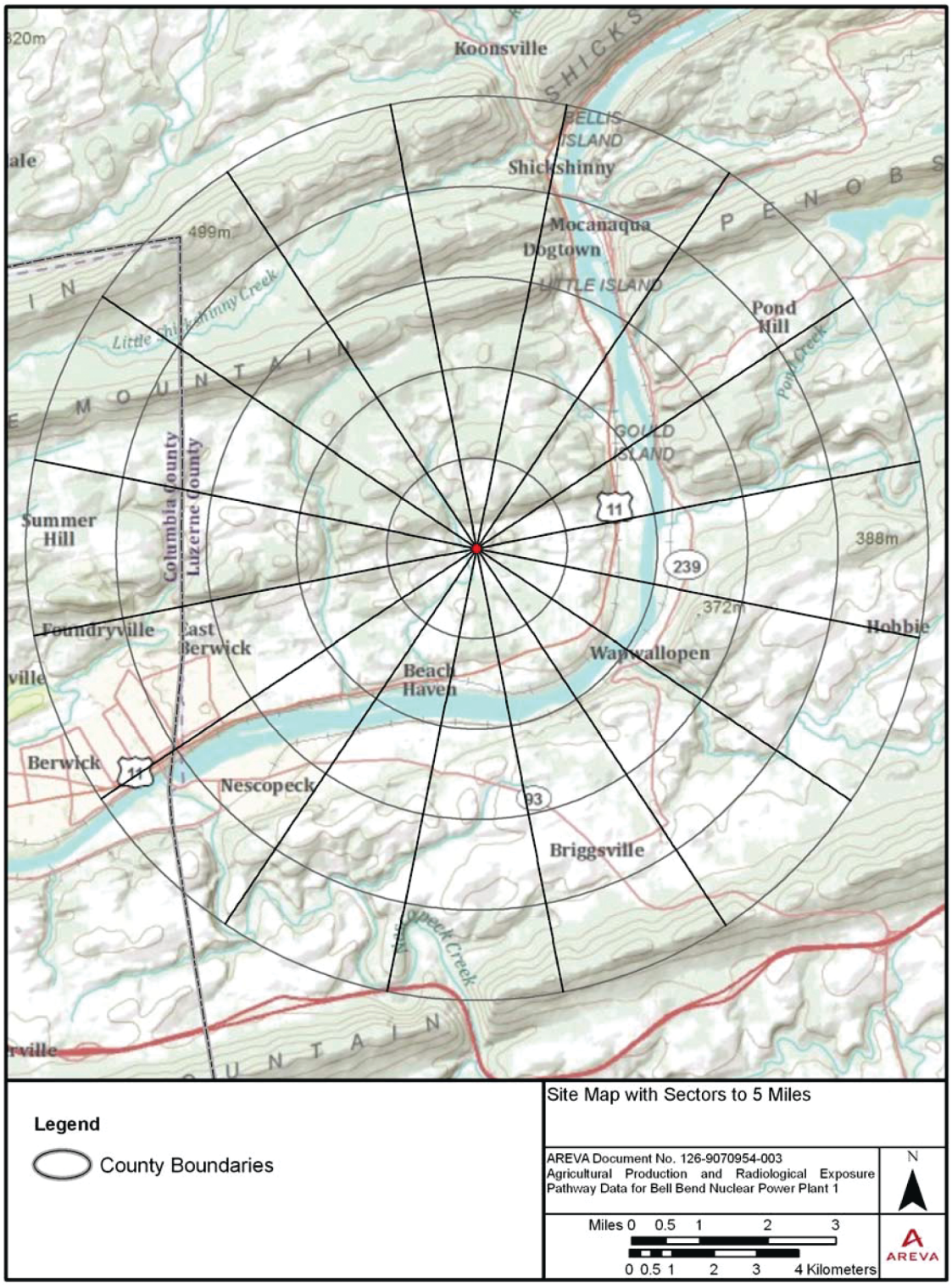


Figure A-3: Map of Pennsylvania Counties

