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**THE RESEARCH & DEVELOPMENT
TAX CREDIT REPORT to the
PENNSYLVANIA GENERAL ASSEMBLY**

Tom Wolf, Governor

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The Pennsylvania R&D Tax Credit Statute

On May 7, 1997, Act 7 of 1997 created the Pennsylvania research and development (R&D) tax credit. The R&D tax credit provision became Article XVII-B of the Tax Reform Code of 1971 (TRC). The intent of the R&D tax credit was to encourage taxpayers to increase R&D expenditures within the Commonwealth in order to enhance economic growth. The terms and concepts used in the calculation of the Commonwealth’s R&D tax credit are based on the federal government’s R&D tax credit definitions for qualified research expense.¹

For R&D tax credits awarded between December 1997 and December 2003, Act 7 of 1997 authorized the Department of Revenue (Department) to approve up to \$15 million in total tax credits per fiscal year. Additionally, \$3 million of the \$15 million was set aside for “small businesses,” where a “small business” is defined as a “for-profit corporation, limited liability company, partnership or proprietorship with net book value of assets totaling...less than five million dollars (\$5,000,000).”

Over the years, several changes have been made to the R&D tax credit statute. Table 1 lists all of the acts that have changed the R&D tax credit statute, along with the applicable award years, the overall tax credit cap and the small business set aside.

**Table 1. Pennsylvania Research & Development Tax Credit Program
History of R&D Tax Credit Legislation**

Legislation	Award Years	Total Tax Credit Cap	Small Business Set Aside
Act 7 of 1997	1997 - 2003	\$15.0 million	\$3.0 million
Act 46 of 2003	2004 - 2005	\$30.0 million	\$6.0 million
Act 116 of 2006	2006 - 2008	\$40.0 million	\$8.0 million
Act 48 of 2009	2009	\$20.0 million	\$4.0 million
Act 48 of 2009	2010	\$18.0 million	\$3.6 million
Act 26 of 2011 ²	2011 - 2016	\$55.0 million	\$11.0 million
Act 85 of 2012 ³	Sunset Date Repealed	Unchanged	Unchanged
Act 85 of 2016 ⁴	Sunset Date Repealed	Unchanged	Unchanged

One of the more noteworthy features of the R&D tax credit program is the ability for R&D tax credit recipients to sell unused tax credits to other taxpayers. Act 46 of 2003 allowed R&D tax credit recipients to apply to the Department of Community and Economic Development (DCED) to sell or assign an R&D tax credit if there has been no claim for allowance filed within one year from the date that the Department approved the credit. According to Act 48 of 2009, for R&D tax credits awarded in December 2009 and forward, the one year holding period is no longer in effect; credits awarded in 2009 and forward can be sold immediately. The purchaser or assignee must still use the newly obtained R&D tax credit in the taxable year in which the purchase or assignment of the credit is made. The purchased or assigned R&D credit cannot be used to offset more than 75 percent of a tax liability for a taxable year. The purchased or assigned credit cannot be carried

¹ Public Law 99-514, 26 U.S.C. § 41.

² The prior sunset date was established by Act 116 of 2006.

³ Act 85 of 2012 repealed the sunset date for the R&D tax credit in Section 1712-B, but left Section 1707-B unchanged.

⁴ Act 85 of 2016 repealed the sunset date for the R&D tax credit in Section 1707-B.

over, carried back, resold or refunded. The provision to sell or assign unused R&D tax credits applies to credits awarded in December 2003 and forward, but the initial sale or assignment could not take place until at least December 2004.

The R&D tax credit may be claimed against the following taxes: the capital stock and franchise tax (CSFT)⁵, the corporate net income tax (CNIT) and the personal income tax (PIT). Taxpayers claiming the credit against any of these taxes could not reduce their tax liability for taxable years 2004 and earlier by more than 50 percent. Act 46 of 2003 eliminated this provision starting with tax year 2005; a taxpayer is able to use the awarded R&D tax credit to reduce a given tax liability by up to 100 percent. Taxpayers awarded R&D tax credits by the Department may carry over and apply any unused tax credit for up to fifteen (15) succeeding taxable years.

The Pennsylvania R&D tax credit, which is calculated using the increase over the taxpayer's base year research expenses for qualified R&D conducted within Pennsylvania, originally generated a tentative credit at the rate of 10 percent. However, Act 116 of 2006 increased the rate at which the tentative R&D tax credit is calculated to 20 percent for small businesses only beginning with the credit awarded in December 2006 and forward.

Taxpayers must submit an application to the Department by September 15th to apply for the R&D tax credit. The credit is for qualified Pennsylvania research expenditures made in the taxable year ending in the prior calendar year. The Department has until December 15th to notify taxpayers of their approved tax credit amount.

Act 85 of 2012 repealed the sunset date for the R&D tax credit in Section 1712-B of the law, but left the reference to the sunset date in Section 1707-B unchanged. Act 85 of 2016 repealed the reference to the sunset date in Section 1707-B.

Act 46 of 2003 mandated that the Department report to the General Assembly the names of all taxpayers awarded R&D tax credits in each year starting in 2004 and for each year thereafter. Appendix A at the end of this report lists the name of each taxpayer receiving the R&D tax credit from the Department in December 2016, 2017 and 2018, along with the amount of credit received and utilized. In an effort to control the size of the document, this report will only list the names of taxpayers who have received the R&D tax credit in the current year and the two preceding years. Reports from earlier years will still be available that retain information on earlier years.

The other major change in the R&D tax credit program made by Act 46 of 2003 was the creation of the R&D Tax Credit Assignment Program. The program, which is primarily administered by DCED, permits taxpayers with unused R&D tax credits to sell them for cash to other taxpayers who can use them. The goal of the program is to "assist the growth and development of technology-oriented businesses, particularly small start-up technology businesses."⁶ These small start-up firms, which often do not have significant tax liabilities in their early years, receive cash for their unused R&D tax credits.⁷ The purchasers of the unused R&D tax credits are then able to partially offset their own tax liabilities with the unused credits.

The earliest that unused R&D tax credits could be sold was December 2004, for credits awarded by the Department in December 2003. Taxpayers can only sell unused amounts of tax credits that exceed any collectible tax liability against which the credit may be offset. S Corporations may not apply to sell or assign

⁵ The R&D tax credit can no longer be used against the CSFT; the CSFT was eliminated for tax year 2016 and forward.

⁶ "Research and Development Tax Credit Assignment Program Guidelines," DCED, September 2004.

⁷ "Unused R&D tax credits" means that the taxpayer has not applied the tax credits against a specific tax year liability. Further, the taxpayer cannot sell the tax credit if it has any unpaid liabilities against which the tax credit could be used.

any credit that has been passed-through to its shareholders. In order to sell an unused credit, the taxpayer must file an application with DCED. The application identifies the seller and the R&D tax credit that it intends to sell, along with the buyer and the amount for which the credit is being sold or assigned.

The buyer of the unused R&D tax credit can use it to offset up to 75 percent of a qualified tax liability in a tax year. The buyer cannot carry forward, carry back, get a refund for or reassign the purchased credit. Further, the buyer must use the purchased tax credit against a qualified tax liability in the taxable year in which it was transferred. Lastly, the buyer must identify to the Department the taxpayer from which they bought the unused R&D tax credit.

An R&D tax credit will be considered to be unused and, therefore, available for sale as long as it is not applied against a specific tax year liability and the taxpayer does not have a collectible tax liability. As of February 2019, \$119.1 million of the \$618.0 million R&D tax credit awarded between December 2003 and December 2017 (i.e., 19.3 percent of the \$618.0 million) has been sold or assigned. Purchasers of those unused tax credits have paid \$111.4 million for them in total, or 93.5 percent of the value of the unused tax credits.

Act 43-2017 authorizes the Department of Revenue to perform tax clearances on taxpayers prior to the awarding of a tax credit to ensure all taxpayers are compliant with tax payment and filing obligations.

The complete statistics on sold or assigned unused tax credits by award year are shown in Table 2.

**Table 2. Pennsylvania Research & Development Tax Credit Program
Complete Statistics on the Sale or Assignment of Unused R&D Tax Credits**

(\$millions)

Credit Awarded In	R&D Credit Awarded	Amount of Unused Tax Credits Sold/Assigned	Number of Taxpayers Selling/Assigning Unused Credit	Amount of Unused Tax Credits Sold For	Percent of Value Unused Tax Credits Sold For
2003	\$15.0	\$1.3	18	\$1.2	91.4%
2004	\$30.0	\$3.7	44	\$3.3	90.1%
2005	\$30.0	\$9.2	51	\$8.6	93.3%
2006	\$40.0	\$8.7	76	\$8.2	93.9%
2007	\$40.0	\$9.2	94	\$8.8	95.7%
2008	\$40.0	\$11.0	125	\$10.5	95.2%
2009	\$20.0	\$5.2	112	\$4.8	93.5%
2010	\$18.0	\$2.9	110	\$2.7	93.7%
2011	\$55.0	\$13.7	126	\$12.8	93.1%
2012	\$55.0	\$5.0	123	\$4.6	92.0%
2013	\$55.0	\$8.7	162	\$8.1	92.9%
2014	\$55.0	\$12.9	200	\$12.0	92.8%
2015	\$55.0	\$14.3	211	\$13.4	93.1%
2016	\$55.0	\$11.4	228	\$10.8	94.3%
2017	\$55.0	\$1.8	89	\$1.7	92.8%
TOTAL	\$618.0	\$119.1		\$111.4	93.5%

Tax credit sales are often arranged by a broker, who provides a service by bringing together sellers and buyers of credits, and in return takes a portion of the tax credit as their fee. The Department does not have

complete data about these arrangements. However, DCED staff has stated that the level of broker fees can vary widely, but the average broker fee is in the range of 5 to 6 percent of the value of the credit.

R&D Tax Credit Claimed and Awarded in Pennsylvania for December 2018

Table 3 shows the amount of R&D tax credit awarded by the Department in 2018 for qualified research expenditures made by taxpayers in Pennsylvania in taxable year 2017. Without the \$55 million cap, \$130.3 million in credit would have been awarded to 1,150 taxpayers. Of the approved taxpayers, 86.2 percent received an R&D tax credit of less than \$50,000, receiving 24.2 percent of the total amount of approved credit. Taxpayers with an approved R&D tax credit of \$50,000 or more claimed 75.8 percent of the approved credit amount. The 159 taxpayers receiving \$50,000 or more in credit represented 13.8 percent of the total number of applicants.

**Table 3. Pennsylvania Research & Development Tax Credit Program
Tentative and Actual Credit for Tax Year 2018⁸**

(\$thousands)

Actual Credit Range	Number of Applicants	Percent of Applicants	Tentative Credit Amount	Actual Credit Amount	Percent of Actual Credit
\$0.001 - \$4.9	302	26.3%	\$1,432.9	\$679.5	1.2%
\$5.0 - \$19.9	440	38.3%	\$10,145.9	\$4,918.9	8.9%
\$20.0 - \$49.9	249	21.7%	\$16,078.1	\$7,710.8	14.0%
\$50.0- \$99.9	77	6.7%	\$11,202.4	\$5,368.0	9.8%
\$100.0 - \$499.9	68	5.9%	\$28,649.7	\$12,146.6	22.1%
\$500.0 - \$999.9	8	0.7%	\$13,880.8	\$5,344.6	9.7%
\$1,000.0 & greater	6	0.5%	\$49,908.9	\$18,831.6	34.2%
TOTAL	1,150	100%	\$130,298.7	\$55,000.0	100%

Table 4 details the tentative amount of R&D tax credit awarded by the Department for each year through December 2018.

⁸ Detail may not add up due to rounding; 203 other applicants were rejected and did not receive any credit.

**Table 4. Pennsylvania Research and Development Tax Credit Program
Total Tentative Tax Credit Awarded By Year, 1997-2018**

(\$thousands)

Credit Awarded In	Number of Applicants	Tentative Credit Amount	Credit Awarded In	Number of Applicants	Tentative Credit Amount
1997	292	\$66,371.0	2008	466	\$90,712.9
1998	270	\$56,572.3	2009	507	\$80,208.0
1999	275	\$53,456.5	2010	488	\$94,419.6
2000	284	\$59,207.5	2011	537	\$130,551.4
2001	293	\$71,407.6	2012	569	\$106,966.9
2002	254	\$74,255.8	2013	631	\$94,468.3
2003	242	\$70,191.9	2014	765	\$87,511.4
2004	274	\$70,932.9	2015	790	\$84,110.5
2005	291	\$65,806.1	2016	948	\$85,485.0
2006	379	\$78,640.0	2017	1,126	\$108,053.0
2007	439	\$94,732.9	2018	1,150	\$130,298.7

Without any caps on annual awards, \$1,854.4 million in R&D tax credit would have been awarded to the 3,454 taxpayers from the tax credit’s inception through December 2018. Actual R&D tax credit awards have totaled \$763.0 million over that timeframe. Over the years, the varying annual credit caps have reduced the amount of R&D tax credit that would have been awarded to 41.1 percent of what was requested.

Table 5 presents the R&D tax credit awarded in December 2018 by business type.

**Table 5. Pennsylvania Research and Development Tax Credit Program
Actual Credits by Business Type in 2018**

(\$thousands)

Business Type	Number of Taxpayers	Percent of Taxpayers	Actual Credit Amount	Percent of Actual Credit
Manufacturing	524	45.6%	\$30,628.8	55.7%
Services	406	35.3%	\$18,969.1	34.5%
Miscellaneous ⁹	220	19.1%	\$ 5,402.1	9.8%
TOTAL	1,150	100%	\$55,000.0	100%

Manufacturers represented 45.6 percent of the taxpayers receiving the tax credit in 2018, claiming 55.7 percent of the total amount of approved credit. Pharmaceutical manufacturers continue to claim the largest single share for manufacturers receiving the R&D tax credit; 31 pharmaceutical manufacturers requesting credit were awarded \$15.2 million in credit. In the Services sector, the largest number of credit recipients were designers of computer systems and related services, with 108 recipients receiving \$4.1 million in credit. Also in the Services sector, the largest amount of credit went to companies in data and information services;

⁹ Miscellaneous business type includes business activities associated with individuals or corporations with North American Industry Classification System (NAICS) codes for the agriculture, construction, mining, wholesale trade, retail trade, and financial sectors and individuals.

45 such companies received \$7.1 million in credit in December 2018. In the Miscellaneous sector, there was not one particular type of business among tax credit recipients that was more prevalent.

Table 6 provides a breakdown of the R&D tax credit claimed by small and not small businesses in December 2018. As noted earlier, small businesses are those with net book assets of less than \$5 million.

**Table 6. Pennsylvania Research and Development Tax Credit Program
Small and Not Small Businesses in 2018**

(\$thousands)

Business Size	Number of Applicants	Percent of Applicants	Tentative Credit Amount	Actual Credit Amount	Percent of Actual Credit
Small	496	43.1%	\$16,132.5	\$11,000.0	20.0%
Not Small	654	56.9%	\$114,166.2	\$44,000.0	80.0%
TOTAL	1,150	100%	\$130,298.7	\$55,000.0	100%

In December 2018, small businesses filed for awards totaling more than the \$11.0 million in R&D tax credit set aside for them, hence their awards had to be pro-rated. The \$44.0 million program cap reduced the amount of credit approved for the not small businesses to 38.5 percent of the requested amount in December of 2018. In December 2017, the not small businesses received 51.2 percent of the amount of credit they requested.

Table 7 shows the history of the R&D tax credit for the small business set aside awarded by the Department for each year through December 2018.

**Table 7. Pennsylvania Research and Development Tax Credit Program
Small Business Set Aside By Year, 1997-2018**

(\$thousands)

Credit Awarded In	Number of Applicants	Tentative Credit Amount	Actual Credit Amount
1997	67	\$889.1	\$889.1
1998	85	\$1,821.4	\$1,821.4
1999	82	\$3,002.0	\$3,000.0
2000	83	\$1,545.4	\$1,545.4
2001	75	\$1,373.4	\$1,373.4
2002	79	\$1,615.6	\$1,615.6
2003	81	\$1,082.3	\$1,082.3
2004	94	\$1,419.8	\$1,419.8
2005	108	\$2,268.0	\$2,268.0
2006	173	\$7,081.1	\$7,081.1
2007	193	\$6,845.9	\$6,845.9
2008	205	\$8,053.0	\$8,000.0
2009	211	\$8,688.4	\$4,000.0
2010	213	\$8,487.8	\$3,600.0
2011	217	\$7,632.7	\$7,632.7
2012	242	\$7,085.2	\$7,085.2
2013	276	\$9,405.0	\$9,405.0
2014	332	\$10,801.9	\$10,801.1
2015	348	\$11,512.8	\$11,000.0
2016	432	\$18,611.0	\$11,000.0
2017	531	\$22,756.5	\$11,000.0
2018	496	\$16,132.5	\$11,000.0

Small businesses have been awarded \$123.5 million of the \$158.1 million in R&D tax credits that they have applied for since the inception of the R&D tax credit program; they have received 78.1 percent of the total amount of tax credits for which they applied. A total of \$152.6 million in tax credit was set aside for them over this period.

Eight times in the history of the R&D tax credit program the small business set aside has been awarded in total: 1999, 2008 through 2010, and 2015 through 2018. Most years, the small businesses have received the total amount of tax credit for which they applied. When small businesses claim less than the R&D credit

set aside for them, the not small businesses receive a pro-rated amount of the excess R&D tax credit not claimed by the small businesses.

Table 8 shows the amount of R&D tax credit that has been applied against the CNIT, CSFT and PIT for taxable years 1997 through 2016. The data in Table 8 are for taxpayers that have directly received the tax credit from the Department, as well as those taxpayers that have purchased unused R&D tax credits.

The first taxable year against which the credit could be used was 1997. For PIT, individuals who received the credit directly are included, as are any individual owners of S corporations or limited liability companies (LLCs) who received the pass-through benefit. All credit amounts are as of February 2019.

As of February 2019, \$537.2 million, or 82.3 percent of the \$653.0 million in R&D tax credit that has been awarded for 1997 through 2016, has been applied to specific tax periods. Of the applied credits, 35.5 percent has been applied against the CSFT; 57.8 percent has been applied against the CNIT; 6.6 percent has been applied against the PIT. It is important to note that the amount of tax credit applied to a particular taxable year can vary over time as a taxpayer’s taxable year liability may change due to assessment or the application of other credits.

**Table 8. Pennsylvania Research and Development Tax Credit Program
Application by Tax Type and Taxable Year, 1997-2016**

Taxable Year	Corporate Net Income Tax	Number of Taxpayers	Capital Stock & Franchise Tax	Number of Taxpayers	Personal Income Tax	Number of Taxpayers
1997	\$ 4,808,403	93	\$ 3,654,425	192	\$187,863	91
1998	\$ 2,669,951	84	\$ 5,262,915	199	\$791,636	195
1999	\$ 3,129,320	91	\$ 6,317,818	233	\$439,671	162
2000	\$ 4,495,931	77	\$ 6,465,943	213	\$523,087	201
2001	\$ 6,364,344	82	\$ 7,141,332	217	\$534,126	173
2002	\$ 7,925,753	49	\$ 5,313,965	220	\$698,408	165
2003	\$ 8,733,454	62	\$ 8,086,269	217	\$337,985	154
2004	\$14,874,207	67	\$ 8,387,866	263	\$721,801	171
2005	\$12,630,586	66	\$13,164,167	291	\$ 1,389,912	179
2006	\$16,241,888	96	\$15,884,825	327	\$ 2,679,623	235
2007	\$15,221,106	104	\$12,720,361	356	\$ 1,799,924	236
2008	\$18,151,421	103	\$11,792,443	407	\$ 1,327,515	306
2009	\$ 8,414,374	91	\$12,364,902	480	\$ 1,460,930	211
2010	\$20,594,531	110	\$12,878,861	505	\$ 1,334,225	187
2011	\$19,747,901	108	\$20,988,923	537	\$ 1,888,433	256
2012	\$16,892,918	147	\$15,066,839	532	\$ 2,966,287	325
2013	\$34,843,966	160	\$ 7,823,160	579	\$ 3,073,282	429
2014	\$30,324,527	172	\$10,727,560	679	\$ 3,798,012	548
2015	\$30,375,730	169	\$ 6,803,495	762	\$ 4,618,126	664
2016	\$34,208,730	234	NA	NA	\$ 5,114,630	789
TOTAL	\$310,649,039		\$190,846,068		\$35,685,476	

It should be noted that it is possible that some portion of the R&D tax credit awarded by the Department might never be used against a tax year liability, particularly those credits not affected by the provisions of Act 46 of 2003.

R&D tax credits awarded in December 1997, the first credits awarded under the program, have expired and cannot be used beyond tax year 2012. As of February 2019, of the \$15.0 million awarded to 292 taxpayers in December 1997, approximately \$225,000 has not been used. This amounts to 1.5 percent of the total amount of R&D tax credits awarded in 1997.

R&D tax credits awarded in December 1998 have expired and cannot be used beyond tax year 2013. As of February 2019, of the \$15.0 million awarded to 270 taxpayers in December 1998, approximately \$309,000 has not been used. This amounts to 2.1 percent of the total amount of R&D tax credits awarded in 1998.

R&D tax credits awarded in December 1999 have expired and cannot be used beyond tax year 2014. As of February 2019, of the \$15.0 million awarded to 275 taxpayers in December 1999, approximately \$462,000 has not been used. This amounts to 3.1 percent of the total amount of R&D tax credits awarded in 1999.

R&D tax credits awarded in December 2000 have expired and cannot be used beyond tax year 2015. As of February 2019, of the \$15.0 million awarded to 275 taxpayers in December 1999, approximately \$705,000 has not been used. This amounts to 4.7 percent of the total amount of R&D tax credits awarded in 2000.

It is still possible that these expired tax credits could be used if certain past tax liabilities for those taxpayers were to change, but those tax credits cannot be sold or used against any future tax years.

One possible reason for non-use of the tax credit is a reorganization in which a taxpayer claiming the credit goes out of existence or merges with another business before applying the credit against a tax liability. Another observation about usage of the tax credit is that, for taxable years prior to 2005, the amount of credit a taxpayer could claim against a tax type in one tax year was limited to 50 percent of the tax liability. This provision had ensured that a taxpayer could not totally eliminate a tax liability using only the R&D tax credit. However, Act 46 of 2003 eliminated the 50 percent limit. This fact, combined with the 15-year carryover, should allow taxpayers to receive most, if not all, of the tax benefit of the credit. Further, the provision in Act 46 of 2003 allowing the sale or assignment of any unused R&D tax credit awarded in December 2003 and after should minimize how much R&D tax credit is not utilized.

The CSFT has been eliminated for taxable years beginning after December 31, 2015, and the R&D tax credit can no longer be claimed against it for those tax periods. This is important for S corporations and LLCs that are not subject to the CNIT. S corporations and LLCs may pass the tax credit through to shareholders who can claim it against their PIT. Therefore, S corporations and LLCs, in order to use the R&D tax credit after 2015, will have to either apply it against PIT or sell their unused tax credits. They will be able to carry it forward for up to 15 taxable years.

Taxes Paid by R&D Tax Credit Recipients

Table 9 shows the CNIT liabilities for taxable year 2016 (the latest year for which reports are available for all taxpayers) for taxpayers receiving the R&D tax credit in 2018. Table 9 and Table 5 have a similar structure in order to provide comparability. Please note that taxpayers claiming the credit against the personal income tax are not included in these data. Also, taxpayers who purchased unused R&D tax credit are not included in these data.

**Table 9. Pennsylvania Research and Development Tax Credit Program
Taxable Year 2016 CNIT Liabilities by Business Type**

Business Type	2016 CNIT Liability
Manufacturing	\$57,432,073
Services	\$90,752,627
Miscellaneous	\$55,376,506
TOTAL	\$203,561,206

In order to provide an idea of the relative value of the R&D tax credit to recipients, an analysis was conducted comparing the R&D tax credit awarded in 2018 to the total tax year 2016 self-assessed CNIT.¹⁰ Of the 1,150 taxpayers receiving the R&D tax credit in 2018 that are subject to the CNIT, their total self-assessed 2016 tax year CNIT totaled \$203.6 million. Though there are obviously varied ratios per individual taxpayer, the \$55.0 million in tax credit awarded in 2018 represented 27.0 percent of the total self-assessed tax amount for tax year 2016, while the \$130.3 million in tax credit requested represented 64.0 percent of the total self-assessed tax amount for tax year 2016.

Federal R&D Tax Credit Program

The federal government first adopted the R&D tax credit as a temporary credit in 1981. The federal government does not cap the total credit amount that can be claimed in a taxable year. Since its enactment the credit was temporary and was routinely extended through legislation. On December 18, 2015, the credit was made permanent and enhanced with the enactment of the Protecting Americans from Tax Hikes (PATH) Act of 2015 (H.R. 2029; P.L. 114-113).

The public policy goal of the R&D tax credit is to encourage the private sector to increase R&D spending, which in turn serves as a catalyst to economic growth by increasing productivity through the utilization of new technology. The credit is justified in economic theory on the basis of market failure, which occurs because firms may under-invest in R&D when they tend to not recoup all associated costs of investing in R&D. Hence, less R&D occurs than would be economically optimal for the economy as a whole. The R&D tax credit is a method for lowering the cost of R&D to private firms and increasing the return on investment. By increasing the rate of return on investment, the R&D tax credit encourages more R&D than would occur if the credit did not exist.

Administration & Evaluation of Pennsylvania R&D Tax Credit Program Applications

In order to fairly and equitably award credits to businesses within the Commonwealth of Pennsylvania, the Department of Revenue has taken steps to establish an on-line application process that creates transparency in the application itself, assists with the evaluation of those applicants and provides insight into the economic benefits of the R&D Credits awarded to those businesses.

Beginning with the 2018 R&D Application, the department created the online application system with each applicant creating a unique User ID and Password. Implementing the R&D Credit online application provided the opportunity to add valuable business rules. These rules can require data entry in certain key fields that if in the past left blank would have resulted in a denial or mail correspondence. The rules also create the opportunity to present only relevant fields to the applicant based on the entry of information, such as after selecting an entity type. Once completed, the applicant receives a unique confirmation number to reference when accessing the application in the future and to identify related correspondence.

¹⁰ In some cases, the tax liability may have been self-assessed and settled.

The electronic application process provided a mechanism to create a workflow that tracked the status of the application for the taxpayer, indicating whether the application was received, pending, reviewed, approved, or rejected. Once verification of the initial application was complete, the approval process continued confirming that the applicant and/or 20 percent owner was in compliance filing and paying all appropriate tax returns.

As the Department of Revenue is tasked with the integrity of the application process and credits awarded, the department moved toward a system designed to further substantiate the applicant's PA-Qualified Expenditures, Total Expenditures, Direct Wages, and 3rd Party/Subcontracted Labor. Data analytics were developed and incorporated to group selected applicants based on information from the application and applicant history. Selected applicants were asked to provide records to substantiate areas including that wages were incurred for an employee conducting qualified research and development activities in Pennsylvania.

This review process provides greater assurance that the claimed research and development activities met the statutory qualifications for a tax credit. For the 2018 application process, the department's detailed review of supporting records resulted in an additional \$465,300 of R&D credits redistributed to other qualified applicants.

The submission of an application must be completed by September 15th and the department must approve the credit by December 15th. The period provides a limited timeframe, and the Department of Revenue is committed to further evaluation of the process and will continue to implement enhancements to the online application and the applicant review.

Act 43-2017 authorizes the Department of Revenue to perform tax clearances on taxpayers prior to the awarding of a tax credit to ensure all taxpayers are compliant with tax payment and filing obligations.

The two issues for determination are entity tax compliance and ownership tax compliance for entity owners with a 20% or greater share of ownership.

For the Research and Development tax credit, less than 2 percent of applicants were deemed non-compliant and denied the credit. Approximately \$1.4M in liabilities were cleared through either payments, error resolution, credits or account adjustments. Additionally, over 600 unfiled returns were filed by taxpayers when prompted by Revenue during the compliance process.

R&D Expenditures in Pennsylvania and the United States

In 1995, according to the National Science Foundation (NSF), private industry in Pennsylvania spent \$5,331 million of its own funds on R&D expenditures. This was 4.0 percent of the total R&D expenditures by private industry in 1995 in the United States (\$132,103 million).

By 2016¹¹, the total amount of R&D expenditures in Pennsylvania by private industry had risen to \$12,300 million. This was an increase over the twenty-one year period of 130.7 percent. Over the same period, total R&D expenditures by private industry in the United States had risen by 178.2 percent to a level of \$367,516 million. For 2016, R&D expenditures in Pennsylvania by private industry were 3.3 percent of total R&D expenditures by private industry in the United States. Pennsylvania ranked 9th in the entire US in R&D spending by private industry in 2016.

The Pennsylvania R&D expenditures reported on the December 2017 tax credit applications for businesses receiving the R&D tax credit, which were based on research expenditures in 2016, totaled \$3,990.1

¹¹The most recent year for which estimated state-level R&D spending is available from the National Science Foundation is 2016.

million. This amount represented 32.4 percent of the total R&D performed in Pennsylvania by private industry as estimated by the NSF in 2016.

For comparison, the 1,150 R&D tax credit applicants in 2018 had total Pennsylvania R&D expenditures in 2017 of \$5,264.5 million. Not all R&D done by industry in Pennsylvania is performed by R&D tax credit applicants.

A study released in September 2011¹² by the R&D Credit Coalition, an organization of trade associations and companies dedicated to the permanent establishment of the federal R&D tax credit, examined the economic impact of the existing R&D tax credit and the potential impact of strengthening certain provisions of the R&D tax credit. The study found that the existing federal R&D tax credit “is estimated to have increased annual private research spending by \$10 billion in the short-term and by \$22 billion in the long-term.” It was noted that these annual figures compare very favorably with the \$6 to \$8 billion annual federal revenue loss attributed to the credit.

R&D Tax Credit Programs in Other States

A majority of states that have a corporate net income tax have sought to capture the potential benefits of encouraging R&D within their state by enacting an R&D tax credit. There are 42 states besides Pennsylvania that have provided for R&D tax credits in recent law, although, for a few of those states, the credits may have lapsed pending renewal. Most incorporate provisions of current or former R&D credits under the Internal Revenue Code.¹³

New Jersey’s R&D tax credit is like Pennsylvania’s in that it mirrors the federal R&D tax credit. However, New Jersey’s R&D tax credit statute does not cap the total amount of credit that can be awarded in a year. Like the Pennsylvania R&D tax credit prior to Act 46 of 2003, there is a 50 percent cap on the amount of credit that a taxpayer can apply against its tax year liability. In fiscal year 2018, \$81.0 million in R&D tax credit was claimed in New Jersey. Additionally, the New Jersey R&D tax credit statute allows certain biotech and emerging technology companies to sell unused R&D tax credits to any company paying the corporate net income tax.¹⁴ After Act 46 of 2003, all companies receiving the Pennsylvania R&D tax credit, regardless of their business sector, can sell or assign any unused R&D tax credits awarded beginning in December 2003.

Effectiveness of the Pennsylvania R&D Tax Credit Program

The timeframe for R&D projects in the private sector can be lengthy. It is not uncommon for businesses to have R&D projects extend for 10 to 15 years or more. The Pennsylvania R&D tax credit has thus far had a potential impact on increasing research expenses in twenty-one years, 1997 through 2017. Although 1996 Pennsylvania research expenses were used to calculate the credit in 1997, the taxpayer’s R&D decisions could not have been affected by the credit prior to enactment of Act 7 in May 1997. Also, the changes made by Act 46 of 2003 altered several parameters of the program that could impact the effectiveness of the R&D tax credit. Some observations can be made about the effectiveness of the Pennsylvania R&D tax credit over the life of its existence.

The most recent economic recession did have an impact on R&D spending in Pennsylvania by private industry. Overall, R&D spending in Pennsylvania by industry fell by 13.2 percent in 2008 but recovered strongly in 2009 to grow by 13.7 percent according to NSF data.

¹² “The R&D Credit: An Effective Policy for Promoting Research Spending,” Prepared by Ernst and Young LLP for the R&D Credit Coalition, September 2011.

¹³ CCH Incorporated, Multistate Charts, ¶1680-200 Credits for Investment/Research Activities.

¹⁴ Companies with 225 employees or less may sell unused R&D tax credits in New Jersey.

Over the lifetime of the R&D tax credit program, 3,454 different taxpayers have been awarded some amount of the total \$763.0 million in tax credit awarded between 1997 and 2018. The number of taxpayers qualifying for the tax credit due to increased Pennsylvania research expenditures is still expanding, though there is some volatility from year to year regarding Pennsylvania research expenditure amounts.

Of the 1,150 taxpayers receiving the R&D tax credit in 2018, 735 were either Pennsylvania S corporations, LLCs, LLPs (limited liability partnerships), sole proprietorships or individuals, and 415 were C corporations. The S corporations, LLCs, LLPs or individuals received \$16.3 million in R&D tax credit, while the C corporations received \$38.7 million.

The 1,150 taxpayers claiming the R&D tax credit in 2018 had total Pennsylvania research expenditures in taxable year 2017 of \$5,264.5 million. This was 18.3 percent increase compared to their total Pennsylvania research expenditures in taxable year 2016 of \$4,451.7 million.

While there is not a study measuring the effects of the R&D tax credit in Pennsylvania, a study released by the Milken Institute¹⁵ in December 2015 could be used to gauge the effectiveness of the R&D tax credit programs in a general sense. The study measures the impact of a proposal to double the existing rate of calculation in the California R&D tax credit from 15 percent to 30 percent of the increase in California R&D expenses over the base year. The report concluded that, in the tenth year after adopting the change, the \$700 million in additional R&D credits would stimulate between \$4.5 billion and \$6.8 billion in additional R&D activity in California, with a multiplier between 6.4 and 9.7. Further, the report found that that, in the tenth year after adopting the change, the gross domestic product (GDP) of California would be higher by between \$7.7 billion and \$10.5 billion. For comparison's sake, in 2014, California's GDP was \$2.3 trillion, so the additional growth of between \$7.7 billion and \$10.5 billion in ten years time would not be a significant share of the California economy. Even so, the report does conclude that while doubling the tax credit could be seen as an unfair tax giveaway, it concludes that the action is worth the cost. It is worth pointing out that Pennsylvania is a very different business environment than California, and it's unclear that the same conclusion can be drawn here.

Impact on Not Small Businesses

Out of the 1,150 taxpayers receiving the tax credit in 2018, 654 did not qualify as small businesses. Their total Pennsylvania research expenditures in taxable year 2017 were \$5,014.3 million, a 17.9 percent increase over their taxable year 2016 Pennsylvania research expenditures of \$4,251.4 million. They received \$44.0 million in R&D tax credit in December 2018.

Of the 654 not small businesses, 507 increased their Pennsylvania research expenditures in taxable year 2017 over taxable year 2016 by 31.5 percent in the aggregate. Their Pennsylvania research expenditures in taxable year 2017 rose to \$3,703.3 million from \$2,816.4 million in taxable year 2016. Only 147 of these businesses reduced their Pennsylvania research expenditures over the same period. Their Pennsylvania research expenditures in taxable year 2017 declined by 8.6 percent to \$1,311.0 million from \$1,434.8 million in taxable year 2016.

Impact on Small Businesses

Out of the 1,150 taxpayers receiving the tax credit in 2018, 496 were small businesses. Their total Pennsylvania research expenditures in taxable year 2017 were \$250.2 million, a 24.9 percent increase over their taxable year 2016 Pennsylvania research expenditures of \$200.3 million. The 496 small businesses received all of the \$11.0 million set aside for them in December 2018.

¹⁵ "California's Innovation-Based Economy: Policies to Maintain and Enhance It," The Milken Institute, December 2015.

Of the 496 small businesses, 409 increased their Pennsylvania research expenditures in taxable year 2017 over taxable year 2016 by 35.9 percent in the aggregate. Their Pennsylvania research expenditures in taxable year 2017 rose to \$212.6 million from \$156.5 million in taxable year 2016. Only 87 small businesses reduced their Pennsylvania research expenditures over the same period. Their Pennsylvania research expenditures in taxable year 2017 declined by 14.2 percent to \$37.6 million from \$43.9 million in taxable year 2016.

Impact on First Time Claimants and New Companies

In 2018, 310 taxpayers were awarded the tax credit for the first time, claiming \$8.3 million in credit. Their Pennsylvania research expenditures totaled \$460.8 million for taxable year 2017. Conversely, 448 taxpayers that claimed the tax credit in 2017 did not receive any credit in 2018. These 448 taxpayers had Pennsylvania research expenditures in taxable year 2016 of \$1,819.3 million and claimed \$19.9 million in tax credit in 2017.

Of all the 1,150 taxpayers claiming the R&D tax credit in 2018, 619 were companies incorporated in Pennsylvania after the passage of Act 7 of 1997. It is possible that not all of these newly incorporated companies are start-ups, but may be newly formed subsidiaries of a parent corporation. These companies claimed \$32.5 million in tax credit in 2018 and had total Pennsylvania research expenditures in taxable year 2017 of \$1,835.8 million, a 31.3 percent increase from their Pennsylvania research expenditures in taxable year 2016 of \$1,397.7 million.

The 619 more recently incorporated companies had a total taxable year 2016 CNIT liability of \$61.3 million; 540 taxpayers had zero tax liability.

Impact on Established Companies

In order to provide more insight into the companies that regularly claim the R&D tax credit, this report will examine 208 taxpayers for which the Department has tracked Pennsylvania research expenditures for the last ten taxable years, from 2008 through 2017. This group of credit recipients has received \$190.9 million in total tax credit from 1997 through 2018, or 25.0 percent of the total \$763.0 million awarded over twenty two years. These 208 companies represent 71.2 percent of the number of companies that received the R&D tax credit in its first year, 1997. As a group, these taxpayers are a representative cross-section of the type of companies that have come to consistently claim the R&D tax credit.

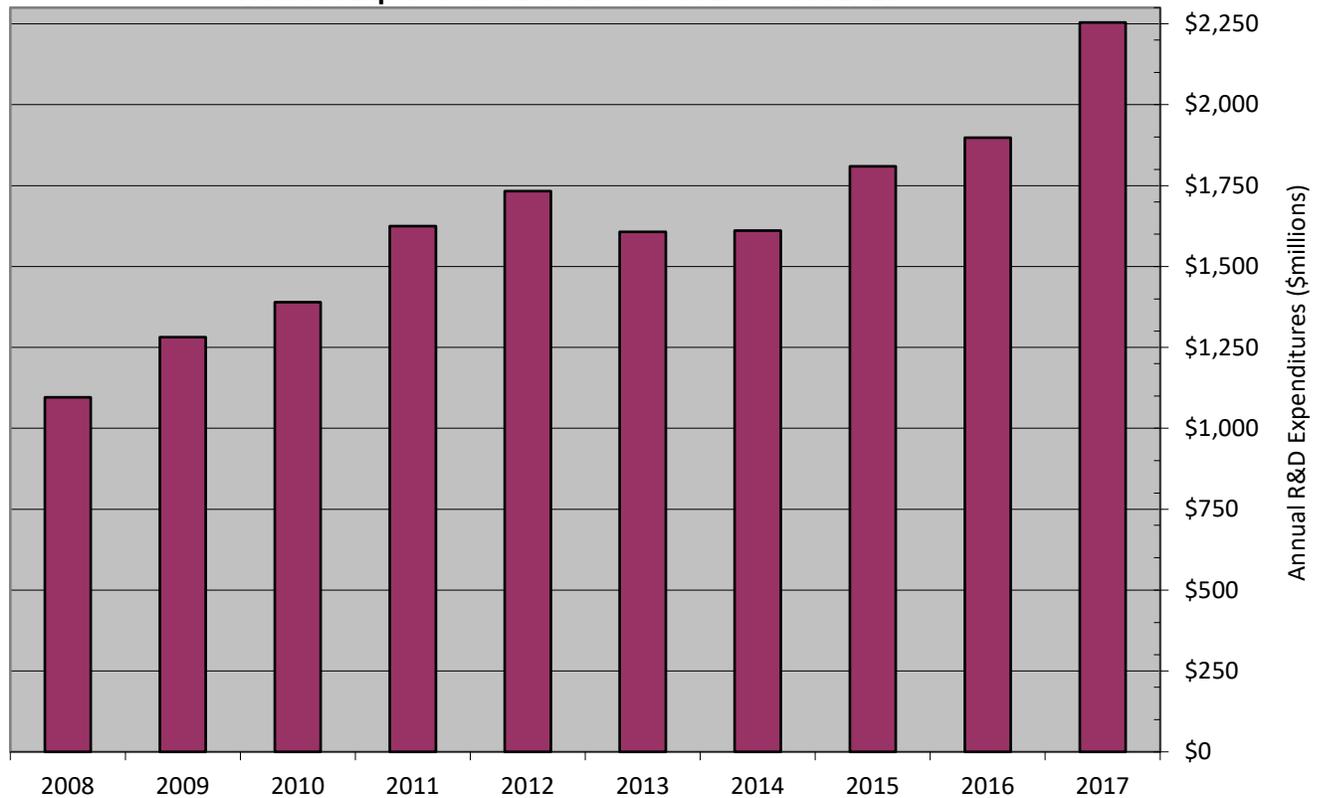
For these 208 taxpayers, their 2017 Pennsylvania R&D expenditures totaled \$2,253.7 million. This is an aggregate growth rate of 105.7 percent over their 2008 Pennsylvania R&D expenditures of \$1,095.7 million; between 2008 and 2017, the Pennsylvania R&D expenditures for these 208 taxpayers grew at a compound annual growth rate of 8.3 percent.

These 208 taxpayers were awarded \$21.1 million in R&D tax credit in 2018, 38.4 percent of the total amount of R&D tax credit awarded in December 2018. This credit amount was 0.9 percent of their total amount of Pennsylvania research expenditures in taxable year 2017. Overall, it is important to note that the R&D tax credit awarded remains relatively small when compared to the amount of money spent by the taxpayers to conduct their research activities in the Commonwealth.

The 208 established taxpayers had a total CNIT liability for taxable year 2016 of \$43.1 million.

Chart 1 graphically shows the Pennsylvania R&D expenditures for the 208 established taxpayers for the last ten taxable years, 2008 through 2017.

**Chart 1. Pennsylvania R&D Expenditures by Year for 208 Established Companies
With PA Expenditure Data Between 2008 and 2017**



Small versus Not Small

Of the 208 taxpayers, 142 did not qualify as small businesses. They received \$181.4 million in tax credit over the twenty-two years of the program. Their 2017 Pennsylvania R&D expenditures totaled \$2,206.2 million. This is an aggregate growth rate of 103.9 percent over their 2008 Pennsylvania R&D expenditures of \$1,081.8 million; between 2008 and 2017, the Pennsylvania R&D expenditures for these 122 taxpayers grew at a compound annual growth rate of 8.2 percent.

Of the 208 taxpayers, there were 66 small businesses that received \$9.5 million in tax credit over the twenty-two years of the program. Their 2017 Pennsylvania R&D expenditures totaled \$47.5 million. This is an aggregate growth rate of 242.2 percent over their 2008 Pennsylvania R&D expenditures of \$13.9 million; between 2008 and 2017, the Pennsylvania R&D expenditures for these 66 taxpayers grew at a compound annual growth rate of 14.6 percent.

By Industry Type

Of the 208 taxpayers, 137 were classified as manufacturers. They received \$157.4 million in tax credit over the twenty-two years of the program. Their 2017 Pennsylvania R&D expenditures totaled \$1,873.3 million. This is an aggregate growth rate of 90.0 percent over their 2008 Pennsylvania R&D expenditures of \$986.2 million; between 2008 and 2017, the Pennsylvania R&D expenditures for these 137 taxpayers grew at a compound annual growth rate of 7.4 percent.

Of the 208 taxpayers, there were 71 non-manufacturing businesses that received \$33.6 million in tax credit over the twenty-two years of the program. Their 2017 Pennsylvania R&D expenditures totaled \$380.5 million. This is an aggregate growth rate of 247.4 percent over their 2008 Pennsylvania R&D expenditures of

\$109.5 million; between 2008 and 2017, the Pennsylvania R&D expenditures for these 71 taxpayers grew at a compound annual growth rate of 14.8 percent.

Conclusions on the Impact of the R&D Tax Credit in Pennsylvania

When all 1,150 taxpayers receiving the R&D tax credit in 2018 were examined, small businesses increased their Pennsylvania research expenditures in taxable year 2017 more than not small businesses. However, the Pennsylvania research expenditures for small businesses were only 8.8 percent of the total Pennsylvania research expenditures in taxable year 2017 for all businesses receiving the tax credit. The overwhelming majority of Pennsylvania research expenditures continue to be made by taxpayers not classified as small businesses.

Of the 208 taxpayers examined for whom the Department has tracked Pennsylvania research expenditures for the last ten taxable years, for 2008 through 2017, manufacturers were the primary beneficiaries. Across all of the business types, the R&D tax credit remains a small percentage of Pennsylvania research expenditures. Hence, many other factors are likely to affect a company's R&D spending decisions.

Report Conclusion

The R&D tax credit has existed in Pennsylvania for twenty-two years. Literature evaluating the effectiveness of the federal R&D tax credit and state R&D tax credits has shown mixed results regarding the effectiveness of the programs. Many factors other than the R&D tax credit influence a company's R&D investment decisions. This report's other observations can be summarized as:

- In December 2018, 1,150 companies were awarded credits, receiving the capped amount of \$55.0 million, or 42.2 percent of the amount requested.
- In the absence of a cap, \$130.3 million in tax credits would have been awarded.
- In 2017, the 1,150 companies awarded the R&D tax credit had total Pennsylvania research expenditures of \$5,264.5 million.
- Manufacturing firms, particularly pharmaceutical manufacturers, continue to be the primary beneficiaries of the R&D tax credit.
- Small businesses claimed all of the \$11.0 million in R&D tax credit set aside for them in December 2018.
- As of February 2019, a total of \$119.1 million in unused R&D tax credits have been sold or assigned from tax credits awarded from December 2003 through December 2017; \$111.4 million was paid for the unused credit, or 93.5 percent of the value of the unused credits.
- The R&D tax credit program has awarded a total of \$763.0 million in tax credit to 3,455 different taxpayers over the life of the program thus far. Without the caps on annual awards, a total of \$1,854.4 million in requested R&D tax credit would have been awarded. The effect of the annual cap on awards reduced the aggregate amount of R&D tax credits awarded to 41.1 percent of the requested amount.