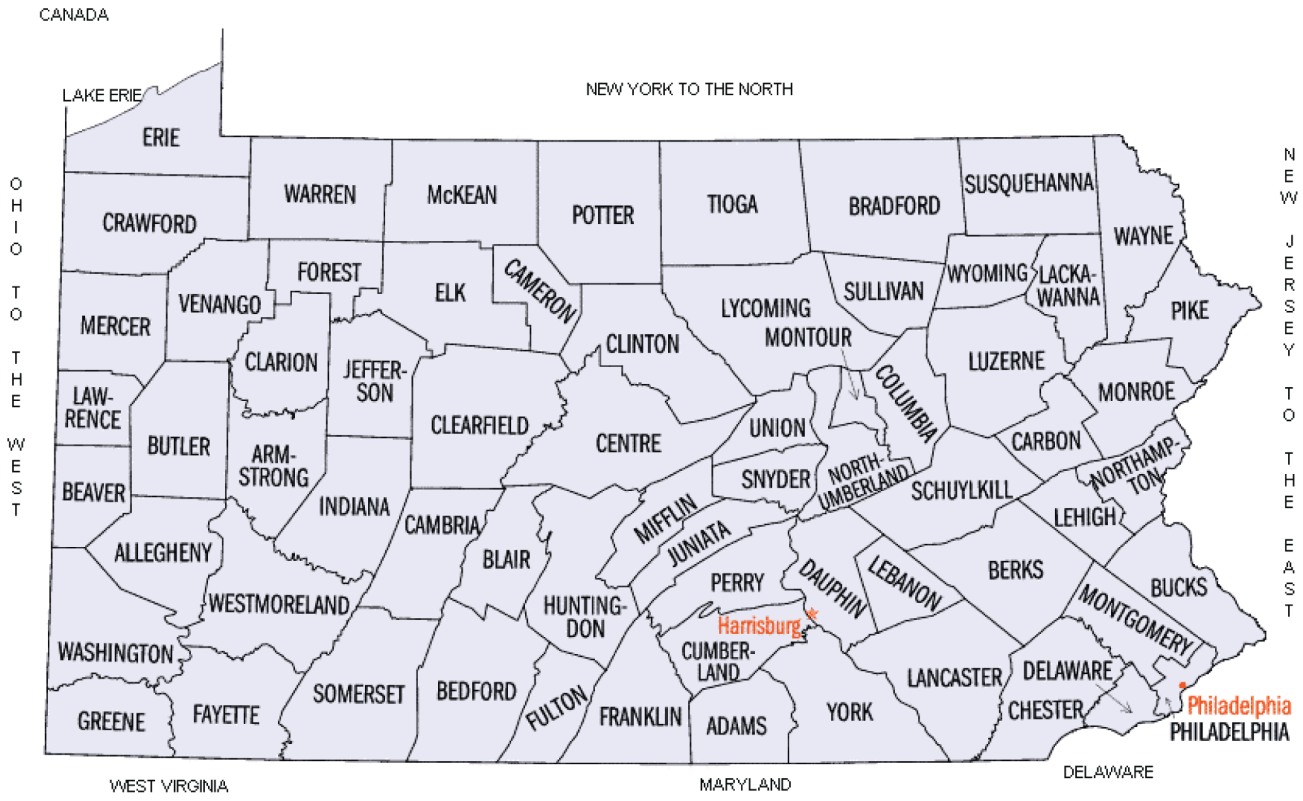
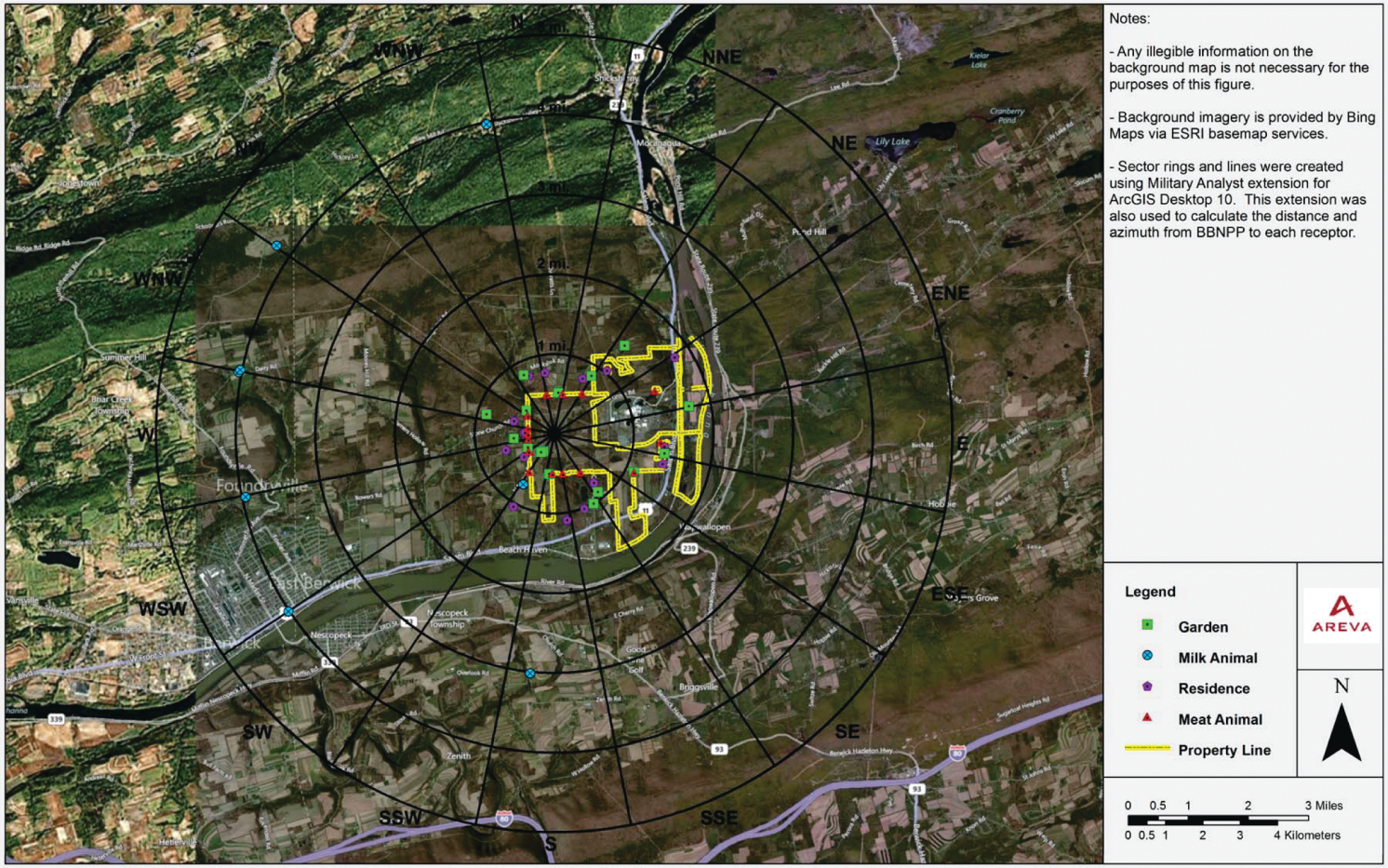