APPENDIX A

**Table 1. Pennsylvania Research & Development Tax Credit Program
Taxpayers Receiving Credit in December 2018, 2017 and 2016
Sorted by 2018 Credit Awarded (Largest to Smallest)
(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Janssen Research & Development, LLC	\$10,024.9	\$10,464.0	\$10,464.0
Uber Technologies, Inc.	\$3,354.7	\$3,114.9	\$0.0
Philly Shipyard, Inc.	\$1,546.7	\$395.9	\$395.9
Google, Inc.	\$1,506.9	\$4,042.8	\$3,456.7
Intel Americas, Inc.	\$1,241.7	\$1,768.0	\$473.9
Incyte Corporation	\$1,156.6	\$0.0	\$0.0
SEI Global Services, Inc.	\$897.0	\$1,489.3	\$0.0
SAP America, Inc.	\$853.7	\$905.6	\$0.0
GlaxoSmithKline, LLC	\$772.5	\$0.0	\$0.0
The Vanguard Group, Inc.	\$624.9	\$527.3	\$527.3
Eli Lilly and Company	\$579.3	\$0.0	\$0.0
The Boeing Company	\$567.4	\$128.7	\$128.7
Ansys, Inc.	\$548.6	\$163.4	\$163.4
Janssen Biotech, Inc.	\$501.4	\$1,312.8	\$1,312.8
Arconic, Inc. (f/k/a Alcoa, Inc.)	\$494.1	\$265.7	\$0.0
Precision Pipeline, LLC	\$485.8	\$0.0	\$0.0
Bayer Healthcare, LLC	\$447.5	\$1,847.5	\$0.0
Merck Sharp & Dohme Corp.	\$402.3	\$0.0	\$0.0
Comcast Holdings Corporation	\$389.7	\$593.5	\$593.5
BAE Systems Land & Armaments, LP	\$315.9	\$0.0	\$0.0
Honeywell International, Inc.	\$279.7	\$260.2	\$0.0
CSLB Holdings, Inc.	\$270.6	\$129.1	\$0.0
Datacap Systems, Inc.	\$263.2	\$306.3	\$156.0
BMH, LLC	\$256.1	\$0.0	\$0.0
Javan Engineering, Inc.	\$250.7	\$86.9	\$66.6
Argan, Inc.	\$249.8	\$0.0	\$0.0
QSI Management, LLC	\$244.2	\$5.2	\$0.0
IQVIA, Inc. (f/k/a Quintiles IMS Incorporated)	\$239.0	\$0.0	\$0.0
The Hershey Company	\$237.1	\$1,335.2	\$1,335.2
Communications Test Design, Inc.	\$219.8	\$117.2	\$117.2
York International Corporation	\$214.5	\$427.7	\$179.7
Armstrong World Industries, Inc.	\$198.2	\$161.4	\$161.4
Domtar Corporation	\$196.0	\$55.9	\$55.9
International Business Machines Corporation	\$195.0	\$694.0	\$559.8
Advanced Technology Services Group, LLC	\$189.3	\$182.6	\$102.8
Komatsu Mining Corp. (f/k/a Joy Global, Inc.)	\$187.2	\$262.4	\$0.0
Holtec International Power Division, Inc.	\$181.5	\$126.2	\$0.0
Complexa, Inc.	\$178.2	\$102.8	\$75.3
Zoll Manufacturing Corp.	\$173.7	\$560.6	\$560.6
Cisco Systems, Inc.	\$167.5	\$1,978.9	\$0.0
Savana, Inc.	\$158.5	\$158.9	\$84.0
Holtec Manufacturing Division	\$157.6	\$673.1	\$118.2
Cerner Corporation	\$150.8	\$141.0	\$141.0
CJL Engineering, Inc.	\$149.0	\$0.0	\$0.0
Shire Human Genetic Therapies, Inc.	\$148.5	\$278.3	\$278.3
John Bean Technologies Corporation	\$141.6	\$452.4	\$153.2
Nokia Of America Corporation (f/k/a Alcatel Lucent USA, Inc.)	\$140.6	\$0.0	\$0.0
TMNA Services, LLC	\$140.2	\$203.1	\$102.4
Lutron Electronics Co., Inc.	\$140.0	\$748.8	\$249.8
A. I. Labs, LLC	\$135.9	\$0.0	\$0.0

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Carlisle Fluid Technologies, Inc.	\$135.7	\$0.0	\$0.0
Aevi Genomic Medicine, Inc.	\$135.6	\$0.0	\$0.0
Hydro-Pac, Inc.	\$134.5	\$0.0	\$0.0
Process Combustion Corporation	\$133.9	\$281.8	\$0.0
WebpageFX, Inc.	\$131.2	\$107.2	\$48.8
Victaulic Company	\$130.1	\$677.6	\$660.5
Deacom, Inc.	\$128.0	\$40.7	\$0.0
Graymont Pa, Inc.	\$126.7	\$0.0	\$0.0
Innovu, LLC	\$124.8	\$56.1	\$0.0
Arkema, Inc.	\$123.2	\$0.0	\$0.0
Duolingo, Inc.	\$121.1	\$171.1	\$165.7
Facebook, Inc.	\$121.1	\$0.0	\$0.0
GSI Health, LLC	\$117.7	\$0.0	\$0.0
Fujirebio Diagnostics, Inc.	\$117.5	\$210.6	\$45.1
Bimbo Bakeries USA, Inc.	\$117.5	\$0.0	\$0.0
Emoney Advisor Holdings, LLC	\$116.9	\$261.0	\$0.0
Aurora Innovation, Inc.	\$116.7	\$0.0	\$0.0
Dart Container Corp. Of Pennsylvania	\$114.3	\$92.9	\$0.0
Aggregates Equipment, Inc.	\$114.2	\$12.9	\$12.2
Globus Medical, Inc.	\$113.9	\$405.8	\$405.8
Lehigh Cement Company, LLC	\$113.2	\$234.3	\$0.0
Xyntek Incorporated	\$110.7	\$44.9	\$0.0
3Gtms, Inc.	\$109.7	\$107.6	\$56.3
Genus Lifesciences, Inc.	\$109.7	\$518.3	\$518.3
Argo AI, LLC	\$109.5	\$0.0	\$0.0
Oncoceutics, Inc.	\$108.8	\$86.0	\$86.0
Covestro, LLC	\$105.7	\$266.4	\$266.4
Aerzen USA Corporation	\$104.9	\$184.4	\$38.7
SRC Solutions, Inc.	\$104.3	\$0.0	\$0.0
Pentec Health, Inc.	\$103.9	\$49.0	\$49.0
Net Health Systems, Inc.	\$102.0	\$71.7	\$0.0
JD Eckman, Inc.	\$100.5	\$173.1	\$79.8
AutoSoft, Inc.	\$98.0	\$48.8	\$0.0
Recro Pharma, Inc.	\$97.4	\$215.5	\$0.0
Biomeme, Inc.	\$96.1	\$45.9	\$0.0
Pendu Manufacturing, Inc.	\$95.5	\$0.0	\$0.0
Carpenter Technology, Corporation	\$95.3	\$0.0	\$0.0
Chondrial Therapeutics, Inc.	\$94.2	\$0.0	\$0.0
David Michael Co., Inc.	\$92.2	\$0.0	\$0.0
K S Tooling, Inc.	\$91.3	\$7.3	\$0.0
Knopp Biosciences, LLC	\$90.7	\$56.8	\$56.8
Matrix Pdm Engineering, Inc.	\$89.9	\$112.8	\$0.0
Materials Research & Design, Inc.	\$87.7	\$0.0	\$0.0
Okna Windows Corp.	\$86.7	\$0.0	\$0.0
Misko, Inc.	\$86.4	\$0.0	\$0.0
Primetals Technologies USA, LLC	\$86.2	\$112.7	\$78.8
Kinsley Construction, Inc.	\$82.9	\$76.1	\$76.1
SPD Electrical Systems, Inc.	\$81.8	\$150.9	\$150.9
Seco/Warwick Corporation	\$81.8	\$41.2	\$0.0
Ansaldo Sts USA, Inc.	\$81.5	\$16.4	\$16.4

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	Awarded	Awarded	Utilized ¹
Avery Dennison Corporation	\$81.4	\$91.7	\$0.0
Krystal Biotech, Inc.	\$81.1	\$0.0	\$0.0
Bohler Engineering PA, LLC	\$78.0	\$52.1	\$0.0
Listrak, Inc.	\$77.4	\$184.6	\$89.9
Nvidia Corporation	\$77.1	\$57.8	\$0.0
Accudyn Products, Inc.	\$76.8	\$58.1	\$58.1
Tri-State Technology Professionals, Inc.	\$76.1	\$0.0	\$0.0
Advertising Specialty Institute, Inc.	\$76.1	\$96.8	\$0.0
Fibrocell Science, Inc.	\$75.9	\$148.0	\$0.0
Sanofi Pasteur, Inc.	\$75.8	\$1,784.7	\$1,784.7
KCF Technologies, Inc.	\$74.2	\$28.4	\$28.4
Nabriva Therapeutics US, Inc.	\$73.5	\$76.7	\$0.0
Graybills Tool & Die, Inc.	\$73.3	\$22.2	\$22.2
NeverWet, LLC	\$72.0	\$0.0	\$0.0
Mars Incorporated	\$70.7	\$0.0	\$0.0
Velicept Therapeutics, Inc.	\$70.5	\$73.8	\$0.0
Just Play, LLC	\$70.5	\$217.2	\$0.0
Mathway, LLC	\$69.0	\$52.3	\$0.0
II VI Inc.	\$66.2	\$186.8	\$0.0
Ensemble Holding II, Inc.	\$65.9	\$0.0	\$0.0
Griffith Consulting, LLC	\$65.7	\$0.0	\$0.0
Morgan, Lewis & Bockius, LLP	\$65.4	\$0.0	\$0.0
Phonetics, Inc. (d/b/a Sensaphone)	\$65.4	\$12.3	\$0.0
DGI-Menard, Inc.	\$65.3	\$86.2	\$27.2
Analytical Graphics, Inc.	\$65.2	\$91.5	\$4.5
Applied Systems Associates, Inc.	\$63.7	\$77.6	\$77.6
Blackney-Hayes Architects, P.C.	\$63.1	\$0.0	\$0.0
Hennecke, Inc.	\$62.9	\$125.2	\$5.5
Farmers Pride, Inc.	\$62.7	\$0.0	\$0.0
Wilson Legal Solutions, Inc.	\$62.6	\$74.8	\$29.1
Qortek, Inc.	\$62.5	\$46.8	\$32.5
P H Glatfelter Company	\$62.5	\$0.0	\$0.0
Printfly Corporation	\$61.8	\$73.0	\$0.0
Immunome, Inc.	\$61.3	\$117.9	\$0.0
ZSX Medical, LLC	\$60.3	\$34.3	\$18.2
EFE Laboratories, Inc.	\$60.1	\$10.1	\$10.1
AcademyOne, Inc.	\$59.9	\$80.1	\$42.0
Knoll, Inc.	\$59.8	\$374.7	\$116.1
PDC Machines, Inc.	\$59.7	\$19.2	\$19.2
Chelsea Building Products, Inc.	\$59.5	\$49.1	\$49.1
Tyber Medical, LLC	\$59.5	\$0.0	\$0.0
ADCT America, Inc.	\$57.8	\$41.5	\$0.0
Curavi Health, Inc.	\$56.9	\$0.0	\$0.0
LH Signs, Inc.	\$55.3	\$0.0	\$0.0
Infinera Corporation	\$55.1	\$155.2	\$0.0
CitizenDeveloper.Com, LLC	\$55.0	\$0.0	\$0.0
Swift Financial Corporation	\$54.3	\$0.0	\$0.0
Quest Diagnostics Clinical Laboratories	\$54.2	\$85.9	\$0.0
RJP Consulting Group, LLC	\$54.0	\$0.0	\$0.0
Appllied Control Engineering, Inc.	\$53.8	\$0.0	\$0.0

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	Awarded	Awarded	Utilized ¹
Blue Mountain Quality Resources, Inc.	\$52.8	\$0.0	\$0.0
Arrow International, Inc.	\$52.3	\$136.8	\$107.8
Trevena, Inc.	\$52.2	\$2,488.8	\$994.7
The Dow Chemical Company	\$52.1	\$116.5	\$0.0
Gwynedd Manufacturing, Inc.	\$52.1	\$0.0	\$0.0
Fabricated Components, Inc.	\$51.6	\$8.4	\$0.0
Energycap, Inc.	\$51.4	\$12.6	\$0.0
Identified Technologies Corporation	\$50.8	\$59.6	\$59.6
Seegrid Corporation	\$50.1	\$74.8	\$7.2
Kroll Bond Rating Agency, Inc.	\$49.2	\$0.0	\$0.0
Certaineed Corporation	\$49.2	\$10.5	\$0.0
Canary Compliance, LLC	\$48.6	\$0.0	\$0.0
Michelman Steel Enterprises, LLC	\$48.4	\$40.1	\$0.0
Legal Sifter, Inc.	\$47.4	\$27.4	\$0.0
International SOS Assistance, Inc.	\$47.4	\$0.0	\$0.0
Johnson Matthey, Inc.	\$47.0	\$422.8	\$92.8
Advent Design Corporation	\$46.9	\$35.0	\$0.0
Pride Mobility Products Corporation	\$46.8	\$20.4	\$20.4
SSM Industries, Inc.	\$46.5	\$17.8	\$0.0
Automated Financial Systems, Inc.	\$45.3	\$69.5	\$0.0
Gentex Corporation	\$45.1	\$0.0	\$0.0
Dental Imaging Technologies Corp.	\$45.1	\$50.5	\$38.8
Onex, Inc.	\$44.9	\$6.5	\$0.0
Kuhn Tool & Die Co.	\$44.7	\$10.9	\$0.0
Comprehensive Fire Technologies, Inc.	\$44.5	\$22.2	\$0.0
Professional Staffing Solutions, LLC	\$44.4	\$0.0	\$0.0
NCC Automated Systems, Inc.	\$44.2	\$139.8	\$85.1
Avantor Performance Materials Holdings, Inc.	\$44.2	\$7.4	\$0.0
Controlled Molding, Inc.	\$44.1	\$52.3	\$26.5
Forge Life Sciences, LLC	\$43.7	\$0.0	\$0.0
Maven Machines, Inc.	\$43.6	\$0.0	\$0.0
Interstate Holdings, Inc.	\$43.3	\$163.1	\$71.9
Fedex Ground Package System, Inc.	\$43.3	\$0.0	\$0.0
St. Marys Tool and Die, Inc.	\$43.1	\$33.4	\$24.5
SigmaPharm Laboratories, LLC	\$42.4	\$64.8	\$0.0
Fenix Group International, LLC	\$42.2	\$0.0	\$0.0
ChemImage Corporation	\$42.1	\$0.0	\$0.0
Vertex, Inc.	\$42.0	\$33.9	\$33.9
Gettle Incorporated	\$41.6	\$89.6	\$89.6
Heavywater, Inc.	\$41.3	\$0.0	\$0.0
Cook Myosite, Inc.	\$41.1	\$18.7	\$0.0
Carmell Therapeutics Corporation	\$40.9	\$0.0	\$0.0
Harbor Business Compliance Corp.	\$40.7	\$24.3	\$16.4
Astrobotic Technology, Inc.	\$40.6	\$51.0	\$44.8
Packaging Progressions, Inc.	\$40.6	\$50.6	\$33.0
Larson Texts, Inc. (d/b/a Big Ideas Learning)	\$40.6	\$99.6	\$99.6
Arcadis US, Inc.	\$40.4	\$0.0	\$0.0
Heraeus Incorporated	\$40.3	\$161.6	\$6.4
Drug Plastics & Glass Co. Inc.	\$39.9	\$13.0	\$0.0
Flowmetric Diagnostics, Inc.	\$39.8	\$34.7	\$22.8

APPENDIX A

**Table 1. Pennsylvania Research & Development Tax Credit Program
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(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
PhytogenX, Inc.	\$39.8	\$109.2	\$109.2
RE 2, Inc.	\$39.6	\$0.0	\$0.0
The Ott Group, Inc.	\$39.6	\$0.0	\$0.0
Interdigital Communications, Inc.	\$39.0	\$303.7	\$303.7
International Chemical Company	\$39.0	\$26.5	\$2.5
Abbott Acquisition Company, LLC	\$39.0	\$27.0	\$0.0
Wampole Miller, Inc.	\$38.4	\$109.4	\$0.0
Interactive Liquid, LLC	\$38.4	\$75.0	\$75.0
Hindle Power, Inc.	\$38.1	\$74.2	\$28.1
Houwzer, LLC	\$37.9	\$18.2	\$18.2
Lycera Corp.	\$37.7	\$46.7	\$0.0
General Dynamics Mission Systems	\$37.6	\$57.4	\$57.4
Integra York PA, Inc.	\$37.6	\$62.1	\$49.4
Aerotech, Inc.	\$37.2	\$105.2	\$49.3
DT Davis Enterprises, Ltd. Hovertech International	\$37.1	\$338.8	\$148.3
Foot Locker Corporate Services, Inc.	\$37.1	\$0.0	\$0.0
LandStudies, Inc.	\$37.0	\$0.0	\$0.0
Hubert C. Jasinski Dental Lab, Inc.	\$37.0	\$9.1	\$0.0
Follett, LLC	\$36.8	\$64.9	\$64.9
Intact Vascular, Inc.	\$36.7	\$381.8	\$381.8
Crescent Industries, Inc.	\$36.5	\$31.3	\$0.0
Shumaker Industries, Inc.	\$36.5	\$0.0	\$0.0
Eisai, Inc.	\$36.3	\$144.7	\$0.0
DRV, Inc.	\$36.2	\$0.0	\$0.0
PBM, Inc.	\$36.1	\$35.4	\$29.4
Northway Industries, Inc.	\$36.1	\$31.7	\$22.3
Plastek Industries, Inc.	\$35.9	\$158.2	\$158.2
Accipiter Systems, Inc.	\$35.7	\$0.0	\$0.0
Molecular Devices, LLC	\$35.5	\$41.6	\$0.0
Atomic Design, Inc.	\$35.3	\$20.9	\$20.6
Western Oncolytics, Ltd.	\$35.3	\$0.0	\$0.0
Radian Guaranty, Inc.	\$35.2	\$420.5	\$112.2
WABTEC Corp.	\$34.9	\$70.0	\$0.0
Oberg Industries, Inc. And QSS	\$34.8	\$162.4	\$110.1
Excel Health, LLC	\$34.6	\$0.0	\$0.0
Sparks Marketing Corp	\$34.5	\$0.0	\$0.0
CMT Laboratories, Inc.	\$34.2	\$25.3	\$24.3
AutoMap, LLC	\$34.1	\$9.5	\$9.5
Livegenic, Inc.	\$34.1	\$29.1	\$29.1
Cardiac Assist, Inc.	\$33.7	\$0.0	\$0.0
O'Neal Industries, Inc.	\$33.7	\$39.1	\$0.0
Durawood Products, Inc.	\$33.5	\$50.3	\$0.0
Anholt Technologies, Inc.	\$33.5	\$80.5	\$80.5
PPG Architectural Finishes, Inc.	\$33.5	\$48.4	\$0.0
Ingmar Medical, Ltd.	\$33.5	\$13.9	\$0.0
Aramark Corp.	\$33.3	\$0.0	\$0.0
Amuneal Manufacturing Corp.	\$33.2	\$143.4	\$116.8
Laser Tool, Inc.	\$33.1	\$38.0	\$0.0
LAN Connect, Inc.	\$33.1	\$25.7	\$0.0
Gelest, Inc.	\$32.9	\$200.8	\$9.1

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Weis Markets, Inc.	\$32.9	\$15.8	\$0.0
1Digital Agency	\$32.9	\$29.7	\$29.7
Jeannette Shade And Novelty Company (d/b/a JSG Oceana)	\$32.8	\$23.1	\$15.1
PayPal, Inc.	\$32.8	\$0.0	\$0.0
Genex Holdings, Inc.	\$32.7	\$25.1	\$0.0
Axalta Coating Systems, LLC	\$32.6	\$72.8	\$0.0
Innovative Control Systems, Inc.	\$32.5	\$9.5	\$9.5
Sidecar Interactive, Inc.	\$32.5	\$153.8	\$68.8
US Specialty Formulations, LLC	\$32.5	\$33.7	\$7.5
AT&T Services, Inc.	\$32.4	\$228.0	\$142.9
Teleosoft, Inc.	\$32.4	\$0.0	\$0.0
Pulse Technologies, Inc.	\$32.2	\$42.5	\$0.0
Highpoint Tool and Machine, Inc.	\$32.1	\$34.3	\$0.0
Vocollect, Inc.	\$32.1	\$17.6	\$17.6
Gecko Robotics, Inc.	\$32.1	\$0.0	\$0.0
Sheetz, Inc.	\$31.7	\$0.0	\$0.0
Bosch Rexroth Corporation	\$31.6	\$18.5	\$0.0
Kovatch Mobile Equipment Corp.	\$31.4	\$0.6	\$0.0
Lucas Systems, Inc.	\$31.3	\$56.8	\$16.5
Near-Miss Management, LLC	\$31.2	\$37.9	\$37.9
ImCare Biotech, LLC	\$31.0	\$0.0	\$0.0
Pass and Seymour, Inc.	\$30.9	\$31.7	\$31.7
Premier Automation Holdings, Inc.	\$30.9	\$1.4	\$1.4
Lighthouse Electric Company, Inc.	\$30.8	\$0.0	\$0.0
Human Motion Technologies, LLC	\$30.6	\$12.0	\$0.0
RS Energy Group, Inc.	\$30.5	\$0.0	\$0.0
AirViz, Inc.	\$30.5	\$13.8	\$0.0
Ocugen, Inc.	\$30.4	\$19.4	\$0.0
Tyndale Enterprises, Inc.	\$30.3	\$41.4	\$41.4
Gap Holding Company, Inc.	\$30.3	\$27.4	\$11.6
GSM Industrial, Inc.	\$30.2	\$0.0	\$0.0
Savage Visual Effects, LLC	\$30.1	\$32.3	\$32.3
Mine Vision Systems, Inc.	\$30.0	\$27.0	\$27.0
Jig, Inc.	\$29.9	\$0.0	\$0.0
3Fx, Inc.	\$29.7	\$27.0	\$0.0
ElectroTech Systems, Inc.	\$29.7	\$8.7	\$0.0
X-Cell Tool & Mold, Inc.	\$29.6	\$98.5	\$0.0
CVS Pharmacy, Inc.	\$29.5	\$183.5	\$0.0
Mebias Discovery, LLC	\$29.4	\$0.0	\$0.0
Cenero, LLC	\$29.2	\$0.0	\$0.0
Hefner Machine & Tool, Inc.	\$29.2	\$6.0	\$6.0
Amphenol Thermometrics, Inc.	\$29.0	\$33.4	\$33.4
Federal Hearings & Appeals Services, Inc.	\$29.0	\$0.0	\$0.0
Menasha Corporation	\$28.9	\$0.0	\$0.0
AFP Advanced Food Products, LLC	\$28.7	\$74.8	\$74.8
Tired Hands Brewing Company	\$28.6	\$0.0	\$0.0
Millennium Manufacturing, Inc.	\$28.5	\$25.0	\$25.0
Essent Corporation	\$28.5	\$13.5	\$0.0
Jazz Pharmaceuticals, Inc.	\$28.5	\$258.0	\$258.0
Mallinckrodt, Inc.	\$28.5	\$0.0	\$0.0