Figure A-4: Receptor Locations Following Power Block Relocation



A.3 Grain Production

The grain production by county is taken from the 2002 USDA agriculture census, Reference 6. The data is shown in Table A-3. The data shown is all the different types of grain reported in Reference 6. This data is converted to a production rate (kg/mi^2) by use of the appropriate conversion factor from Table A-1, and dividing by the county area. The production rate is shown in Table A-5. A county with a "D" in Table A-3 indicates that the value is not reported to preserve the anonymity of the reporting farms. The production for counties with a "D" is taken as the average of all counties with a "D". The amount of production for all "D" counties is the state total minus the production of all other counties.

The acreage planted for each crop is shown in Table A-4, with the area fraction shown in Table A-6. The area fraction is the area of the crop divided by the total cropland. Counties with a "D" are treated the same as the production rate, above.

An example calculation for wheat production by sector is shown in Table A-7. Each sector can lie in up to four counties. The production rate for each of the counties (if present) is shown. The production rate for each county was taken from the total production rate in Table A-5. The wheat produced for each sector is the maximum production rate from the four counties, times the sector area. The production rate for each sector is calculated in a similar fashion for each of the grains shown in Table A-7. The total grain production is summed over each grain type, by sector, and shown in summary form in Table 2 and Table 3. The detailed calculation for each grain type (similar to Table A-7) is not shown because of the excessive volume of data. The details can be examined in the spreadsheet included with the COLD files in Section 7.0.

The area fraction by sector is calculated similarly to the wheat production example, above. Each sector can lie in up to four counties. The area fraction for each sector is merely the maximum area fraction from each of the four possible counties.

The calculations are all performed in Microsoft Excel, carrying the typical number of digits (approximately 15) throughout the calculation. The final results are rounded to 4 significant digits after all mathematical operations have been performed. Thus the various totals as shown in Table 2 and Table 3 are correct, but it is possible that the sums of the rows and columns as shown won't precisely match the totals shown.