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
J. B. Kintner Sons	\$28.5	\$27.5	\$0.0
Erie Custom Computer Applications	\$28.2	\$26.6	\$10.2
ChannelApe, Inc.	\$28.2	\$0.0	\$0.0
Architectural Polymers, Inc.	\$28.0	\$3.2	\$0.0
VoIPstreet, Inc.	\$28.0	\$34.8	\$0.0
Say Plastics, Inc.	\$27.9	\$14.0	\$14.0
Track 5 Media, LLC	\$27.9	\$22.2	\$22.2
C & J Industries, Inc.	\$27.9	\$0.0	\$0.0
Gerg Tool And Die, Inc.	\$27.8	\$0.0	\$0.0
Wagman, Inc.	\$27.8	\$31.1	\$0.0
Powerlink Valuations, LLC	\$27.8	\$0.0	\$0.0
I2R Nanowave, Inc.	\$27.7	\$0.0	\$0.0
Zynerba Pharmaceuticals, Inc.	\$27.7	\$0.0	\$0.0
V T Graphics, Inc.	\$27.7	\$36.0	\$36.0
Tmunity Therapeutics, Inc.	\$27.6	\$0.0	\$0.0
Akustica, Inc.	\$27.5	\$24.5	\$4.3
Trademark Vision USA, LLC	\$27.4	\$11.1	\$11.1
Maguire Products, Inc.	\$27.3	\$94.8	\$0.0
X Card Holding Co., LLC	\$27.3	\$9.2	\$9.2
Penn Engineering and Manufacturing Corp.	\$27.2	\$27.6	\$1.1
Advanced Cooling Technologies, Inc.	\$27.2	\$226.0	\$217.4
Tech Tube, Inc.	\$27.1	\$13.4	\$0.0
M&S Centerless Grinding	\$26.8	\$5.3	\$0.0
Capsen Robotics, Inc.	\$26.6	\$7.4	\$7.4
Cadence, Inc.	\$26.5	\$0.0	\$0.0
Universal Electric Corporation	\$26.3	\$101.7	\$101.7
PrimePay, LLC	\$26.1	\$69.7	\$10.8
York Imperial Plastics, Inc.	\$26.0	\$7.5	\$0.0
PHL Collective, LLC	\$25.7	\$5.4	\$21.6
Phoenix Technical Solutions, Inc.	\$25.7	\$279.7	\$279.7
Custom Molds/Plastics	\$25.7	\$0.0	\$0.0
Pro Shopkeeper Computer Software Co., Inc.	\$25.4	\$0.0	\$0.0
Target Precision, LLC	\$25.4	\$26.2	\$0.0
Erie Aviation, Inc.	\$25.4	\$0.0	\$0.0
Houghton International, Inc.	\$25.3	\$58.6	\$58.6
Go2Power, LLC	\$25.3	\$9.1	\$9.1
C&R Directional Boring, LLC	\$25.2	\$18.4	\$10.5
Hunter Mechanical, Inc.	\$25.0	\$0.0	\$0.0
Light Tool & Machine, Inc.	\$25.0	\$1.5	\$1.5
Confluence Technologies, Inc.	\$24.9	\$48.8	\$3.0
Environmental Control Services, Inc.	\$24.8	\$12.1	\$0.0
Epic Web Studios	\$24.8	\$20.8	\$20.8
Innovative Systems, Inc.	\$24.8	\$17.4	\$0.0
Red Hat, Inc.	\$24.6	\$0.0	\$0.0
Curry Supply Co.	\$24.6	\$0.0	\$0.0
The Manitowoc Company, Inc.	\$24.6	\$0.0	\$0.0
Advanced Simulation Technology, Inc.	\$24.6	\$0.0	\$0.0
Precision Medical Products, Inc.	\$24.5	\$32.2	\$32.2
Infiana USA, Inc.	\$24.4	\$29.4	\$0.0
Turn 14 Distribution, Inc.	\$24.2	\$31.1	\$31.1

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Matthews International Corporation	\$24.1	\$57.9	\$0.0
VeryApt, Inc.	\$24.0	\$30.7	\$14.2
Trumbull Corporation	\$23.6	\$152.1	\$152.1
Shop Vac Corporation	\$23.4	\$0.0	\$0.0
Cagent Vascular, LLC	\$23.0	\$7.1	\$0.0
Vastex International, Inc.	\$23.0	\$37.7	\$18.8
Siemens PLM Software, Inc.	\$23.0	\$75.8	\$0.0
Desmone Associates, Inc.	\$23.0	\$0.0	\$0.0
Guru Technologies, Inc.	\$23.0	\$41.8	\$41.8
IT Assist, LLC	\$22.9	\$48.3	\$48.3
Noria Technologies, LLC	\$22.9	\$0.0	\$0.0
Avanceon, LP	\$22.9	\$0.0	\$0.0
Corry Micronics, Inc.	\$22.8	\$12.8	\$12.8
Lamtec Corporation	\$22.8	\$74.4	\$74.4
Intervala, LLC	\$22.7	\$0.0	\$0.0
BioSpectra, Inc.	\$22.6	\$90.7	\$69.5
R D Coatings, Inc.	\$22.6	\$24.4	\$24.4
B H Industries, Inc.	\$22.5	\$0.0	\$0.0
Abuwala & Company, LLC	\$22.4	\$0.0	\$0.0
Industrial Resolution, LLC	\$22.3	\$23.9	\$23.9
Andritz, Inc.	\$22.3	\$62.7	\$62.7
Krando Metal Products, Inc.	\$22.3	\$22.5	\$0.0
Epicor Software Corp.	\$22.1	\$0.0	\$0.0
Galera Therapeutics, Inc.	\$22.1	\$46.7	\$24.3
IMS Technology Services, Inc.	\$22.1	\$0.0	\$0.0
Viper Network Systems, LLC	\$22.1	\$11.6	\$0.0
Castle Mold and Tool, Inc.	\$22.1	\$20.3	\$9.2
Highwood USA, LLC	\$22.0	\$42.9	\$0.0
GEM Mechanical Services, Inc.	\$21.9	\$0.0	\$0.0
Kaarta, Inc. (f/k/a Real Earth, Inc.)	\$21.9	\$0.0	\$0.0
Softerware, Inc.	\$21.7	\$105.6	\$64.2
Ultragenyx Pharmaceutical, Inc.	\$21.7	\$17.8	\$0.0
Learning Sciences International, LLC	\$21.5	\$27.3	\$0.0
Michael Baker International, Inc.	\$21.4	\$0.0	\$0.0
Keystone Compliance, LLC	\$21.2	\$45.0	\$19.8
Cargas Systems, Inc.	\$21.1	\$26.1	\$26.1
Fres-Co System USA, Inc.	\$21.1	\$85.2	\$85.2
Bentley Systems Inc.	\$21.1	\$73.6	\$18.7
Talbar, Inc.	\$21.0	\$9.8	\$0.0
Social Media Information, LLC	\$21.0	\$11.3	\$11.3
CMW Holdco, Inc. (d/b/a Cross MediaWorks)	\$20.8	\$148.1	\$0.0
Solar Innovations, Inc.	\$20.7	\$11.5	\$0.0
SJ Consulting Group, Inc.	\$20.7	\$31.9	\$0.0
John R. Bromiley Company, Inc.	\$20.6	\$53.2	\$53.2
Havpak, Inc.	\$20.6	\$29.0	\$0.0
Reclamere, Inc.	\$20.5	\$25.3	\$25.3
Kraemer Textiles, Inc.	\$20.4	\$0.0	\$0.0
Sharp Edge Labs, Inc.	\$20.4	\$42.3	\$42.3
KW, Inc.	\$20.4	\$52.4	\$19.7
InspiraFS, Inc.	\$20.4	\$15.3	\$7.1

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	Awarded	Awarded	Utilized ¹
Edgemate, Inc.	\$20.3	\$26.6	\$11.1
Bainbridge Health, Inc.	\$20.2	\$0.0	\$0.0
Michael F. Ronca Sons, Inc.	\$20.2	\$0.0	\$0.0
Nutrisystem, Inc.	\$20.1	\$54.0	\$54.0
Optimus Technologies, Inc.	\$20.1	\$17.8	\$9.7
Modern Wall Systems, LP	\$20.1	\$0.0	\$0.0
Benchmark Construction Co., Inc.	\$20.1	\$1.9	\$0.0
Arrow Electric, Inc.	\$20.1	\$8.2	\$0.0
Sharp Innovations, Inc.	\$19.9	\$0.0	\$0.0
Dossier Systems, Inc.	\$19.9	\$29.8	\$0.0
TransducerWorks, LLC	\$19.8	\$0.0	\$0.0
Orthos Enterprises, Inc.	\$19.8	\$27.7	\$13.9
GeorgeKo Industries, Inc.	\$19.8	\$20.3	\$19.2
Tube Methods, Inc.	\$19.7	\$1.9	\$0.0
Miller Welding and Machine Company, Inc.	\$19.7	\$24.4	\$24.4
Forest Devices, Inc.	\$19.7	\$7.5	\$0.0
DF Stauffer Biscuit Co., Inc.	\$19.6	\$49.5	\$49.5
Standard Offset Printing Company	\$19.5	\$0.0	\$0.0
The Milnes Co., Inc.	\$19.5	\$8.3	\$0.0
Laminar Flow, Inc.	\$19.5	\$12.3	\$5.6
Smithwise, Inc.	\$19.5	\$50.2	\$22.1
Pinnacle 21, LLC	\$19.4	\$35.8	\$35.8
PrintMail Solutions, Inc.	\$19.4	\$39.7	\$25.7
Robert Bosch, LLC	\$19.4	\$8.9	\$0.0
Inverse Paradox, LLC	\$19.4	\$20.8	\$12.6
Vertical Screen, Inc.	\$19.4	\$8.4	\$0.0
Lindy Paving, Inc.	\$19.3	\$78.0	\$78.0
JWF Holdings, Inc.	\$19.3	\$79.3	\$47.6
Avere Systems, Inc.	\$19.3	\$111.3	\$0.0
Kemper Equipment, Inc.	\$19.2	\$15.5	\$0.0
Arris Global Services, Inc. (f/k/a Arris Korea, Inc.)	\$19.1	\$0.0	\$0.0
Triumph Controls, LLC	\$19.0	\$10.5	\$0.0
Wacker Chemical Corporation	\$18.9	\$103.0	\$103.0
Cutanea Life Sciences, Inc.	\$18.8	\$390.0	\$0.0
Ensinger, Inc.	\$18.8	\$0.0	\$0.0
Five Eleven Pharma, Inc.	\$18.6	\$41.7	\$0.0
Diamond Kinetics, Inc.	\$18.6	\$26.9	\$26.9
R.M. Palmer Company	\$18.6	\$25.5	\$8.6
IMET Corporation	\$18.6	\$38.7	\$16.9
UM Technologies, LLC	\$18.6	\$4.2	\$0.0
Rockland, Inc.	\$18.6	\$58.3	\$25.5
AT&T Mobility Services, LLC	\$18.5	\$21.4	\$21.4
ITRCO, LP	\$18.4	\$54.1	\$54.1
Audia International, Inc.	\$18.4	\$21.4	\$0.0
Corle Building Systems, Inc.	\$18.4	\$69.1	\$41.4
Scrub Daddy, Inc.	\$18.4	\$36.6	\$0.0
G Adasavage, LLC	\$18.4	\$0.0	\$0.0
Ikos Holdings, Inc.	\$18.3	\$0.0	\$0.0
Marketing G2, LLC	\$18.3	\$18.4	\$18.4
Precision Medical, Inc.	\$18.2	\$0.0	\$0.0

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	Awarded	Awarded	Utilized ¹
Irene's Bakery & Gourmet Kitchen, Inc.	\$18.2	\$26.8	\$26.8
BartonPartners Architects Planners	\$18.2	\$99.7	\$99.7
Unilog Content Solutions, LLC	\$18.2	\$48.4	\$0.0
Amplifier Research Corp.	\$18.1	\$68.9	\$0.0
BlendPro, Inc.	\$18.1	\$0.0	\$0.0
Enclara Pharmacia (f/k/a ExcelleRx, Inc.)	\$18.0	\$34.1	\$34.1
Penn Metal Stamping, Inc.	\$18.0	\$0.0	\$0.0
Lake Tool, Inc.	\$17.8	\$0.0	\$0.0
Athena Global Advisors, Inc.	\$17.8	\$3.7	\$3.7
SmartyPal, Inc.	\$17.7	\$24.6	\$24.6
Access Security Corp.	\$17.7	\$13.4	\$0.0
Cybersonics, Inc.	\$17.7	\$14.8	\$0.0
Forney, LP	\$17.6	\$0.0	\$0.0
Soft Genetics, LLC	\$17.6	\$33.2	\$33.2
Insectarium & Butterfly Pavilion	\$17.6	\$0.0	\$0.0
C360 Technologies, Inc.	\$17.5	\$0.0	\$0.0
Clinical Research Associates of Central PA, LLC	\$17.5	\$12.2	\$0.9
National Magnetics Group, Inc.	\$17.4	\$85.2	\$85.2
Advanced Construction Robotics, Inc.	\$17.4	\$0.0	\$0.0
Burkhardt Sheet Metal Company, Inc.	\$17.2	\$4.1	\$4.1
Gamry Instruments, Inc.	\$17.2	\$44.4	\$43.1
Georgia Pacific Consumer Operations, LLC	\$17.1	\$0.0	\$0.0
Neuro Kinetics, Inc.	\$17.1	\$46.7	\$27.5
Leagueside, Inc.	\$16.8	\$0.0	\$0.0
Custom Metal Fabricating, Inc.	\$16.7	\$3.1	\$0.0
Ariel Precision Medicine, Inc.	\$16.6	\$0.0	\$0.0
Dun & Bradstreet, Inc.	\$16.6	\$115.2	\$7.5
OnCourse Systems For Education, LLC	\$16.5	\$0.0	\$0.0
Reading Precast, Inc.	\$16.5	\$21.4	\$21.4
Philadelphia D M, Inc.	\$16.4	\$21.1	\$21.1
Composer, LLC	\$16.4	\$0.0	\$0.0
Actco Tool & Manufacturing Company, Inc.	\$16.3	\$7.4	\$7.4
Social Station, LLC	\$16.2	\$0.0	\$0.0
Acutec Precision Machining, Inc.	\$16.2	\$56.0	\$0.0
TRS Technologies, Inc. (f/k/a TRS Ceramics, Inc.)	\$16.2	\$36.5	\$21.5
Piezo Energy, Inc.	\$16.2	\$0.0	\$0.0
The Rainmaker Group Ventures, LLC	\$16.1	\$14.5	\$0.0
Schenck Accurate, Inc. (d/b/a Schenck Process, LLC)	\$16.1	\$0.0	\$0.0
Forbo Flooring, Inc. (f/k/a Forbo Linoleum, Inc.)	\$16.0	\$0.0	\$0.0
Reynolds & Reynolds Electronics, Inc.	\$15.9	\$40.1	\$36.5
Asset-Map, LLC	\$15.7	\$5.6	\$5.6
Snake Creek Lasers, LLC	\$15.7	\$0.0	\$0.0
Certes Networks, Inc.	\$15.7	\$0.0	\$0.0
Jobob Investments, Inc.	\$15.6	\$0.0	\$0.0
TSE, Inc.	\$15.6	\$18.9	\$9.5
Specialty Tires of America - PA	\$15.6	\$17.2	\$0.0
Penn Manufacturing Industries, Inc.	\$15.6	\$0.0	\$0.0
Henry H Ottens Manufacturing Co, Inc.	\$15.5	\$0.0	\$0.0
Godshalls Quality Meats, Inc.	\$15.3	\$24.8	\$12.8
Akas Tex, LLC	\$15.3	\$0.0	\$0.0

APPENDIX A

**Table 1. Pennsylvania Research & Development Tax Credit Program
Taxpayers Receiving Credit in December 2018, 2017 and 2016
Sorted by 2018 Credit Awarded (Largest to Smallest)
(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
East Penn Manufacturing Company	\$15.3	\$79.7	\$47.3
Netbeez, Inc.	\$15.3	\$6.1	\$0.0
Avery Dennison Retail Info Services, LLC	\$15.2	\$0.0	\$0.0
John Rock, Inc.	\$15.2	\$16.2	\$0.0
Global Metal Powders, LLC	\$15.2	\$34.1	\$34.1
Jarus Technologies Incorporated	\$15.2	\$26.3	\$2.8
Mars Information Services, Inc.	\$15.1	\$0.0	\$0.0
Voci Technologies Incorporated	\$15.1	\$0.0	\$0.0
Quaker Maid Meats, Inc.	\$15.1	\$0.0	\$0.0
Intertek USA, Inc.	\$15.1	\$241.5	\$114.0
Providence Engineering Corporation	\$15.0	\$0.0	\$0.0
Heat Exchange And Transfer, Inc.	\$15.0	\$0.0	\$0.0
FXI, Inc.	\$14.8	\$0.0	\$0.0
Progeny Systems Corporation	\$14.8	\$45.2	\$0.0
Custom Processing Services, Inc.	\$14.8	\$9.1	\$9.1
Veyko, Inc.	\$14.8	\$4.5	\$0.0
Carrier Class Green Infrastructure, LLC	\$14.7	\$5.1	\$0.0
Parker Hannifin Corporation	\$14.6	\$17.6	\$17.6
Colorcon, Inc.	\$14.6	\$0.0	\$0.0
Problem Solutions, LLC	\$14.5	\$23.9	\$10.8
Richards Energy Group, Inc.	\$14.5	\$5.4	\$5.4
HydroSpray Wash Systems, Inc.	\$14.4	\$7.4	\$7.4
Universal Industrial Gases, Inc.	\$14.4	\$28.5	\$13.5
Nuventive, LLC	\$14.4	\$13.1	\$2.9
American International Forwarding, Inc.	\$14.4	\$49.4	\$49.4
Keystone Machinery Corporation	\$14.3	\$43.8	\$37.5
Telefactor Robotics, LLC	\$14.3	\$19.9	\$0.0
J.R. Peters, Inc.	\$14.3	\$44.7	\$26.6
Pik-Rite, Inc.	\$14.3	\$0.0	\$0.0
Therm-Omega-Tech, Inc.	\$14.2	\$47.4	\$0.0
Cleaversoft	\$14.2	\$10.7	\$10.7
B&B Designed Systems, Inc.	\$14.2	\$11.6	\$11.6
Intuidex, Inc.	\$14.1	\$6.4	\$6.3
Bloom Engineering Company, Inc.	\$14.0	\$0.0	\$0.0
Ateeco, Inc.	\$14.0	\$14.4	\$0.0
Herkules USA Corporation	\$14.0	\$18.8	\$0.0
AppCove, Inc.	\$14.0	\$0.0	\$0.0
Neurohabilitation Corporation	\$13.8	\$0.0	\$0.0
Grudi Associates, Inc.	\$13.7	\$23.9	\$9.7
LCR Embedded Systems, Inc.	\$13.6	\$6.2	\$6.2
Ecopax, LLC	\$13.6	\$0.0	\$0.0
R.A. Walton & Co., Inc. (t/a Walton & Company)	\$13.5	\$10.5	\$10.5
Moreframes Animation, LLC	\$13.5	\$2.2	\$2.2
Amphenol Intercon Systems, Inc.	\$13.5	\$53.0	\$1.3
Videoray, LLC	\$13.4	\$11.6	\$0.0
General Dynamics Satcom Technologies, Inc.	\$13.3	\$19.4	\$10.4
Pulse Anatomical Model Company, Inc.	\$13.2	\$8.0	\$8.0
EFS Networks, Inc.	\$13.2	\$10.6	\$0.0
Keriton, LLC	\$13.2	\$0.0	\$0.0
T-Mobile USA, Inc.	\$13.1	\$4.2	\$0.0

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(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
JBS Science, Inc.	\$13.0	\$0.0	\$0.0
M.H. Eby, Inc.	\$12.9	\$33.9	\$4.9
Come Ready Foods, LLC	\$12.9	\$0.0	\$0.0
Development Dimensions International, Inc.	\$12.8	\$25.1	\$0.0
Nicholson Kovalchick Architects, Inc.	\$12.7	\$0.0	\$0.0
Advanced Composite Products, Inc.	\$12.7	\$17.5	\$17.5
Sloan Brothers Company	\$12.7	\$0.0	\$0.0
Turn 5, Inc.	\$12.6	\$56.4	\$56.4
Quire, LLC	\$12.5	\$9.1	\$0.0
Haller Enterprises, Inc.	\$12.5	\$18.2	\$0.0
Series U Of UM Partners, LLC	\$12.4	\$0.0	\$0.0
TechKnowServ Corporation	\$12.4	\$12.0	\$4.3
PDM Constructors, LLC	\$12.4	\$8.3	\$8.3
RKI Apps, Inc.	\$12.4	\$10.8	\$10.8
Sensor Networks, Inc.	\$12.4	\$0.0	\$0.0
Premier Dental Products Company	\$12.4	\$49.9	\$49.9
Zephyr Aluminum, LLC	\$12.4	\$13.1	\$2.8
Qualaris Healthcare Solutions, Inc.	\$12.4	\$18.0	\$7.2
Silberline Manufacturing Co., Inc.	\$12.4	\$5.0	\$0.0
Innovative Sintered Metals, Inc.	\$12.4	\$17.1	\$17.1
Port Erie Plastics, Inc.	\$12.2	\$27.7	\$27.7
A H Sportswear Co, Inc.	\$12.1	\$33.9	\$0.0
NeuroFlow	\$12.0	\$0.0	\$0.0
CIW Enterprises, Inc.	\$12.0	\$13.1	\$0.0
Johnston Mechanical, LLC	\$12.0	\$5.5	\$5.5
WFE Holdings, LLC	\$11.9	\$54.6	\$48.3
Silvertip, Inc.	\$11.9	\$14.5	\$12.6
Instinct Science, LLC	\$11.9	\$0.0	\$0.0
PhaseBio Pharmaceuticals, Inc.	\$11.9	\$47.1	\$0.0
Specialty Minerals, Inc.	\$11.9	\$22.0	\$0.0
Oat Foundry, LLC	\$11.8	\$3.8	\$3.8
E B Endres, Inc.	\$11.8	\$0.0	\$0.0
Towerstar Pets, LLC	\$11.8	\$0.0	\$0.0
Barry Isett & Associates, Inc.	\$11.8	\$13.6	\$0.0
Whirley Industries, Inc.	\$11.7	\$0.0	\$0.0
Forms And Surfaces, Inc.	\$11.6	\$45.0	\$21.2
Penn State Industries, Inc.	\$11.6	\$78.8	\$49.5
Mason Jars Company	\$11.6	\$4.4	\$4.4
Integrated Management Solutions, Inc.	\$11.5	\$11.7	\$0.0
Tracey Mechanical, Inc.	\$11.5	\$12.3	\$12.3
PracticeMatch Corporation	\$11.4	\$0.0	\$0.0
Chromalox, Inc.	\$11.4	\$17.1	\$0.0
K2 Kinetics, LLC	\$11.3	\$0.0	\$0.0
Combustion Service & Equipment Co.	\$11.3	\$0.0	\$0.0
WeCreate, LLC	\$11.3	\$8.0	\$8.0
Sea Pharmaceuticals, LLC	\$11.3	\$0.0	\$0.0
Inolox, Inc.	\$11.2	\$70.8	\$59.3
Deibler Machining, LLC	\$11.2	\$12.0	\$12.0
Teletracking Technologies, Inc.	\$11.1	\$63.6	\$3.6
Global Data Management Systems, LLC	\$11.1	\$93.5	\$54.7