Table A-3: Annual Grain Production by County

County	Area (mile^2)	Corn (Bushels)	Wheat (Bushels)	Oats (Bushels)	Barley (Bushels)	Sorghum (Bushels)	Buckwheat (Bushels)	Emmer and Spelt (Bushels)	Rye (Bushels)	Soybeans (Bushels)
Berks	858.88	1,914,528	512,549	219,739	298,527	1,493	D	7,070	26,837	620,683
Bradford	1150.67	817,236	2,669	114,378	2,509	D	2,324	0	4,656	21,908
Carbon	381.04	38,107	17,167	40,781	2,615	690	0	0	3,808	4,521
Columbia	485.55	944,727	234,705	142,656	20,550	6,307	D	D	15,679	220,405
Dauphin	525.29	676,719	287,040	93,396	101,287	36,667	0	8,522	15,043	187,620
Lackawanna	458.63	59,919	D	2,720	0	0	D	0	D	
Lebanon	361.86	1,701,787	377,532	33,006	257,105	4,409	148	3,460	33,530	345,497
Lehigh	346.66	1,734,571	416,717	88,379	70,069	10,612	260	D	14,041	385,597
Luzerne	890.81	311,481	53,786	102,586	1,410	0	341	0	9,208	46,329
Lycoming	1234.85	1,101,206	65,543	157,543	11,382	439	524	0	10,120	194,157
Monroe	608.50	106,815	29,905	33,327	1,930	D	0	0	13,458	31,660
Montour	130.75	236,020	63,629	54,158	12,488	0	D	7,020	3,658	144,023
Northampton	373.80	1,572,812	274,134	84,116	39,507	38,587	D	0	5,092	279,483
Northumberland	459.91	2,020,263	227,000	115,439	147,576	D	5,150	2,330	7,521	458,571
Pike	546.81	D	0	0	0	0	0	0	0	D
Schuylkill	778.36	747,763	236,664	117,505	52,078	3,095	D	0	9,385	165,620
Snyder	331.20	685,156	118,328	126,078	41,977	D	514	19,610	21,161	151,692
Sullivan	449.94	54,991	0	10,072	D	0	0	0	D	
Susquehanna	822.86	125,979	950	9,625	0	D	0	0	1,638	D
Union	316.73	686,893	106,318	57,529	31,600	D	D	5,120	12,636	252,234
Wayne	729.22	17,428	D	1,765	D	D	D	0	D	D
Wyoming	397.20	202,375	D	21,779	D	0	0	0	D	D
State	44816.61	52,645,120	8,936,589	6,768,130	3,774,180	181,215	42,346	238,876	620,310	9,665,498
Number of counties in the state with a “D”.		3	6		8	18	19	7	7	6
Production area in counties with a “D”		74,256	13,782		10,098	22,063	7,411	8,166	8,019	30,742

Area data was taken from References 7 through 48. Agricultural annual production data was taken from Reference 6, either Table 1 or Table 24 of the county data. Note: An entry of "D" means that there were not enough farms reporting to ensure anonymity.

Table A-4: Annual Grain Production Acreage by County

County	Crop land (acres)	Corn (acres)	Wheat (acres)	Oats (acres)	Barley (acres)	Sorghum (acres)	Buckwheat (acres)	Emmer and Spelt (acres)	Rye (acres)	Soybeans (acres)
Berks	173,223	36,348	9,718	3,496	3,922	33	D	101	745	24,615
Bradford	185,296	9,617	67	2,213	90	D	153	0	146	762
Carbon	13,952	1,022	405	803	55	55	0	0	99	307
Columbia	88,657	18,623	4,670	2,518	286	116	D	D	460	11,446
Dauphin	76,798	12,505	5,354	1,641	1,311	D	0	136	430	11,229
Lackawanna	22,195	930	D	58	0	0	D	0	D	
Lebanon	102,547	25,347	6,799	615	3,532	75	6	58	819	15,099
Lehigh	73,053	25,967	7,445	1,489	1,004	311	9	D	284	16,908
Luzerne	39,444	5,881	1,206	1,797	34	0	18	0	291	1,966
Lycoming	103,763	18,405	1,677	2,773	218	16	17	0	305	6,782
Monroe	18,971	3,536	634	771	22	D	0	0	344	1,843
Montour	27,658	4,021	1,423	936	196	0	D	81	111	5,775
Northampton	66,203	26,320	4,981	1,408	529	1,244	D	0	130	11,000
Northumberland	93,967	31,052	4,382	1,783	1,812	D	499	30	227	20,819
Pike	3,068	D	0	0	0	0	0	0	0	D
Schuylkill	78,347	17,315	5,024	3,078	757	119	D	0	305	7,962
Snyder	71,711	13,310	2,836	2,188	723	D	30	309	503	7,915
Sullivan	17,010	876	0	187	D	0	0	0	D	
Susquehanna	104,822	1,428	69	165	0	D	0	0	80	D
Union	57,189	10,857	2,119	1,033	464	D	D	44	358	10,203
Wayne	56,888	472	D	42	D	D	D	0	D	D
Wyoming	35,409	2,530	D	488	D	0	0	0	D	D
State	5,120,685	790,111	172,137	117,653	54,292	4,529	2,473	3,675	17,173	378,846
Number of counties in the state with a “D”.		3	6		8	19	20	7	6	6
Production area in counties with a “D”		1,182	293		194	1,465	430	120	122	1,330

Area data was taken from References 7 through 48. Agricultural annual production data was taken from Reference 6, either Table 1 or Table 24 of the county data.
Note: An entry of "D" means that there were not enough farms reporting to ensure anonymity.