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Stein Seal Company	\$11.1	\$21.3	\$0.0
Brothers, Inc.	\$11.0	\$0.0	\$0.0
United Parcel Service, Inc. (Ohio)	\$11.0	\$12.8	\$0.0
Kane Innovations, Inc.	\$11.0	\$5.2	\$5.2
Ohm Labs, Inc.	\$10.9	\$9.2	\$8.7
Evolent Health, Inc.	\$10.9	\$0.0	\$0.0
Paragon Engineering Services, Inc.	\$10.8	\$0.0	\$0.0
Industrial Vision Systems, Inc.	\$10.8	\$2.5	\$0.0
Bio Med Sciences, Inc.	\$10.8	\$8.3	\$2.4
Dataforma Incorporated	\$10.8	\$68.8	\$68.8
Neutronics, Inc.	\$10.7	\$58.1	\$1.8
Delta Information Systems, Inc.	\$10.7	\$29.0	\$0.1
Site Design Concepts, Inc.	\$10.7	\$0.0	\$0.0
Kleinschmidt Associates	\$10.7	\$0.0	\$0.0
Golden Brothers, Inc. (t/a Golden Technologies)	\$10.6	\$38.7	\$0.0
MiMedx Group, Inc.	\$10.6	\$13.3	\$13.3
Meco Constructors, Inc.	\$10.6	\$16.6	\$16.6
WizeHive, Inc.	\$10.6	\$47.0	\$26.4
Photosonix Medical, Inc.	\$10.5	\$19.2	\$0.0
Sweet Note Bakery, Inc.	\$10.5	\$10.5	\$5.4
Calumet Specialty Products Partners, LP	\$10.5	\$0.0	\$0.0
ARDEX, LP	\$10.4	\$0.0	\$0.0
Oliver Tolas Healthcare Packaging	\$10.4	\$8.3	\$8.3
J. Baur Machining, Inc.	\$10.4	\$4.7	\$0.0
Laminators Incorporated	\$10.4	\$19.5	\$19.5
Novelty Manufacturing Co.	\$10.4	\$14.4	\$0.0
Channellock, Inc.	\$10.4	\$15.7	\$0.0
Radius Corporation	\$10.4	\$14.7	\$14.3
State Of The Arc Welding And Fabricating, LLC	\$10.3	\$7.0	\$0.0
Dobil Laboratories, Inc.	\$10.3	\$0.0	\$0.0
Luzerne Farm, LLC	\$10.3	\$16.6	\$8.7
Photonis USA Pennsylvania, Inc.	\$10.2	\$3.8	\$0.0
Zipcorp, Inc.	\$10.2	\$9.9	\$0.0
Brayman Holding Company, Inc.	\$10.2	\$1.4	\$0.0
Quest Diagnostics Of Pennsylvania Incorporated	\$10.1	\$176.1	\$89.8
Chemcut Holdings, LLC	\$10.1	\$12.6	\$12.6
Apter Industries, Inc.	\$10.1	\$6.3	\$6.3
Adobe Systems Incorporated	\$10.1	\$47.5	\$29.2
Plastikos, Inc.	\$10.1	\$5.6	\$5.6
Hanna Transfer Company North	\$10.0	\$3.8	\$2.6
RLC Electronic Systems, Inc.	\$10.0	\$28.8	\$14.9
Primbio Research Institute, LLC	\$10.0	\$36.7	\$36.7
Clear-Coat Holding Company	\$10.0	\$8.5	\$0.0
TrafficCast International, Inc.	\$10.0	\$0.0	\$0.0
Loop Software, LLC	\$9.9	\$0.0	\$0.0
American Turned Products, Inc.	\$9.9	\$0.0	\$0.0
Novasep Americas, Inc.	\$9.9	\$0.0	\$0.0
Dental Marketing Insights, LLC	\$9.9	\$0.0	\$0.0
Team Ten, LLC (American Eagle Paper Mills)	\$9.8	\$52.7	\$52.7
Clark Associates, Inc.	\$9.8	\$40.7	\$40.7

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Project Execution Network, LLC	\$9.8	\$22.5	\$22.5
RB Distribution, Inc.	\$9.8	\$231.2	\$231.2
Kore Mart Limited	\$9.7	\$9.4	\$0.0
Yards Brewing Company, LLC	\$9.7	\$10.2	\$0.0
LSC Design, Inc.	\$9.6	\$8.4	\$8.4
Cloud Chemistry, LLC	\$9.6	\$0.0	\$0.0
Abec, Inc.	\$9.6	\$203.8	\$203.8
Grue & Bleen, LLC	\$9.6	\$4.7	\$0.0
Eminence Entertainment Enterprises, LLC	\$9.6	\$24.5	\$24.5
Crimewatch Technologies, Inc.	\$9.5	\$0.0	\$0.0
DMLogic, LLC	\$9.5	\$12.9	\$0.0
Lunchtime Software, LLC	\$9.4	\$0.2	\$0.0
BirdBrain Technologies, LLC	\$9.4	\$9.1	\$9.1
WTW Architects, Inc.	\$9.3	\$0.0	\$0.0
Aquatech International Corporation	\$9.3	\$0.0	\$0.0
Nalco Company, LLC	\$9.3	\$33.1	\$0.0
VS Networks, LLC	\$9.2	\$0.0	\$0.0
Yelp, Inc.	\$9.2	\$0.0	\$0.0
AP Thermoforming, LLC	\$9.2	\$9.4	\$0.0
Walsh Granite JV	\$9.1	\$0.0	\$0.0
Integra Lifesciences Corporation	\$9.1	\$9.2	\$0.0
Parker White Metal Company	\$9.0	\$16.6	\$16.6
Innovage, LLC	\$9.0	\$0.0	\$0.0
Alpine Sales & Rental Corp.	\$9.0	\$5.6	\$5.6
Meco Demolition, Inc.	\$9.0	\$6.5	\$0.0
Straight Arrow Products, Inc.	\$9.0	\$33.3	\$33.3
Specialty Seal Group, Inc.	\$9.0	\$9.8	\$9.8
Penn-Air & Hydraulics Corp.	\$9.0	\$14.1	\$0.0
NICUSA, Inc.	\$8.9	\$0.0	\$0.0
The Lackner Group, Inc.	\$8.9	\$29.7	\$29.7
Medical Products Laboratories, Inc.	\$8.9	\$19.6	\$0.0
Creative Multimedia Solutions, LLC	\$8.9	\$0.0	\$0.0
Diamond Mt, Inc.	\$8.8	\$6.1	\$0.8
SB Global Foods, Inc.	\$8.8	\$4.1	\$4.1
Velocity.Net Communications, Inc.	\$8.8	\$22.6	\$22.6
WBQ Intermediate, LLC	\$8.7	\$0.0	\$0.0
SecureStrux Limited, LLC	\$8.7	\$0.0	\$0.0
Superior Tech, Inc.	\$8.7	\$0.0	\$0.0
AE Design, Inc.	\$8.7	\$0.0	\$0.0
Wolfgang Operations, LLC	\$8.6	\$0.0	\$0.0
Spices, Inc.	\$8.6	\$0.0	\$0.0
Magnetic Windings Co., Inc.	\$8.6	\$34.4	\$27.4
Materion Brush, Inc.	\$8.5	\$24.2	\$0.0
Center Hardwood, LLC	\$8.5	\$21.2	\$11.9
JJ White, Inc.	\$8.5	\$0.0	\$0.0
Trigon Holding, Inc.	\$8.5	\$0.0	\$0.0
Ashley Furniture Industries, Inc.	\$8.5	\$14.3	\$14.3
Dagostino Electronic Services, Inc.	\$8.5	\$15.8	\$15.8
Gilbert Architects, Inc.	\$8.5	\$0.0	\$0.0
Snowdon International Limited Co. Cafferata and Co.	\$8.5	\$45.5	\$45.5

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Prominent Fluid Controls, Inc.	\$8.5	\$22.7	\$22.7
Morgan Advanced Materials and Technology, Inc.	\$8.4	\$0.0	\$0.0
Signature Vacuum Systems, Inc.	\$8.4	\$1.3	\$0.0
Digital Dream Labs, LLC	\$8.4	\$4.7	\$4.7
Return Logic, Inc.	\$8.3	\$11.3	\$4.4
Electron Energy Corporation	\$8.3	\$0.0	\$0.0
Montgomery Bros. Plumbing & Heating, LLC	\$8.2	\$9.5	\$9.5
Jamestown Paint Company	\$8.2	\$0.0	\$0.0
Diehl Co., LLC	\$8.2	\$0.0	\$0.0
EAFab Corporation	\$8.1	\$0.0	\$0.0
Robinson Fans, Inc.	\$8.1	\$40.5	\$5.2
The Adept Corporation	\$8.1	\$1.8	\$0.0
Dynamic Energy Solutions, LLC	\$8.1	\$8.9	\$0.0
Pocket Expert, LLC	\$8.0	\$1.4	\$1.4
Mikros Systems Corporation	\$8.0	\$0.0	\$0.0
Fluitron, Inc.	\$8.0	\$2.0	\$1.3
Ralph S Alberts Co., Inc.	\$8.0	\$0.0	\$0.0
Corazon, Inc.	\$7.9	\$0.0	\$0.0
Red Queen Gaming, LLC	\$7.9	\$0.0	\$0.0
Specialty Coated Products, Inc.	\$7.9	\$32.9	\$0.0
BioHybrid Solutions, LLC	\$7.9	\$0.0	\$0.0
Science Applications International Corp.	\$7.9	\$4.7	\$4.7
Filmtronics, Inc.	\$7.8	\$0.0	\$0.0
Havpak International, Inc.	\$7.8	\$0.0	\$0.0
Dempsey Uniform & Linen Supply, Inc.	\$7.8	\$0.0	\$0.0
Multi-Color Corporation	\$7.8	\$6.2	\$0.0
Armada Supply Chain Solutions, LLC	\$7.8	\$0.0	\$0.0
CDG Environmental, LLC	\$7.8	\$6.6	\$3.6
Berk Wiper International, LLC	\$7.7	\$24.6	\$0.0
VaxForm, LLC	\$7.7	\$27.4	\$0.0
Superior Tire Rubber Corp.	\$7.7	\$32.5	\$0.0
Pyrotechnics Management, Inc.	\$7.6	\$6.7	\$6.7
F S Tool, Inc.	\$7.6	\$0.0	\$0.0
Huston, Inc.	\$7.6	\$8.2	\$8.2
GHD, Inc.	\$7.5	\$0.0	\$0.0
World Electronics Sales and Service, Inc.	\$7.5	\$0.0	\$0.0
Carnegie Robotics, LLC	\$7.5	\$24.8	\$0.0
ArtSkills, Inc.	\$7.5	\$34.4	\$21.1
ThreeRivers 3D, Inc.	\$7.5	\$30.2	\$0.0
Meeker Holding Company, Inc.	\$7.5	\$22.4	\$22.4
Hanover Iron Works, Inc.	\$7.5	\$13.2	\$0.0
Peterson Cartridge Co.	\$7.4	\$10.8	\$0.0
CryoConcepts, LP	\$7.4	\$32.5	\$32.5
TL Lighting Holdings, LLC	\$7.4	\$0.0	\$0.0
BioChem Insights, Inc.	\$7.3	\$17.1	\$11.2
FlexSys America, LP	\$7.3	\$22.9	\$0.0
ChargeItSpot, LLC	\$7.3	\$6.7	\$0.0
J K Tool, Inc. (f/k/a J K Tool & Die, Inc.)	\$7.3	\$0.0	\$0.0
Greenwich Terminals, LLC	\$7.3	\$13.1	\$11.2
Shadowfax, Inc. (c/o American Polarizers, Inc.)	\$7.2	\$0.0	\$0.0

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Duck Duck Go, Inc.	\$7.2	\$0.0	\$0.0
PSNergy, LLC	\$7.1	\$3.6	\$0.0
OCTech, LLC	\$7.1	\$6.7	\$2.1
Rushabh Instruments, LLC	\$7.1	\$5.0	\$5.0
Forever, Inc.	\$7.1	\$23.2	\$23.2
Industry Weapon, Inc.	\$7.1	\$7.8	\$4.2
Skill Survey, Inc.	\$7.1	\$18.4	\$18.4
Neville Chemical Company	\$7.0	\$21.0	\$0.0
Siemens Industry, Inc.	\$7.0	\$14.3	\$0.0
Lee Industries, Inc.	\$7.0	\$13.5	\$0.0
Grant Street Group, Inc.	\$6.9	\$3.7	\$0.0
Communication Systems, Inc.	\$6.9	\$5.4	\$0.0
Coriell Life Sciences, Inc.	\$6.9	\$0.0	\$0.0
Plan A, Inc.	\$6.9	\$0.0	\$0.0
Sarris Candies, Inc.	\$6.8	\$65.7	\$36.8
Wild Meadow Farms, LLC	\$6.8	\$0.0	\$0.0
Simona America, Inc.	\$6.8	\$0.0	\$0.0
Camco Manufacturing, Inc.	\$6.7	\$11.9	\$1.8
EnerSys Delaware, Inc.	\$6.7	\$0.0	\$0.0
Atrin Pharmaceuticals, LLC	\$6.7	\$26.7	\$0.3
Blatek, Inc.	\$6.7	\$0.0	\$0.0
Penn Color, Inc.	\$6.6	\$28.1	\$28.1
Bald Eagle Precision, LLC	\$6.6	\$6.6	\$2.2
Clean Earth, Inc.	\$6.6	\$10.9	\$10.9
Weaver Companies, Inc.	\$6.6	\$18.5	\$0.0
Climatech Holding Company, Inc.	\$6.6	\$20.5	\$20.5
Timothy Haahs & Associates, Inc.	\$6.6	\$15.7	\$0.0
Mainstream Swimsuits, Inc.	\$6.6	\$34.8	\$0.0
Betts Industries, Inc.	\$6.6	\$0.0	\$0.0
Advanced Manufacturing Technologies	\$6.5	\$11.8	\$7.0
BoardBookit, Inc.	\$6.5	\$7.8	\$6.0
R&B Laboratory, Inc.	\$6.5	\$6.4	\$0.0
PB Heat, LLC	\$6.4	\$0.0	\$0.0
Kadco Ceramics, LLC	\$6.4	\$7.5	\$7.5
Seakeeper, Inc.	\$6.4	\$93.2	\$0.0
Finish Thompson, Inc.	\$6.3	\$16.0	\$10.6
Woodward McCoach, Inc.	\$6.3	\$0.0	\$0.0
416 Johnson Properties, LTD	\$6.3	\$0.0	\$0.0
Mcadoo & Allen, Inc.	\$6.2	\$10.6	\$10.6
Hosler Corp.	\$6.2	\$2.0	\$2.0
Crompco, LLC	\$6.2	\$14.4	\$14.4
Foxhole Technology, Inc.	\$6.2	\$0.0	\$0.0
Laboratory Testing, Inc.	\$6.2	\$29.6	\$19.1
IOP Holdings, LLC	\$6.2	\$8.4	\$0.0
Touchtown, Inc.	\$6.2	\$10.4	\$10.4
JLS Automation, LLC	\$6.2	\$0.0	\$0.0
Rosenberger USA Corp.	\$6.1	\$1.0	\$1.0
Lesleh Precision, Inc.	\$6.1	\$0.0	\$0.0
Hanover Foods Corporation	\$6.0	\$0.0	\$0.0
Architectural Precast Innovations, Inc.	\$6.0	\$13.4	\$13.4

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Bulk Chemicals, Inc.	\$6.0	\$3.4	\$3.4
Leech Industries, Inc.	\$6.0	\$0.9	\$0.9
Gen7, Inc.	\$6.0	\$0.0	\$0.0
ARCCA Incorporated	\$6.0	\$66.3	\$56.3
Hranec Sheet Metal, Inc.	\$6.0	\$0.0	\$0.0
Griff & Associates, LP	\$5.9	\$27.1	\$16.0
Miria Systems, Inc.	\$5.9	\$31.4	\$25.1
SRVD, Inc.	\$5.9	\$4.8	\$0.0
Lehigh Defense, LLC	\$5.9	\$3.8	\$3.8
Sage Software, Inc.	\$5.9	\$0.0	\$0.0
LUXTECH, LLC	\$5.9	\$39.5	\$18.5
United Parcel Service General Services Co.	\$5.9	\$1.6	\$0.0
Superior Plastic Products, Inc.	\$5.8	\$29.5	\$12.5
Agr International, Inc.	\$5.8	\$0.0	\$0.0
Lorne G. Seifert, LLC	\$5.8	\$0.0	\$0.0
Atoptix, Inc.	\$5.8	\$0.0	\$0.0
Boose At Cornwall, Inc.	\$5.8	\$17.3	\$0.0
Sunny Dell Foods, Inc.	\$5.8	\$12.4	\$12.4
Thompsons Candle Co.	\$5.8	\$28.4	\$7.0
Paragon Holding Corporation	\$5.8	\$0.0	\$0.0
Otreva, LLC	\$5.8	\$3.2	\$0.0
E X H, Inc.	\$5.8	\$1.5	\$1.5
SFS Group USA, Inc.	\$5.7	\$6.8	\$0.0
Competition Tire East, Inc.	\$5.7	\$50.7	\$50.7
Advansix, Inc.	\$5.7	\$0.0	\$0.0
Acrobatiq, Inc.	\$5.7	\$0.0	\$0.0
Diversified Packaging Concepts, Inc. (d/b/a North Atlantic Specialty Bag)	\$5.6	\$1.4	\$1.4
Union Carbide Corporation	\$5.6	\$0.0	\$0.0
TravelWits, LLC	\$5.6	\$1.5	\$0.0
Armstrong Utilities, Inc.	\$5.6	\$26.2	\$18.9
Casual Living Unlimited, LLC	\$5.6	\$0.0	\$0.0
Starn Tool & Manufacturing Company	\$5.5	\$0.0	\$0.0
Harry Miller Corporation	\$5.5	\$21.6	\$0.0
DelStar Technologies, Inc.	\$5.5	\$0.0	\$0.0
StubHub, Inc.	\$5.5	\$9.6	\$9.6
Trigon Plastics, LLC	\$5.4	\$0.0	\$0.0
Bettwy Electric, Inc.	\$5.4	\$22.7	\$22.7
Shaw Industries, Inc.	\$5.4	\$12.3	\$0.0
Blue Ridge Pressure Castings, Inc.	\$5.3	\$20.2	\$6.9
Anthony Folino Construction, Inc.	\$5.3	\$0.0	\$0.0
Altoona Roofing & Sheet Metal, Inc.	\$5.3	\$3.2	\$3.2
Strados Labs, LLC	\$5.3	\$0.0	\$0.0
Structured Mining Systems, Inc. (d/b/a Cervis, Inc.)	\$5.3	\$0.0	\$0.0
Matrix Tool, Inc.	\$5.2	\$0.0	\$0.0
Aetna Life Insurance Company	\$5.2	\$126.7	\$126.7
Shanks Extracts, Inc.	\$5.2	\$5.8	\$0.0
H. Shoemaker Welding Machine Shop	\$5.1	\$0.0	\$0.0
Northeast Industrial Manufacturing, Inc.	\$5.0	\$0.5	\$0.0
VascularStrategies, LLC	\$5.0	\$7.3	\$4.0
Creative Bending Systems, Inc.	\$5.0	\$7.4	\$5.5

APPENDIX A

**Table 1. Pennsylvania Research & Development Tax Credit Program
Taxpayers Receiving Credit in December 2018, 2017 and 2016
Sorted by 2018 Credit Awarded (Largest to Smallest)
(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Standard Precision Manufacturing Incorporated	\$4.9	\$0.0	\$0.0
Richter Precision, Inc.	\$4.9	\$66.5	\$45.0
RobotWits, LLC	\$4.9	\$6.0	\$0.0
American Manufacturing & Engineering Corporation	\$4.9	\$3.4	\$0.0
Impulse Technology, LLC	\$4.8	\$0.0	\$0.0
Plastech Container Systems, Inc.	\$4.8	\$5.7	\$3.6
Cummins-Allison Corp.	\$4.7	\$12.6	\$12.6
Chant Engineering Co., Inc.	\$4.7	\$67.3	\$47.1
Macron Dynamics, Inc.	\$4.7	\$3.2	\$3.2
Raceseng, Inc.	\$4.7	\$3.6	\$3.6
Penn State Construction J&D, LLC	\$4.7	\$11.4	\$11.4
DVCC, Inc. and Subsidiaries	\$4.6	\$0.0	\$0.0
Three M Tool and Die Corp.	\$4.6	\$0.0	\$0.0
TIW Technology, Inc.	\$4.6	\$12.3	\$0.0
Kunzler & Company, Inc.	\$4.6	\$3.0	\$0.0
Doutt Tool, Inc.	\$4.6	\$12.9	\$12.9
Asko, Inc.	\$4.5	\$0.0	\$0.0
Sussex Wire, Inc.	\$4.5	\$17.4	\$1.0
JCR Sales Mfg., LLC	\$4.5	\$0.7	\$0.0
Evol Science, LLC	\$4.5	\$0.7	\$0.0
Newage Industries, Inc.	\$4.5	\$37.6	\$21.0
Dyco, Inc.	\$4.5	\$17.9	\$17.9
MGS, Inc.	\$4.5	\$7.5	\$6.3
Syandus, Inc. (c/o D. Seifert)	\$4.5	\$0.0	\$0.0
Georgia Pacific Corrugated, LLC	\$4.4	\$2.9	\$2.9
Artsana USA, Inc.	\$4.4	\$13.2	\$13.2
Northport Distribution, LLC	\$4.4	\$2.8	\$2.7
Bore Tech, Inc.	\$4.4	\$12.9	\$6.8
Wise Telemetry, LLC	\$4.4	\$2.2	\$2.2
Solar Technology, Inc.	\$4.3	\$22.5	\$22.5
Gardners Candies, Inc.	\$4.3	\$2.6	\$0.0
White Oak Mills, Inc.	\$4.3	\$6.2	\$3.4
Edward Marc Brands, Inc.	\$4.3	\$0.0	\$0.0
Quad Graphics Marketing, LLC	\$4.3	\$3.3	\$3.3
Accusource, LLC	\$4.3	\$25.6	\$10.7
Commonwealth Fire Protection Company	\$4.2	\$0.0	\$0.0
NovaTech, LLC	\$4.2	\$5.7	\$0.0
Defiance Metal Products Of Pa, Inc.	\$4.2	\$5.3	\$1.3
Medius AG, LLC	\$4.2	\$0.0	\$0.0
SKC, Inc.	\$4.1	\$15.0	\$13.5
AES Asset Acquisition Corporation	\$4.1	\$1.1	\$1.1
Sealstrip Corporation	\$4.1	\$8.8	\$4.3
Adrich, LLC	\$4.1	\$0.0	\$0.0
MePush, Inc.	\$4.0	\$19.3	\$0.0
Romark Logistics of PA, Inc.	\$4.0	\$0.0	\$0.0
School Gate Guardian, Inc.	\$4.0	\$8.0	\$0.0
GHD Services, Inc.	\$4.0	\$0.0	\$0.0
R.G. Steel Corp.	\$3.9	\$6.2	\$6.2
ExecutivePulse, Inc.	\$3.9	\$14.6	\$0.0
Heeter Printing Company	\$3.8	\$64.1	\$41.2

APPENDIX A

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Mission Critical Partners, Inc.	\$3.7	\$10.4	\$10.4
The Dial Corporation	\$3.7	\$9.0	\$0.0
FishUSA, Inc.	\$3.7	\$2.8	\$2.8
Hermance Strouse, Inc.	\$3.7	\$15.3	\$15.3
Metaphase Technologies, Inc.	\$3.7	\$51.6	\$0.0
Neu Dynamics Corp.	\$3.7	\$6.4	\$6.4
Carel USA, Inc.	\$3.7	\$2.6	\$2.6
GreySignal, Inc.	\$3.7	\$0.0	\$0.0
Richardson Cooling Packages, LLC	\$3.7	\$9.9	\$0.0
Dynamet, Inc.	\$3.6	\$0.0	\$0.0
SheaLatone, Inc.	\$3.6	\$0.0	\$0.0
J & R Acquisition Corp.	\$3.6	\$9.6	\$9.6
Faro Technologies, Inc.	\$3.6	\$312.7	\$26.5
Henry Molded Products, Inc.	\$3.6	\$7.9	\$0.0
Harold Beck & Sons, Inc.	\$3.6	\$13.9	\$0.0
Celero Commercial Solutions, LLC	\$3.6	\$0.0	\$0.0
Viking Tool & Gage, Inc.	\$3.5	\$8.3	\$0.0
Michels Bakery, Inc.	\$3.5	\$5.4	\$0.0
Stewart & Tate, Inc.	\$3.5	\$9.4	\$0.0
Acopian Technical Company	\$3.5	\$19.8	\$19.8
Omega Systems Consultants, Inc.	\$3.5	\$0.0	\$0.0
Stoner, Inc.	\$3.5	\$69.5	\$46.6
HealthplanCRM, LLC	\$3.5	\$0.0	\$0.0
PSI Pumping Solutions, Inc.	\$3.5	\$14.9	\$14.9
Accel Diagnostics, LLC	\$3.4	\$0.0	\$0.0
Honeywell Safety Products USA, Inc.	\$3.4	\$13.2	\$13.2
Georgia Pacific Panel Products, LLC	\$3.4	\$0.0	\$0.0
Golden Proportions Marketing, Inc.	\$3.4	\$44.1	\$0.0
Beaver Steel Services, Inc.	\$3.4	\$14.8	\$9.5
Littlestown Foundry, Inc.	\$3.4	\$3.6	\$3.6
Engaged Prospect, LLC	\$3.4	\$0.0	\$0.0
Composite Panels Innovations, LLC	\$3.3	\$2.5	\$2.5
Minteq International, Inc.	\$3.3	\$33.1	\$31.0
Pittsburgh Technologies Group, Inc.	\$3.3	\$3.1	\$0.0
Right Reason Technologies, LLC	\$3.3	\$12.0	\$12.0
Nelson Wrap Dispenser, LLC	\$3.3	\$0.0	\$0.0
Delserro Engineering Solutions, Inc.	\$3.3	\$3.2	\$1.6
ParaCoat Technologies, Inc.	\$3.2	\$4.4	\$2.9
Ellingson Drainage, Inc.	\$3.2	\$0.0	\$0.0
Pequea Machine, Inc.	\$3.2	\$3.4	\$0.0
Easthill Group, Inc.	\$3.2	\$2.5	\$0.0
M3 USA Corporation	\$3.1	\$0.0	\$0.0
Estenda Solutions, Inc.	\$3.1	\$35.6	\$0.0
Newman & Company, Inc.	\$3.1	\$7.2	\$4.4
Valley Instrument Co., Inc.	\$3.0	\$0.4	\$0.0
Trice Medical, Inc.	\$3.0	\$19.5	\$0.0
MyAcclaim, LLC	\$3.0	\$0.0	\$0.0
Oath Americas, Inc.	\$2.9	\$0.0	\$0.0
Fedegari Technologies, Inc.	\$2.9	\$0.0	\$0.0
Crystal, Inc. PMC	\$2.9	\$2.9	\$0.0

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(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Institute On Healthcare Directives	\$2.9	\$0.0	\$0.0
Wazoodle Fabrics, LLC	\$2.9	\$10.6	\$0.0
Shirleys Cookie Co., Inc.	\$2.9	\$0.0	\$0.0
Sig Medical Corporation	\$2.9	\$0.0	\$0.0
Rearick Tooling, Inc.	\$2.9	\$1.2	\$1.2
Kiewit Engineering Group, Inc.	\$2.8	\$0.0	\$0.0
Positek Rfid, LP	\$2.8	\$31.5	\$31.5
Baldwin Publishing, Inc.	\$2.8	\$10.2	\$0.0
E.A. Fischione Instruments, Inc.	\$2.8	\$27.6	\$20.5
Dawar Technologies, Inc.	\$2.8	\$14.5	\$8.4
KieranTimberlake, LLC	\$2.7	\$18.3	\$18.3
United Metal Fabricators, Inc.	\$2.7	\$0.0	\$0.0
Aptagen, LLC	\$2.7	\$12.0	\$12.0
Reaxis, Inc.	\$2.7	\$0.0	\$0.0
Pyrotek Incorporated	\$2.7	\$15.0	\$0.0
Turnkey Taxes, Inc.	\$2.7	\$0.0	\$0.0
Dental Design Labs, Inc.	\$2.6	\$4.5	\$4.5
Specialty Fabrication and Powder Co.	\$2.6	\$10.2	\$7.2
Lifestyle Foods, Inc.	\$2.6	\$3.5	\$0.0
Civic Mapper, LLC	\$2.6	\$0.0	\$0.0
Milton Steel Co.	\$2.6	\$0.7	\$0.7
X Material Processing, LLC	\$2.5	\$0.0	\$0.0
C. B. P .Engineering Corp.	\$2.5	\$0.0	\$0.0
Security Risk Advisors, Inc.	\$2.5	\$2.7	\$0.0
Swing Kingdom, LLC	\$2.5	\$0.0	\$0.0
Imperial Carbide, Inc.	\$2.5	\$0.0	\$0.0
SinterFire, Inc.	\$2.5	\$17.4	\$2.2
Arin Technologies, Inc.	\$2.5	\$0.0	\$0.0
Hytech Tool Design, Co.	\$2.5	\$0.0	\$0.0
Taminco Corporation	\$2.4	\$0.0	\$0.0
Morris Knowles & Associates, Inc.	\$2.4	\$0.0	\$0.0
Scheerer Bearing Corporation	\$2.4	\$25.1	\$0.0
Michele Luciew (d/b/a Wrivo, LLC)	\$2.4	\$0.0	\$0.0
Beiler Hydraulics, Inc.	\$2.4	\$12.5	\$12.5
Wright Labs, LLC	\$2.3	\$0.0	\$0.0
Winter Gardens Quality Foods, Inc.	\$2.3	\$3.3	\$0.0
Penn State Mechanical Contractors, Inc.	\$2.3	\$10.9	\$10.9
Starkist Co.	\$2.3	\$0.0	\$0.0
Andritz Metals, Inc.	\$2.3	\$0.0	\$0.0
Earth Shapers, LLC	\$2.3	\$0.0	\$0.0
MCS Industries, Inc.	\$2.3	\$7.1	\$7.1
Schlouch Incorporated	\$2.2	\$8.0	\$8.0
Dassault Systemes Biovia Corp.	\$2.2	\$0.0	\$0.0
Fiber-Line Investment, LLC	\$2.2	\$0.0	\$0.0
ColumnTek, LLC	\$2.1	\$0.0	\$0.0
Thrive Commerce, LLC	\$2.1	\$26.6	\$26.0
Kongsberg Protech Systems USA Corporation	\$2.0	\$0.0	\$0.0
SP Acquisition Company, LLC (d/b/a Reitech Corporation)	\$2.0	\$1.1	\$0.0
Diversified Coatings, Inc.	\$2.0	\$15.6	\$0.0
ApexDrop, LLC	\$2.0	\$0.0	\$0.0

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(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
PittMoss, LLC	\$2.0	\$1.7	\$1.7
Victaulic Fire Safety Company, LLC	\$2.0	\$0.0	\$0.0
Quinn & Associates, Inc.	\$2.0	\$2.7	\$2.7
Indeck Keystone Energy, LLC	\$2.0	\$0.0	\$0.0
Keystone Manufacturing, Inc.	\$2.0	\$2.9	\$0.0
Mallet & Company, Inc.	\$2.0	\$0.0	\$0.0
Matreya, LLC	\$2.0	\$0.5	\$0.4
Spark Cures, LLC	\$2.0	\$0.0	\$0.0
Charles Beseler Company	\$1.9	\$6.4	\$3.6
JETNET Corporation	\$1.9	\$2.0	\$2.0
Fairmount Foundry, Inc.	\$1.9	\$6.1	\$6.1
Modern Cabinet And Construction, Inc.	\$1.9	\$6.7	\$6.7
Novotech Construction, Inc.	\$1.9	\$14.3	\$4.8
York Ice Co., Inc.	\$1.9	\$2.2	\$2.2
Nurse Navigator Solutions, LLC	\$1.9	\$0.0	\$0.0
Samuel Strapping Systems, Inc.	\$1.9	\$0.0	\$0.0
Snyder Distributors, Inc.	\$1.8	\$2.1	\$0.8
Gulden Ophthalmics, Inc.	\$1.8	\$0.0	\$0.0
Load Rite Corp.	\$1.8	\$3.7	\$3.7
LabelPack Automation, Inc.	\$1.8	\$0.0	\$0.0
K12 Systems, Inc.	\$1.8	\$0.0	\$0.0
LoanLogics, Inc.	\$1.8	\$0.0	\$0.0
Panther Learning Systems, Inc.	\$1.8	\$0.3	\$0.0
PMC Organometallix, Inc.	\$1.8	\$1.5	\$1.5
Great Lakes Automation Services, Inc.	\$1.8	\$4.9	\$4.8
L T L Wholesale, Inc.	\$1.8	\$8.3	\$3.8
Strasburg Rail Road Company	\$1.7	\$0.0	\$0.0
Hillside Acquisition Group, LLC and Subs	\$1.7	\$3.6	\$0.0
Blair Strip Steel Co.	\$1.7	\$3.3	\$0.0
Lightweight Manufacturing, Inc.	\$1.7	\$0.0	\$0.0
The Beistle Company	\$1.6	\$0.0	\$0.0
Concurrent EDA, LLC	\$1.6	\$0.0	\$0.0
Atlas Molding, LLC	\$1.6	\$0.0	\$0.0
Eastman Chemical Company	\$1.6	\$0.0	\$0.0
Everest Software, LP	\$1.6	\$0.0	\$0.0
Petco Animal Supplies Stores, Inc.	\$1.6	\$0.0	\$0.0
Rapid Reaction, Inc.	\$1.6	\$2.6	\$0.0
Trinity Plastics, Inc.	\$1.5	\$0.0	\$0.0
Perficient, Inc.	\$1.5	\$15.7	\$15.7
Leisters Furniture, Inc.	\$1.5	\$0.0	\$0.0
American Textile Company, Inc.	\$1.5	\$17.4	\$15.4
Readeeming Beauty, Inc. (d/b/a BeautyBlender)	\$1.5	\$35.2	\$17.5
Jordan Acquisition Group, LLC (d/b/a American Auto Matrix)	\$1.4	\$2.9	\$0.0
L.F. Lambert Spawn Company, Inc.	\$1.4	\$6.3	\$4.7
TekResults, Ltd.	\$1.4	\$1.2	\$1.2
JetSpring, LLC	\$1.4	\$0.0	\$0.0
Tyrone Milling	\$1.4	\$5.9	\$2.7
Anduril, Inc.	\$1.4	\$0.0	\$0.0
Stoltz Mfg, LLC	\$1.4	\$0.0	\$0.0
SS Industries, LLC	\$1.4	\$0.0	\$0.0

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Daryl G. Stanley	\$1.4	\$0.0	\$0.0
Lobar Site Development Corporation	\$1.3	\$9.2	\$5.3
The Doyle Group, Inc.	\$1.3	\$0.0	\$0.0
Polymer Products Company, Inc.	\$1.3	\$0.0	\$0.0
Timberlane, Inc.	\$1.3	\$0.0	\$0.0
Riverside Materials, Inc.	\$1.3	\$0.0	\$0.0
Document Solutions Group, Inc.	\$1.3	\$24.1	\$17.6
Quantum Software Solutions, Inc.	\$1.3	\$0.1	\$0.0
Coatingtech, LLC	\$1.3	\$2.0	\$0.0
Verizon Services Organization, Inc.	\$1.2	\$0.0	\$0.0
Lost Tavern Brewing, LLC	\$1.2	\$0.0	\$0.0
ANRO, Inc.	\$1.2	\$4.9	\$0.0
Jacob A. Weaver Company	\$1.2	\$0.0	\$0.0
Try Tek Machine Works Incorporated	\$1.2	\$8.4	\$3.6
Custom Laminating Corporation	\$1.2	\$44.9	\$44.9
Bliley Technologies Incorporated (d/b/a Bliley Electric Company)	\$1.2	\$17.7	\$11.1
Drinkworks Corporation	\$1.2	\$0.0	\$0.0
Carpenter Powder Products, Inc.	\$1.1	\$7.6	\$4.3
Armstrong Accuspec, LLC	\$1.1	\$10.8	\$0.0
Solid State Ceramics, Inc.	\$1.1	\$21.3	\$6.8
Wawa, Inc.	\$1.1	\$0.0	\$0.0
Boyesen, Inc.	\$1.1	\$3.5	\$0.5
Guardian Protection Services, Inc.	\$1.1	\$18.9	\$0.0
Greiner Extrusion US, Inc.	\$1.0	\$0.0	\$0.0
Backflips, Inc.	\$1.0	\$3.5	\$0.0
National Glass and Metal Co., Inc.	\$1.0	\$1.5	\$0.0
Smith Provision Co., Inc.	\$1.0	\$1.4	\$1.3
IMG Midstream, LLC	\$1.0	\$59.5	\$0.0
SAS Institute, Inc.	\$1.0	\$13.5	\$0.0
Shift Collaborative, LLC	\$0.9	\$0.6	\$0.0
Front Street Refrigerated Services, LLC	\$0.9	\$0.0	\$0.0
AquaPhoenix Scientific, Inc.	\$0.9	\$15.8	\$7.8
Homeland Manufacturing Services, Inc.	\$0.9	\$0.0	\$0.0
RPM Industries, LLC	\$0.9	\$0.0	\$0.0
Weaver Industries, Inc.	\$0.9	\$4.1	\$0.0
Uni-Tec Consulting Engineers, Inc.	\$0.9	\$16.9	\$16.9
Maxx Orthopedics, Inc.	\$0.9	\$19.0	\$12.9
Hireku, Inc.	\$0.8	\$112.3	\$94.6
ERP Essentials, LLC	\$0.8	\$1.2	\$1.2
Precision Solutions, Inc.	\$0.8	\$0.0	\$0.0
Integrated Power Designs, Inc.	\$0.8	\$4.5	\$4.5
Philadelphia Protection Bureau, Inc.	\$0.8	\$0.0	\$0.0
Integrated Fabrication & Machine, Inc.	\$0.8	\$0.2	\$0.0
X-F Enterprises, Inc.	\$0.8	\$7.4	\$0.0
Pressure Technology	\$0.8	\$0.0	\$0.0
J.A.C.K. Wood Products, LLC	\$0.7	\$0.2	\$0.2
Unique Pretzel Bakery, Inc.	\$0.7	\$0.0	\$0.0
Federal Carbide Co.	\$0.7	\$0.0	\$0.0
Troy Group, Inc.	\$0.7	\$0.0	\$0.0
Spring City Electrical Mfg. Co.	\$0.7	\$2.5	\$1.1

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Mighty Holdings, Inc.	\$0.7	\$4.9	\$4.9
Michael & Associates, Inc.	\$0.6	\$0.0	\$0.0
MCC International, Inc.	\$0.6	\$7.5	\$7.5
SJA Construction, Inc.	\$0.6	\$0.0	\$0.0
Verizon Pennsylvania, LLC	\$0.6	\$0.0	\$0.0
General Transervice, Inc.	\$0.6	\$6.3	\$6.3
Gateway Ticketing Systems, Inc.	\$0.6	\$16.8	\$16.8
CoyoteLight, Inc.	\$0.6	\$1.0	\$1.0
Peacock Laboratories	\$0.6	\$0.3	\$0.0
Penn Weld, Inc.	\$0.6	\$0.0	\$0.0
NeatCap Medical, LLC	\$0.5	\$0.0	\$0.0
Cobham Advanced Electronic Solutions, Inc.	\$0.5	\$158.4	\$0.0
Formtech Enterprises, Inc.	\$0.5	\$0.0	\$0.0
Choitek, LLC	\$0.5	\$0.0	\$0.0
Eagle Metals, Inc.	\$0.5	\$11.7	\$5.6
Actuated Medical, Inc.	\$0.5	\$0.0	\$0.0
Cocalico Distribution, LLC	\$0.4	\$2.6	\$0.0
PHB, Inc.	\$0.4	\$0.0	\$0.0
Polymer Molding, Inc.	\$0.4	\$0.0	\$0.0
Online Stores, LLC	\$0.4	\$0.9	\$0.0
Webstaurant Store, Inc.	\$0.4	\$0.0	\$0.0
Pittsburgh Plastics Mfg, Inc.	\$0.4	\$0.0	\$0.0
Railroad City Brewing Company	\$0.4	\$0.1	\$0.0
State Of The Art, Inc.	\$0.4	\$0.0	\$0.0
Interphase Materials, Inc.	\$0.4	\$0.0	\$0.0
Switcheroo, LLC	\$0.4	\$0.0	\$0.0
Bellefield Systems, LLC	\$0.3	\$28.0	\$28.0
EduLink, Inc.	\$0.3	\$32.1	\$5.4
Giorgio Foods, Inc.	\$0.3	\$0.9	\$0.0
Qrono, Inc.	\$0.3	\$1.2	\$1.0
Custom Milling & Consulting, Inc.	\$0.3	\$0.0	\$0.0
Acton Technologies, Inc.	\$0.3	\$0.0	\$0.0
Cronan Sheet Metal, Inc.	\$0.3	\$1.1	\$0.5
Griffith Brothers Whitetail Ridge, Inc.	\$0.2	\$1.3	\$1.3
Acme Corrugated Box Co., Inc.	\$0.2	\$2.3	\$2.3
McCourt Label Cabinet Company	\$0.2	\$0.0	\$0.0
Interstacks, Inc.	\$0.2	\$22.3	\$0.0
Seasons Evoo Holdings, LLC	\$0.2	\$0.0	\$0.0
Pretzel Pete, Inc.	\$0.2	\$0.0	\$0.0
JDV Robotics, Inc.	\$0.2	\$0.0	\$0.0
Boose Aluminum Foundry Co., Inc.	\$0.2	\$11.5	\$0.0
Keystone Abrasives Co.	\$0.2	\$0.5	\$0.5
Commerce Services, LLC	\$0.2	\$0.4	\$0.4
Cardinal Systems, Inc.	\$0.1	\$3.1	\$0.0
Toledo Furniture, Inc.	\$0.1	\$0.0	\$0.0
Pennlake Corporation	\$0.1	\$4.2	\$0.8
Quinn Analytics, LLC	\$0.1	\$0.0	\$0.0
Sentinel Camera Systems, LLC	\$0.1	\$0.0	\$0.0
S&S X-Ray Products, Inc.	\$0.0	\$0.4	\$0.0
Cosmos Technologies, Inc.	\$0.0	\$0.0	\$0.0

APPENDIX A

**Table 1. Pennsylvania Research & Development Tax Credit Program
Taxpayers Receiving Credit in December 2018, 2017 and 2016
Sorted by 2018 Credit Awarded (Largest to Smallest)
(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Novartis Pharmaceuticals Corporation	\$0.0	\$1,302.2	\$1,302.2
Vitae Pharmaceuticals, Inc.	\$0.0	\$996.2	\$0.0
JLG Industries, Inc.	\$0.0	\$892.5	\$223.9
Omnyx, LLC	\$0.0	\$828.8	\$828.8
QVC, Inc.	\$0.0	\$813.9	\$813.9
Marinus Pharmaceuticals, Inc.	\$0.0	\$808.9	\$403.2
Mack Trucks, Inc.	\$0.0	\$800.4	\$0.0
Spark Therapeutics, LLC	\$0.0	\$790.7	\$0.0
BGFP GoogleDatacenter, Inc.	\$0.0	\$630.5	\$245.9
Shire Holdings US, AG	\$0.0	\$621.7	\$0.0
Windtree Therapeutics, Inc. (f/k/a Discovery Laboratories, Inc.)	\$0.0	\$600.8	\$390.3
Optionality Digital Data Center, Inc.	\$0.0	\$600.2	\$235.7
WHLRC Electronic Option and Future Trading	\$0.0	\$586.4	\$228.7
ARRIS Technology, Inc. (f/k/a General Instrument Corporation)	\$0.0	\$552.7	\$552.7
Merck, Sharp & Dohme Corp.	\$0.0	\$506.5	\$0.0
United States Steel Corporation	\$0.0	\$499.1	\$37.0
NetApp, Inc.	\$0.0	\$472.5	\$0.0
Accu Measurement Testing, Inc.	\$0.0	\$457.8	\$178.3
Armstrong Flooring, Inc.	\$0.0	\$438.0	\$0.0
eDigital Data Center, Inc.	\$0.0	\$430.1	\$167.5
Rex Medical, LP	\$0.0	\$421.0	\$421.0
Braskem America, Inc.	\$0.0	\$413.3	\$413.3
Dataworks Analytic, Inc.	\$0.0	\$398.6	\$0.0
Lasko Products, Inc.	\$0.0	\$355.1	\$0.0
Greene, Tweed & Co., Inc.	\$0.0	\$321.3	\$0.0
Optionbotic Algorithm System, Inc.	\$0.0	\$301.9	\$117.7
Global Technology Enterprise	\$0.0	\$297.5	\$0.0
Solvay USA, Inc.	\$0.0	\$295.4	\$0.0
John Maneely Company	\$0.0	\$295.2	\$0.0
Industrial Scientific Corporation	\$0.0	\$290.3	\$58.1
Cognition Therapeutics, Inc.	\$0.0	\$279.2	\$192.8
Scientific Software International	\$0.0	\$271.6	\$0.0
Thorley Industries, LLC	\$0.0	\$266.1	\$171.4
Aramark	\$0.0	\$260.6	\$0.0
Lord Corporation	\$0.0	\$258.8	\$0.0
Ellwood Investment Corp.	\$0.0	\$248.9	\$96.4
SwapForMore, Inc.	\$0.0	\$241.7	\$94.3
Pfizer, Inc.	\$0.0	\$237.4	\$0.0
Fairchild Semiconductor Corporation	\$0.0	\$234.4	\$0.0
Cognizant Technology Solutions US Corporation	\$0.0	\$233.7	\$233.7
PPG Industries, Inc.	\$0.0	\$233.1	\$0.0
Ralexar Therapeutics, Inc.	\$0.0	\$224.9	\$0.0
Caterpillar Global Mining America, LLC	\$0.0	\$223.6	\$0.0
iPipeline, Inc. (f/k/a Internet Pipeline, Inc.)	\$0.0	\$221.3	\$53.1
Kennametal, Inc.	\$0.0	\$212.5	\$212.5
American Financial & Trading Research, Inc.	\$0.0	\$209.7	\$42.6
Streamlight, Inc.	\$0.0	\$207.1	\$0.0
CSL Behring, LLC	\$0.0	\$202.3	\$0.0
Hamill Manufacturing Company	\$0.0	\$198.6	\$38.6
Abella, Inc.	\$0.0	\$195.0	\$77.5

APPENDIX A

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(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Online Store Builder, Inc.	\$0.0	\$191.5	\$70.5
Orange Innovation, Inc.	\$0.0	\$188.5	\$73.4
American Computing, Inc.	\$0.0	\$181.4	\$66.8
Eastman Chemical Resins, Inc.	\$0.0	\$179.3	\$179.3
Airolution, LLC	\$0.0	\$176.4	\$68.7
American Measurement and Quantitative Method, Inc.	\$0.0	\$173.7	\$64.0
Aquion Energy, Inc.	\$0.0	\$171.2	\$0.0
Advanced Research Systems, Inc.	\$0.0	\$170.8	\$155.8
Synchronoss Technologies, Inc.	\$0.0	\$170.7	\$0.0
Ainsworth Pet Nutrition, LLC	\$0.0	\$164.6	\$0.0
Verizon Data Services, LLC	\$0.0	\$163.8	\$1.2
Minitab, Inc.	\$0.0	\$162.1	\$49.9
Sciqwest, Inc.	\$0.0	\$159.3	\$27.2
Netronome Systems, Inc.	\$0.0	\$158.3	\$0.0
American High Frequency Trading, Inc.	\$0.0	\$155.3	\$65.1
Verizon Services Corp.	\$0.0	\$152.6	\$152.6
Almac Clinical Technologies, LLC	\$0.0	\$151.8	\$151.8
PJ Dick Incorporated	\$0.0	\$150.5	\$150.5
Cherry Pick, Inc.	\$0.0	\$148.3	\$0.0
TetraLogic Pharmaceuticals Corporation	\$0.0	\$147.7	\$0.0
Frontline Technology Group, LLC	\$0.0	\$140.0	\$0.0
Fire Engine Red, Inc.	\$0.0	\$138.7	\$135.9
Teva Pharmaceuticals USA, Inc.	\$0.0	\$137.2	\$137.2
Express Dynamics, LLC	\$0.0	\$135.5	\$135.5
Schell Games, LLC	\$0.0	\$133.0	\$101.0
Nuix North America, Inc.	\$0.0	\$129.8	\$1.3
Pharmaceutical Manufacturing Research Services, Inc.	\$0.0	\$127.8	\$0.0
Renmatix, Inc.	\$0.0	\$124.4	\$124.4
Camber Spine Technologies, LLC	\$0.0	\$123.5	\$123.5
Algorithm Expert	\$0.0	\$122.9	\$45.3
VEKA, Inc.	\$0.0	\$119.6	\$98.4
Aclaris Therapeutics, Inc.	\$0.0	\$118.5	\$0.0
Finisar Corporation	\$0.0	\$116.6	\$0.0
G&W Laboratories, Inc.	\$0.0	\$116.2	\$0.0
First Insight, Inc.	\$0.0	\$115.1	\$89.7
The ExOne Company	\$0.0	\$110.4	\$95.0
Tonic Design Co.	\$0.0	\$110.2	\$110.2
BAE Systems Land & Armaments, Inc.	\$0.0	\$108.9	\$0.0
Apple, Inc.	\$0.0	\$107.6	\$107.6
Respironics, Inc.	\$0.0	\$107.3	\$0.0
CEWA Technologies, Inc.	\$0.0	\$104.4	\$104.4
CloudMine, Inc.	\$0.0	\$102.4	\$52.2
Melior Discovery, Inc.	\$0.0	\$101.5	\$63.5
Lehigh Cement Company, LLC	\$0.0	\$101.3	\$0.0
Kurt J. Lesker Company	\$0.0	\$100.7	\$66.8
NoWait, Inc.	\$0.0	\$100.5	\$81.0
North American Hoganas Company (f/k/a North American Hoganas, Inc.)	\$0.0	\$99.2	\$59.1
Conduit Technology, LLC	\$0.0	\$98.3	\$98.3
NuTec Tooling Systems, Inc.	\$0.0	\$98.2	\$0.0
Genesis Machinery Products, Inc.	\$0.0	\$98.0	\$98.0

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(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
H.B. Frazer Company - Pennsylvania	\$0.0	\$97.7	\$89.8
Branding Brand, Inc.	\$0.0	\$96.0	\$57.0
Cherry Pick, Inc.	\$0.0	\$94.3	\$94.3
OptiNose US, Inc.	\$0.0	\$93.7	\$0.0
Tri-City Marble, LLC	\$0.0	\$93.3	\$0.0
GE Healthcare IITS USA Corp.	\$0.0	\$90.4	\$90.4
USSC, LLC	\$0.0	\$90.0	\$90.0
USSC Acquisition Corp.	\$0.0	\$89.5	\$0.0
Shire ViroPharma, Inc.	\$0.0	\$85.8	\$85.8
Momentum Dynamics Corporation, Inc.	\$0.0	\$83.8	\$43.5
Fleetwood Industries, Inc.	\$0.0	\$82.1	\$0.0
Standard Steel, Inc.	\$0.0	\$81.3	\$0.0
Stitch, Inc. (f/k/a RJ Metrics, Inc.)	\$0.0	\$81.3	\$81.3
NewLink Genetics Corporation	\$0.0	\$80.9	\$80.9
Videon Central, Inc.	\$0.0	\$80.7	\$77.4
Coating and Converting Technologies Corporation	\$0.0	\$79.6	\$0.0
CytoVas, LLC	\$0.0	\$77.5	\$77.5
Phoenix Laser Solutions, LLC	\$0.0	\$77.3	\$77.3
TELA Bio, Inc.	\$0.0	\$76.0	\$0.0
Tech Molded Plastics, Inc.	\$0.0	\$74.8	\$74.8
Mascaro Construction Group, LP	\$0.0	\$74.6	\$0.0
Sweet Street Desserts, Inc.	\$0.0	\$71.7	\$0.0
JUDCO Management, Inc.	\$0.0	\$70.3	\$21.5
Rhiza Labs, LLC	\$0.0	\$70.2	\$0.0
Microsemi SoC Corporation	\$0.0	\$70.0	\$15.1
The DIRECTV Group, Inc.	\$0.0	\$69.4	\$69.4
Clutch Holdings, Inc.	\$0.0	\$68.7	\$0.0
IDL Worldwide, Inc.	\$0.0	\$68.0	\$13.1
Blue Belt Technologies, Inc.	\$0.0	\$67.9	\$0.0
StelKast, Inc.	\$0.0	\$67.8	\$7.1
Web Talent, LLC	\$0.0	\$67.5	\$15.9
Context Therapeutics, LLC	\$0.0	\$66.7	\$0.0
Liquent, Inc.	\$0.0	\$65.8	\$37.0
AIP/BI Holdings, Inc.	\$0.0	\$65.6	\$0.0
W.L. Gore & Associates, Inc.	\$0.0	\$65.6	\$0.0
Rajant Corporation	\$0.0	\$64.9	\$14.3
Conewago Enterprises, Inc.	\$0.0	\$64.1	\$7.4
NASDAQ, Inc.	\$0.0	\$63.5	\$63.5
Future POS, Inc.	\$0.0	\$60.9	\$0.0
Allan Myers, Inc.	\$0.0	\$60.9	\$0.0
GlobalSubmit, Inc.	\$0.0	\$60.8	\$0.0
Dixie Consumer Products, LLC	\$0.0	\$60.6	\$60.6
Swank Construction Company, LLC	\$0.0	\$59.7	\$0.0
Leaf Pharmaceuticals, LLC	\$0.0	\$59.7	\$0.0
ARC Applications, Inc.	\$0.0	\$59.5	\$0.0
Verizon Business Network Services, Inc.	\$0.0	\$59.2	\$41.8
BTG International, Inc.	\$0.0	\$58.1	\$58.1
Rieker, Inc.	\$0.0	\$58.0	\$0.0
Manley Holdings, Inc.	\$0.0	\$57.2	\$0.0
Applied Energy Systems, Inc.	\$0.0	\$57.1	\$57.1

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Sorted by 2018 Credit Awarded (Largest to Smallest)
(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Sicom Systems, Inc.	\$0.0	\$57.0	\$42.6
Leidos, Inc.	\$0.0	\$56.6	\$23.6
Flexicon Corporation	\$0.0	\$56.1	\$56.1
Dietz & Watson, Inc.	\$0.0	\$55.3	\$0.0
Techniserv, Inc.	\$0.0	\$55.2	\$42.0
International Management Consultants, Inc.	\$0.0	\$55.2	\$0.0
EnerSys Delaware, Inc.	\$0.0	\$55.1	\$0.0
Dura-Bond Industries	\$0.0	\$54.3	\$0.0
Clutch Holdings, LLC	\$0.0	\$54.0	\$0.0
Essential Medical, Inc.	\$0.0	\$52.7	\$52.7
Corry Manufacturing Company	\$0.0	\$52.6	\$0.0
US Pipeline, Inc.	\$0.0	\$52.6	\$0.0
Forge Life Sciences, LLC	\$0.0	\$52.1	\$52.1
Synergy Advanced Pharmaceuticals, Inc.	\$0.0	\$51.4	\$39.4
VECTR Research, LLC	\$0.0	\$50.4	\$12.9
Ecotech Marine, LLC	\$0.0	\$50.0	\$50.0
Magnesita Refractories Company	\$0.0	\$48.9	\$48.9
Synapse Print Management, LLC	\$0.0	\$48.3	\$0.0
Trigon, Inc.	\$0.0	\$48.2	\$27.3
The Ott Group, Inc. (f/k/a Polysciences, Inc.)	\$0.0	\$48.1	\$0.0
Rondo-Pak, LLC	\$0.0	\$48.1	\$0.0
Predictive Solutions Corp.	\$0.0	\$48.0	\$2.2
ASI Technologies, Inc.	\$0.0	\$48.0	\$0.0
Management Science Associates, Inc.	\$0.0	\$47.8	\$0.0
Advanced Plasma Solutions, Inc.	\$0.0	\$47.8	\$47.8
Global Tellink Corporation	\$0.0	\$47.4	\$47.4
Longevity Biotech, Inc.	\$0.0	\$47.1	\$47.1
ARRIS Global Services, Inc.	\$0.0	\$46.6	\$2.7
Cellco Partnership	\$0.0	\$46.1	\$0.0
Cerner Health Services, Inc.	\$0.0	\$45.8	\$45.8
Effort Foundry, Inc.	\$0.0	\$45.7	\$45.7
IB Abel, Inc.	\$0.0	\$45.3	\$45.3
Professional Staffing Solutions, LLC	\$0.0	\$45.2	\$14.2
Fortna, Inc.	\$0.0	\$45.0	\$44.4
Crayola, LLC	\$0.0	\$44.8	\$0.0
Berry Plastics SP, Inc.	\$0.0	\$44.3	\$0.0
Lobar Associates, Inc.	\$0.0	\$43.9	\$43.9
American Made, LLC	\$0.0	\$43.5	\$43.5
Refrigeration Design & Service, Inc.	\$0.0	\$43.3	\$43.3
InfoMC, Inc.	\$0.0	\$43.1	\$0.0
Ashley Holdings, Inc.	\$0.0	\$42.7	\$0.0
EnerSys Advanced Systems, Inc.	\$0.0	\$42.0	\$0.0
Sunbury Textile Mills, Inc.	\$0.0	\$42.0	\$30.3
Area Tool & Manufacturing, Inc.	\$0.0	\$41.9	\$0.0
RDC Design Group, LLC	\$0.0	\$41.7	\$41.7
Interstate Resources, Inc.	\$0.0	\$39.6	\$0.0
Think Through Learning, Inc.	\$0.0	\$39.4	\$39.4
Phoenix Contact Development Manufacturing, Inc.	\$0.0	\$38.8	\$38.8
Dick's Sporting Goods, Inc.	\$0.0	\$38.7	\$38.7
O3 World, LLC	\$0.0	\$38.4	\$38.4

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(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Graphene Frontiers, LLC	\$0.0	\$38.4	\$28.3
Brentwood Industries, Inc.	\$0.0	\$38.0	\$38.0
Crestwood Membranes, Inc.	\$0.0	\$37.6	\$37.6
Hendrick Manufacturing Co.	\$0.0	\$37.1	\$37.1
MicroMold Co., Inc.	\$0.0	\$37.0	\$37.0
US Boiler Company, Inc.	\$0.0	\$36.8	\$0.0
Cernostics, Inc.	\$0.0	\$36.3	\$36.3
Vesuvius USA Corporation	\$0.0	\$36.3	\$36.3
Draeger Medical Systems, Inc.	\$0.0	\$35.6	\$35.6
Basic Carbide Corporation	\$0.0	\$35.3	\$35.3
Medidata Solutions, Inc.	\$0.0	\$35.0	\$0.0
Power Conversion Technologies, Inc.	\$0.0	\$34.9	\$34.9
Philadelphia Tramrail Enterprises, Inc.	\$0.0	\$34.8	\$24.0
Language Services Associates, Inc.	\$0.0	\$34.1	\$34.1
NanoVision Diagnostics, Inc.	\$0.0	\$33.7	\$23.5
Cook, Inc.	\$0.0	\$33.6	\$0.0
Salimetrics, LLC	\$0.0	\$33.6	\$33.6
BioMagnetic Solutions, LLC	\$0.0	\$33.5	\$33.5
Cellular Tracking Technologies, LLC	\$0.0	\$33.3	\$18.1
Liberty Fox Technologies, LLC	\$0.0	\$33.2	\$15.2
Rettew Associates, Inc.	\$0.0	\$33.2	\$33.2
Saturn Design Group, LLC (d/b/a ADDREXX)	\$0.0	\$32.9	\$32.9
SpiralGen, Inc.	\$0.0	\$32.9	\$32.9
Environmental Construction Services, Inc.	\$0.0	\$32.8	\$9.1
Sekisui Polymer Innovations, LLC	\$0.0	\$32.2	\$0.0
Suburban Tool & Die Co., Inc.	\$0.0	\$31.8	\$31.8
Eaglet US, Inc.	\$0.0	\$31.7	\$0.0
Control Analytics, Inc.	\$0.0	\$31.2	\$0.0
TicketLeap, Inc.	\$0.0	\$31.2	\$31.2
Akzo Nobel Coatings, Inc.	\$0.0	\$31.1	\$31.1
Curry Rail Services, Inc.	\$0.0	\$30.7	\$30.7
K-Fab, Inc.	\$0.0	\$30.6	\$30.6
Carnegie Learning, Inc.	\$0.0	\$30.3	\$0.0
Gautier Steel, Ltd.	\$0.0	\$30.3	\$30.3
Jako Enterprises, Ltd.	\$0.0	\$30.0	\$0.0
Motors Drives & Controls, Inc.	\$0.0	\$29.9	\$0.0
ChromaTan, Inc.	\$0.0	\$29.8	\$29.8
Modern Industries, Inc.	\$0.0	\$29.8	\$0.0
Hadco Metal Trading Co., LLC	\$0.0	\$29.5	\$29.5
Quintiles, Inc.	\$0.0	\$29.4	\$0.0
Aesynt Incorporated	\$0.0	\$29.4	\$29.4
Greenleaf Corporation	\$0.0	\$29.3	\$0.0
Bostock Company, Inc.	\$0.0	\$29.2	\$7.2
DelphX, LLC	\$0.0	\$28.9	\$28.9
New Era Orthopaedics, LLC	\$0.0	\$28.8	\$28.8
Langan Engineering Environmental Surveying and Landscape Architecture - DPC	\$0.0	\$28.3	\$0.0
Laminated Materials Corporation	\$0.0	\$28.3	\$28.3
DVSPORT, Inc.	\$0.0	\$28.2	\$0.0
TLS Corp. Telos Systems	\$0.0	\$28.1	\$0.5
Woodward McCoach, Inc.	\$0.0	\$28.1	\$16.4

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	Awarded	Awarded	Utilized ¹
Horizon Signal Technologies, Inc.	\$0.0	\$28.0	\$20.0
Tex Visions, LLC	\$0.0	\$28.0	\$0.0
The Proud Company	\$0.0	\$27.8	\$26.3
InvestEdge, Inc.	\$0.0	\$27.7	\$0.0
Melior Pharmaceuticals I, Inc.	\$0.0	\$27.5	\$18.0
Samtec, Inc.	\$0.0	\$27.4	\$0.0
USA Technologies, Inc.	\$0.0	\$27.3	\$0.0
CRC Industries, Inc.	\$0.0	\$27.2	\$27.2
Matrix Operations, LLC (d/b/a Matrix Solutions)	\$0.0	\$27.2	\$5.3
STP Investment Services, LLC	\$0.0	\$27.1	\$27.1
Micromechatronics, Inc.	\$0.0	\$26.9	\$4.2
AssetWorks, Inc.	\$0.0	\$26.7	\$0.0
Pine Hill Manufacturing, LLC	\$0.0	\$26.6	\$24.3
Die-Tech, Inc.	\$0.0	\$26.6	\$26.6
Herbert Rowland & Grubic, Inc.	\$0.0	\$26.6	\$26.6
Clair Bros. Audio Enterprises, Inc.	\$0.0	\$26.5	\$15.1
EthosGen, LLC	\$0.0	\$26.3	\$26.3
Nielsen-Kellerman, Co.	\$0.0	\$26.2	\$0.0
Propelics, Inc.	\$0.0	\$25.9	\$24.5
Raytheon Company	\$0.0	\$25.7	\$25.7
Kwantera Incorporated	\$0.0	\$25.6	\$0.0
Connection Energy, LLC	\$0.0	\$25.5	\$25.5
Zentis Beteiligungsverwaltungs GmbH & Co. KG	\$0.0	\$25.2	\$0.0
American Bridge Company	\$0.0	\$25.0	\$25.0
Lincoln Contracting & Equipment Co., Inc.	\$0.0	\$24.4	\$9.3
X-NAV Technologies, LLC	\$0.0	\$24.3	\$23.0
Superior Forge & Steel Corporation	\$0.0	\$23.8	\$23.8
Renick Brothers Construction Company	\$0.0	\$23.7	\$0.0
Treatspace, Inc.	\$0.0	\$23.7	\$14.9
Marine Acquisition US Incorporated	\$0.0	\$23.6	\$0.1
Crystalplex Corporation	\$0.0	\$23.5	\$10.4
Audience Partners, LLC	\$0.0	\$23.4	\$0.0
Pennsylvania Electric Company	\$0.0	\$23.3	\$23.3
Pennsylvania Power Company	\$0.0	\$23.3	\$23.3
Orbweaver Sourcing, LLC	\$0.0	\$23.2	\$18.5
VASCOR, Inc.	\$0.0	\$23.2	\$22.1
Quaker Sales Corporation	\$0.0	\$23.1	\$0.0
Institute for Musculoskeletal Science and Education, LLC	\$0.0	\$22.9	\$22.9
Glenn O. Hawbaker, Inc.	\$0.0	\$22.7	\$14.8
New Era Technology, Inc.	\$0.0	\$22.5	\$22.5
Triumvirate Environmental, Inc.	\$0.0	\$22.5	\$22.5
AMETEK Technical & Industrial Products, Inc.	\$0.0	\$22.3	\$22.3
Innovative Supply Solutions, LLC	\$0.0	\$22.2	\$0.0
LIA Diagnostics, Inc.	\$0.0	\$22.2	\$0.0
Crosscurrent Business Analytics, LLC	\$0.0	\$22.1	\$22.1
OptimalOps, Inc.	\$0.0	\$22.1	\$22.1
TB Biosciences, Inc.	\$0.0	\$21.6	\$21.6
Stantec Consulting Services, Inc.	\$0.0	\$21.6	\$0.0
MESH, Inc.	\$0.0	\$21.5	\$0.0
Ratex Business Solutions	\$0.0	\$21.5	\$0.0

APPENDIX A

**Table 1. Pennsylvania Research & Development Tax Credit Program
Taxpayers Receiving Credit in December 2018, 2017 and 2016
Sorted by 2018 Credit Awarded (Largest to Smallest)
(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Machined Metals Manufacturing Group, Inc.	\$0.0	\$21.4	\$0.0
Safran Publishing Company	\$0.0	\$21.4	\$0.0
Havaco Technologies Incorporated	\$0.0	\$21.2	\$21.2
Havis, Inc.	\$0.0	\$21.0	\$18.3
MeetBall, LLC	\$0.0	\$20.8	\$20.8
Proconex Acquisition, Inc.	\$0.0	\$20.7	\$20.7
QuadGen Wireless Solutions	\$0.0	\$20.4	\$20.4
TherimuneX Pharmaceuticals, Inc.	\$0.0	\$20.1	\$20.1
Expjii, Inc.	\$0.0	\$20.0	\$0.4
DNP Imagingcomm America Corporation	\$0.0	\$19.6	\$19.6
Stock, Garber and Associates, Inc.	\$0.0	\$19.5	\$13.7
Gecko Robotics, LLC	\$0.0	\$19.5	\$0.0
M-Mech Defense, Inc.	\$0.0	\$19.4	\$13.4
Central Hydraulics, Inc.	\$0.0	\$19.3	\$19.3
Astellas Pharma Global Development, Inc.	\$0.0	\$19.0	\$0.0
DVCC, Inc.	\$0.0	\$19.0	\$0.0
Webber Smith Associates, Inc.	\$0.0	\$18.9	\$0.0
InnaVenture, LLC	\$0.0	\$18.7	\$18.7
Max Levy Autograph, Inc.	\$0.0	\$18.6	\$0.0
Environmental Energy Solutions, LLC	\$0.0	\$18.6	\$9.0
eDocs Technologies	\$0.0	\$18.4	\$7.0
Cornell Iron Works, Inc.	\$0.0	\$18.4	\$0.0
Coinco, Inc.	\$0.0	\$18.3	\$0.0
Casual Living Unlimited, LLC	\$0.0	\$18.0	\$0.0
Graybill Machines, Inc.	\$0.0	\$17.8	\$0.0
American Refining Group, Inc.	\$0.0	\$17.6	\$0.0
Oshkosh Corporation	\$0.0	\$17.6	\$0.0
NCA Technologies, Inc.	\$0.0	\$17.2	\$17.2
Netsch USA Holdings, Inc.	\$0.0	\$17.2	\$17.2
Watson Standard Company	\$0.0	\$17.1	\$0.0
Office Basics, Inc.	\$0.0	\$17.1	\$17.1
Blade Diagnostics Corporation	\$0.0	\$16.9	\$10.3
CDM Smith, Inc.	\$0.0	\$16.9	\$16.9
Wm J. Donovan Co.	\$0.0	\$16.9	\$0.0
FCI USA, LLC	\$0.0	\$16.9	\$16.9
A&A Construction Co., Inc.	\$0.0	\$16.9	\$16.9
Oberon, Inc.	\$0.0	\$16.8	\$16.8
Advanced Textile Composites, Inc.	\$0.0	\$16.8	\$0.0
PHRQL, Inc.	\$0.0	\$16.6	\$12.8
General Carbide Corporation	\$0.0	\$16.6	\$16.6
Lubbering Corp.	\$0.0	\$16.0	\$0.0
David Horn, LLC	\$0.0	\$15.9	\$15.9
Centroid Corporation	\$0.0	\$15.8	\$15.8
Custom Processing Services, LLC	\$0.0	\$15.6	\$0.0
Impact Applications, Inc.	\$0.0	\$15.4	\$12.6
Iagnosis, Inc.	\$0.0	\$15.3	\$15.3
Rochling Machined Plastics, LP	\$0.0	\$15.2	\$8.1
Intuitive Surgical Operations, LLC	\$0.0	\$15.2	\$0.0
Matric Limited	\$0.0	\$15.1	\$12.5
Conestoga Wood Specialties Corporation	\$0.0	\$15.1	\$0.0

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
PTR Group, LP	\$0.0	\$15.0	\$0.0
Bracalentes Manufacturing Co., LLC	\$0.0	\$14.8	\$14.8
GolbeHealer, Inc.	\$0.0	\$14.8	\$0.0
Go Green APU, LLC	\$0.0	\$14.8	\$14.8
Contec Systems Industrial Corp.	\$0.0	\$14.7	\$14.7
Robomatter, Inc.	\$0.0	\$14.7	\$0.0
E City Interactive, Inc.	\$0.0	\$14.6	\$0.0
Sea Pharmaceuticals, LLC	\$0.0	\$14.4	\$0.0
Hessian Co., Ltd.	\$0.0	\$14.3	\$14.3
American Millwork and Cabinetry, Inc.	\$0.0	\$14.2	\$0.0
Powerex, Inc.	\$0.0	\$14.2	\$8.0
Quality Tool and Die, Inc.	\$0.0	\$14.2	\$0.0
AKAS Tex, LLC	\$0.0	\$14.2	\$5.8
Sentinel Holding, Inc.	\$0.0	\$14.1	\$9.6
Double H Plastics, Inc.	\$0.0	\$14.0	\$0.0
FTS Holding Corporation	\$0.0	\$13.9	\$0.0
Instrumentation Industries, Inc.	\$0.0	\$13.6	\$3.3
Breen Energy Solutions, LLC	\$0.0	\$13.5	\$0.0
Ingredion Incorporated	\$0.0	\$13.5	\$13.5
Motionway, Inc. (d/b/a Upstage Video)	\$0.0	\$13.4	\$12.6
Zeigler Bros., Inc.	\$0.0	\$13.4	\$13.4
GlobalPOPS, Inc.	\$0.0	\$13.3	\$13.3
Aspire Bariatrics, Inc.	\$0.0	\$13.3	\$13.3
J.B. Poindexter Co., Inc.	\$0.0	\$13.3	\$13.3
Clear-Coat, LLC	\$0.0	\$13.1	\$12.2
KickUp, Inc.	\$0.0	\$13.0	\$0.0
Beckman Coulter, Inc.	\$0.0	\$13.0	\$13.0
Lebanon Tool Company, Inc.	\$0.0	\$13.0	\$1.1
Martins Famous Pastry Shoppe, Inc.	\$0.0	\$13.0	\$13.0
Telex Metals, LLC	\$0.0	\$12.9	\$0.0
Richmond Engineering Works, LLC	\$0.0	\$12.9	\$0.0
SpinWorks International Corporation	\$0.0	\$12.9	\$0.5
WEI Holding, Inc.	\$0.0	\$12.9	\$0.0
C.U.E., Inc.	\$0.0	\$12.9	\$12.2
Innovative Office Products, LLC	\$0.0	\$12.8	\$0.0
Reading Alloys, Inc.	\$0.0	\$12.8	\$12.8
Ecore International, Inc.	\$0.0	\$12.8	\$12.8
J. Computing, Inc. (d/b/a Juola & Associates)	\$0.0	\$12.8	\$12.8
Jay Fulkroad and Sons, Inc.	\$0.0	\$12.6	\$6.7
Epiphany Solar Water Systems, LLC	\$0.0	\$12.6	\$12.6
Noble Medical, LLC	\$0.0	\$12.3	\$11.6
BillMeLater, Inc.	\$0.0	\$12.2	\$12.2
Array Architects, Inc.	\$0.0	\$12.2	\$9.7
Emphasys Technologies	\$0.0	\$12.1	\$12.1
Flowserve US, Inc.	\$0.0	\$11.9	\$11.9
Trigon Plastics, Inc.	\$0.0	\$11.8	\$0.0
Effort Enterprises, Inc.	\$0.0	\$11.8	\$11.8
O.F. Zurn Company	\$0.0	\$11.8	\$8.2
N. Harris Computer Corporation	\$0.0	\$11.8	\$8.4
VenatoRx Pharmaceuticals, Inc.	\$0.0	\$11.8	\$0.0

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Taxpayers Receiving Credit in December 2018, 2017 and 2016
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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Paul B. Zimmerman, Inc.	\$0.0	\$11.8	\$11.8
Best Building Systems, Inc.	\$0.0	\$11.7	\$0.0
L&W Apparel Company, Inc.	\$0.0	\$11.7	\$0.0
Torvian, Inc.	\$0.0	\$11.7	\$0.0
Advanced Powder Products, Inc.	\$0.0	\$11.6	\$0.0
Blair Companies	\$0.0	\$11.6	\$8.1
CDC Software, LLC	\$0.0	\$11.6	\$11.6
Torchlight Technology Group, LLC	\$0.0	\$11.5	\$0.0
Covey, LLC	\$0.0	\$11.5	\$0.0
Aqua ChemPacs, LLC	\$0.0	\$11.5	\$11.5
Drummond Scientific Company	\$0.0	\$11.4	\$0.0
Vitrius Technologies, LLC	\$0.0	\$11.4	\$8.0
Datto, Inc.	\$0.0	\$11.4	\$1.1
St. Marys Box Company	\$0.0	\$11.3	\$5.8
Core Design Group, LLC	\$0.0	\$11.3	\$0.0
Whitley East, LLC	\$0.0	\$11.3	\$0.0
West Pharmaceutical Services, Inc. (PA)	\$0.0	\$11.2	\$11.2
Grouse Ridge Capital, LLC	\$0.0	\$11.1	\$0.0
DGNY, LLC Co. Govberg Jewelers	\$0.0	\$11.0	\$0.0
R-V Industries, Inc.	\$0.0	\$11.0	\$8.4
CJ Robinson Company	\$0.0	\$10.9	\$5.6
Forney, LP	\$0.0	\$10.9	\$0.0
Edward Marc, Inc.	\$0.0	\$10.8	\$0.0
Latrobe Specialty Metals Company	\$0.0	\$10.8	\$0.0
Preferred Security Components, Inc. (d/b/a Preferred Technologies Group)	\$0.0	\$10.6	\$10.6
Brio Design Partners, LLC (d/b/a Brio Solutions)	\$0.0	\$10.5	\$9.1
E.K. Bare & Sons, Inc.	\$0.0	\$10.3	\$10.3
Liquid X Printed Metals, Inc.	\$0.0	\$10.3	\$0.0
The Lane Construction Corporation	\$0.0	\$10.3	\$0.0
Embedded Energy Technology, LLC	\$0.0	\$10.2	\$1.1
AP Exhaust Holdings, LLC	\$0.0	\$10.2	\$0.0
Erdman Anthony Associates, Inc.	\$0.0	\$10.2	\$10.2
Solenoid Solutions, Inc.	\$0.0	\$10.2	\$0.0
PRL Industries, Inc.	\$0.0	\$10.2	\$1.0
General Nutrition Corporation	\$0.0	\$10.2	\$0.0
Electro Soft, Inc.	\$0.0	\$10.1	\$0.0
TBJ Incorporated	\$0.0	\$10.0	\$0.0
Whitford Corporation	\$0.0	\$9.9	\$6.3
Vistacom, Inc.	\$0.0	\$9.9	\$9.9
Schneider, Inc.	\$0.0	\$9.9	\$9.3
French Creek Production, Inc.	\$0.0	\$9.8	\$7.2
Stahl Sheaffer Engineering, LLC	\$0.0	\$9.7	\$0.0
MainLineDelivery.com	\$0.0	\$9.7	\$9.7
PRL, Inc.	\$0.0	\$9.4	\$9.4
TLC North, LLC	\$0.0	\$9.4	\$9.4
Sumitomo Cryogenics of America	\$0.0	\$9.1	\$9.1
Wiggins Shredding, Inc.	\$0.0	\$9.0	\$0.0
Bettwy Systems, Inc.	\$0.0	\$8.9	\$0.0
MPP Holdings, LLC	\$0.0	\$8.9	\$0.0
Connexus Technology, LLC	\$0.0	\$8.8	\$0.0

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Penn Wood Products, Inc.	\$0.0	\$8.7	\$8.7
Pure Fishing, Inc.	\$0.0	\$8.7	\$8.7
P-O Subsidiary, Inc.	\$0.0	\$8.5	\$0.0
New Metro Design, LLC	\$0.0	\$8.5	\$8.5
MilkCrate, LLC	\$0.0	\$8.5	\$0.0
L3 Technologies, Inc. (f/k/a L-3 Communications Corporation)	\$0.0	\$8.2	\$8.2
Nascent Devices, LLC	\$0.0	\$8.2	\$8.2
Red Nucleus Solutions, LLC	\$0.0	\$8.2	\$0.0
Pasco Tool & Plastics, Inc.	\$0.0	\$8.2	\$0.0
Rosenberger of North America, LLC	\$0.0	\$8.1	\$8.1
Zivtech, LLC	\$0.0	\$8.0	\$0.0
Wheeler Bros., Inc.	\$0.0	\$8.0	\$8.0
Health Sciences Construction Group Ltd.	\$0.0	\$8.0	\$0.0
Pilot Air Freight Corp.	\$0.0	\$7.9	\$0.0
Just Born, Inc.	\$0.0	\$7.9	\$0.0
Zausner Foods Corp and Subsidiaries, Inc.	\$0.0	\$7.9	\$7.9
K&H Technologies, Inc.	\$0.0	\$7.8	\$7.4
Diamondback Automotive Accessories	\$0.0	\$7.8	\$7.8
Structural Services, Inc.	\$0.0	\$7.8	\$7.8
RendrFX, Inc.	\$0.0	\$7.4	\$7.4
Somerset Welding and Steel	\$0.0	\$7.4	\$7.4
Ateeco, Inc.	\$0.0	\$7.1	\$0.0
TB Woods Incorporated	\$0.0	\$7.1	\$0.0
Spartan Motors USA, Inc.	\$0.0	\$7.1	\$7.1
Indian Ridge Provisions, Inc.	\$0.0	\$7.0	\$0.0
Apperson Labs, LLC	\$0.0	\$7.0	\$7.0
Conversant Labs, LLC	\$0.0	\$6.9	\$0.0
LunaMetrics, LLC	\$0.0	\$6.9	\$0.0
Proxicast, LLC	\$0.0	\$6.8	\$6.8
Two Mitts, Inc. (f/k/a Fabri-Kal Corporation)	\$0.0	\$6.8	\$0.0
Dynamic Concepts Manufacturing, LLC	\$0.0	\$6.8	\$6.8
DR Martin Fabricating	\$0.0	\$6.7	\$0.0
PledgePlatform, LLC	\$0.0	\$6.7	\$0.0
Kermitool Acquisition Company, Inc.	\$0.0	\$6.7	\$0.0
Saladax Biomedical, Inc	\$0.0	\$6.7	\$0.0
AeroTech Designs, Inc.	\$0.0	\$6.6	\$0.0
GJRPH, LP	\$0.0	\$6.6	\$0.0
MXL Industries, Inc.	\$0.0	\$6.6	\$3.2
Lancaster Oil Company	\$0.0	\$6.6	\$4.4
LifeVest Health, Inc. (d/b/a Life.io)	\$0.0	\$6.5	\$6.5
Truck-Lite Co., LLC	\$0.0	\$6.4	\$0.0
Diversified Traffic Products, Inc. Mercury Electronics	\$0.0	\$6.4	\$0.0
Ira G. Steffy & Son, Inc.	\$0.0	\$6.4	\$0.0
Orthofix, Inc.	\$0.0	\$6.2	\$6.2
Timac Agro USA, Inc.	\$0.0	\$6.2	\$0.0
CM3 Building Solutions, Inc.	\$0.0	\$6.1	\$6.1
Production System Technologies, Inc.	\$0.0	\$6.1	\$6.1
Gift Card Granny, LLC	\$0.0	\$6.1	\$0.0
The Stork IB2C, Inc.	\$0.0	\$6.0	\$0.0
Level Interactive, Inc.	\$0.0	\$5.9	\$0.0

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	Awarded	Awarded	Utilized ¹
ON Semiconductor Corporation	\$0.0	\$5.9	\$0.0
Aberdeen Road Company	\$0.0	\$5.9	\$3.8
Carbon Freight Company	\$0.0	\$5.9	\$0.0
Big B Manufacturing, Inc.	\$0.0	\$5.8	\$0.0
Biocoat, Inc.	\$0.0	\$5.8	\$5.8
Clair Global Corporation (d/b/a Showco)	\$0.0	\$5.6	\$5.6
Greener Days, LLC	\$0.0	\$5.6	\$5.3
Saucon Technologies	\$0.0	\$5.6	\$0.0
Next Gauge, Inc.	\$0.0	\$5.5	\$5.5
Rubitection, Inc.	\$0.0	\$5.5	\$0.0
AllFill, Inc.	\$0.0	\$5.4	\$0.1
Caliber Therapeutics, Inc.	\$0.0	\$5.4	\$5.1
Sentient Investment Corporation	\$0.0	\$5.4	\$5.1
ShowClix, Inc.	\$0.0	\$5.3	\$0.0
Deeplocal, Inc.	\$0.0	\$5.2	\$5.2
Fragrance Manufacturing, Inc.	\$0.0	\$5.2	\$0.0
Rorus, Inc.	\$0.0	\$5.2	\$0.0
Southwark Metal Manufacturing Company, Inc.	\$0.0	\$5.1	\$0.0
Psychology Software Tools, Inc.	\$0.0	\$5.1	\$0.0
uCompli, LLC	\$0.0	\$5.1	\$0.0
Birdbrain Labs, LLC	\$0.0	\$5.1	\$5.1
Rapid TPC, LLC	\$0.0	\$5.1	\$0.0
Sokolis Transportation Group, Inc.	\$0.0	\$5.0	\$3.0
Powerlytics, Inc.	\$0.0	\$5.0	\$5.0
Good Ideas, Inc.	\$0.0	\$4.9	\$0.0
In The Stix Broadband, LLC	\$0.0	\$4.9	\$4.9
Green Harvest One Corporation	\$0.0	\$4.7	\$0.0
Joseph Barbato Associates, LLC	\$0.0	\$4.6	\$0.0
Advanced Cast Products	\$0.0	\$4.5	\$4.5
Gluzdovcom, Inc.	\$0.0	\$4.5	\$0.0
Omega Flex, Inc.	\$0.0	\$4.4	\$4.4
Pennoni Associates, Inc.	\$0.0	\$4.4	\$4.4
Technotects, Inc.	\$0.0	\$4.4	\$0.0
Levolta Pharmaceuticals, Inc.	\$0.0	\$4.4	\$0.0
Bitronics, LLC	\$0.0	\$4.4	\$4.4
Universal Atlantic Systems, Inc.	\$0.0	\$4.4	\$0.0
Namsco Plastics Industries, Inc.	\$0.0	\$4.3	\$4.3
Yavi, LLC	\$0.0	\$4.3	\$0.0
Bosch Security Systems, Inc.	\$0.0	\$4.3	\$4.3
Videojet Technologies, Inc.	\$0.0	\$4.3	\$4.3
CorkGuru.com, LLC	\$0.0	\$4.3	\$0.0
SparkNET Technologies, LLC	\$0.0	\$4.3	\$4.3
Regal Cast, Inc.	\$0.0	\$4.2	\$3.4
S&S Processing, Inc.	\$0.0	\$4.2	\$4.2
STMicroelectronics, Inc.	\$0.0	\$4.2	\$0.1
Universal Refractories, Inc.	\$0.0	\$4.1	\$0.0
Bazooka Jane, Inc. (d/b/a Trusst Lingerie)	\$0.0	\$4.1	\$0.0
Lockhouse Network, Inc.	\$0.0	\$4.1	\$0.0
Toaster Creations, LLC	\$0.0	\$4.0	\$0.0
Diamond Drinks, Inc.	\$0.0	\$4.0	\$4.0

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	Awarded	Awarded	Utilized ¹
Ross Technology Corporation	\$0.0	\$3.8	\$0.0
T&M Associates	\$0.0	\$3.8	\$3.8
Z-Axis Connector Company	\$0.0	\$3.7	\$0.0
Collegiate Furnishing, Inc.	\$0.0	\$3.7	\$0.0
Millenium Torque & Tensioning, Inc.	\$0.0	\$3.7	\$0.0
Crestline Software, LLC	\$0.0	\$3.7	\$0.0
Blair Roofing, Inc.	\$0.0	\$3.7	\$3.7
Himes Diversified, LLC	\$0.0	\$3.6	\$3.6
Ben Peoples Industries	\$0.0	\$3.6	\$0.0
Papetti Hygrade Egg Products, Inc.	\$0.0	\$3.6	\$0.0
Belden, Inc.	\$0.0	\$3.6	\$0.0
Applied Educational Systems, Inc.	\$0.0	\$3.5	\$1.2
Curotec, LLC	\$0.0	\$3.5	\$1.4
Girton Manufacturing, Inc.	\$0.0	\$3.4	\$0.0
Seraphim Software, LLC	\$0.0	\$3.4	\$3.4
Suntex International, Inc.	\$0.0	\$3.4	\$3.4
Train Control Systems, Inc.	\$0.0	\$3.3	\$0.0
AbiliLife, Inc.	\$0.0	\$3.3	\$3.3
PDQ Industries, Inc.	\$0.0	\$3.3	\$0.0
G&B Specialties, Inc.	\$0.0	\$3.3	\$3.3
turnKey Taxes, Inc.	\$0.0	\$3.3	\$2.6
Patriot Sensors and Controls Corporation	\$0.0	\$3.1	\$3.1
Delmont Laboratories, Inc.	\$0.0	\$3.1	\$0.0
Qmac - Quality Machining, Inc.	\$0.0	\$3.1	\$1.3
Shopagogo, LLC	\$0.0	\$3.0	\$0.0
Jonas Software USA, LLC	\$0.0	\$3.0	\$0.0
Gonnella Baking Company	\$0.0	\$2.9	\$2.9
Terremark North America, LLC	\$0.0	\$2.8	\$0.0
Robert P. Lepley Electrical Contractor, Inc.	\$0.0	\$2.8	\$0.0
Selas Heat Technology Company, LLC	\$0.0	\$2.8	\$0.0
Medtrics Lab, LLC	\$0.0	\$2.8	\$2.8
Martin Energy Group Services, LLC	\$0.0	\$2.7	\$0.0
Ckjk, LLC	\$0.0	\$2.7	\$2.7
Infrascan, Inc.	\$0.0	\$2.7	\$0.0
Trinity Industries, Inc.	\$0.0	\$2.6	\$0.0
Scientific Systems, Inc.	\$0.0	\$2.6	\$0.0
Nicholson Construction Company	\$0.0	\$2.6	\$0.0
AgileSwitch, LLC	\$0.0	\$2.6	\$2.6
WavesinSolids, LLC	\$0.0	\$2.6	\$2.6
Solo Laboratories, Inc.	\$0.0	\$2.6	\$2.6
Analytical Design Solutions, Inc. ADSI	\$0.0	\$2.6	\$2.6
Siemens Medical Solutions USA, Inc.	\$0.0	\$2.5	\$0.0
Ranbar Electrical Materials, Inc.	\$0.0	\$2.5	\$0.0
Thread International PBC, Inc.	\$0.0	\$2.5	\$0.0
II VI Optical Systems, Inc.	\$0.0	\$2.5	\$0.0
Dynamic Manufacturing, LLC	\$0.0	\$2.4	\$2.4
Epidarus Therapeutics	\$0.0	\$2.4	\$0.0
Institute of Consultative Bioethics	\$0.0	\$2.4	\$2.4
Premier Automation, LLC	\$0.0	\$2.4	\$2.4
HCC/KPM, LLC	\$0.0	\$2.4	\$0.0

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Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Dew Fresh, Inc.	\$0.0	\$2.3	\$2.3
Daniel F Young, Inc.	\$0.0	\$2.2	\$2.2
Wright Labs, Inc.	\$0.0	\$2.2	\$0.0
Aldus Brewing Company	\$0.0	\$2.1	\$0.0
VMWARE, Inc.	\$0.0	\$2.1	\$2.1
Future Foam, Inc.	\$0.0	\$2.1	\$2.1
Warners Innovations Solutions	\$0.0	\$2.1	\$2.1
FacioMetrics, LLC	\$0.0	\$2.1	\$0.0
Techpro Building Services, Inc. A-Tech Refrigeration & Mechanical	\$0.0	\$2.0	\$0.0
NE Foods, Inc.	\$0.0	\$2.0	\$2.0
Jacob A. Weaver Company	\$0.0	\$2.0	\$1.5
Shorts Tool and Manufacturing, Inc.	\$0.0	\$2.0	\$2.0
Lumaclean, LLC	\$0.0	\$2.0	\$0.0
WorkDesq, LLC	\$0.0	\$2.0	\$2.0
Xyvid, Inc.	\$0.0	\$2.0	\$0.0
Flexible Compensators, Inc. (t/a Flex Com)	\$0.0	\$1.9	\$1.9
Acker Drill Company, Inc.	\$0.0	\$1.9	\$0.0
Raven Industries, Inc.	\$0.0	\$1.9	\$1.8
Briar Valley Vineyards and Winery, Inc.	\$0.0	\$1.8	\$1.8
Genus Technologies, LLC	\$0.0	\$1.8	\$0.0
Newage Testing Instruments, Inc.	\$0.0	\$1.6	\$1.6
Easthill Specialty, Inc.	\$0.0	\$1.5	\$1.5
Online Store, Inc.	\$0.0	\$1.5	\$0.0
Robar Industries, Inc.	\$0.0	\$1.5	\$0.0
Nova 6, LLC	\$0.0	\$1.5	\$0.0
Triumph Interiors, LLC	\$0.0	\$1.5	\$0.0
AMETEK, Inc.	\$0.0	\$1.4	\$1.4
S&W Race Cars & Components, Inc.	\$0.0	\$1.4	\$0.0
Brayman Precast Solutions, LLC	\$0.0	\$1.4	\$0.0
Burrell Group, Inc.	\$0.0	\$1.3	\$0.0
CWE, Inc.	\$0.0	\$1.3	\$1.3
Blackbaud, Inc.	\$0.0	\$1.3	\$0.0
Spark Cures, LLC	\$0.0	\$1.2	\$0.0
Sylvin Technologies, Inc.	\$0.0	\$1.2	\$1.2
Project Vive, LLC	\$0.0	\$1.2	\$1.2
Circadiance, LLC	\$0.0	\$1.2	\$0.0
Piramal Critical Care, Inc.	\$0.0	\$1.1	\$1.1
Sled, Inc.	\$0.0	\$1.1	\$1.1
Trimetric Enterprises, Inc.	\$0.0	\$1.1	\$1.1
Neuro-Genetics Institute, LLC	\$0.0	\$1.1	\$0.0
Warrior Strength, LLC	\$0.0	\$1.1	\$0.0
EEme, LLC	\$0.0	\$1.1	\$0.0
ASI Business Solutions, Inc. (f/k/a Automated Systems, Inc.)	\$0.0	\$1.1	\$0.0
United Chemical Technologies, Inc.	\$0.0	\$1.1	\$0.0
W.W. Patterson Company	\$0.0	\$1.0	\$0.0
Strahman Valves, Inc.	\$0.0	\$1.0	\$1.0
Multi-Plastics Extrusion, Inc.	\$0.0	\$1.0	\$1.0
PennFleet Corp.	\$0.0	\$1.0	\$0.0
Environmental Monitoring Technical	\$0.0	\$0.9	\$0.0
NovaProbe Incorporated	\$0.0	\$0.9	\$0.0

APPENDIX A

**Table 1. Pennsylvania Research & Development Tax Credit Program
Taxpayers Receiving Credit in December 2018, 2017 and 2016
Sorted by 2018 Credit Awarded (Largest to Smallest)
(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Canto Tool Corporation	\$0.0	\$0.9	\$0.0
Hamilton Precision Metals, Inc.	\$0.0	\$0.9	\$0.9
Orion Security LSP, LLC	\$0.0	\$0.9	\$0.0
Stoltz Mfg., LLC	\$0.0	\$0.8	\$0.0
Heritage Biorobotics, LLC	\$0.0	\$0.8	\$0.0
Mashup Technologies, LLC	\$0.0	\$0.8	\$0.5
Atoptix, LLC	\$0.0	\$0.8	\$0.0
Henwil Corporation	\$0.0	\$0.8	\$0.0
Caledonian Dye Works, Inc.	\$0.0	\$0.8	\$0.0
Robert Mazza, Inc.	\$0.0	\$0.8	\$0.5
Z3 Concepts	\$0.0	\$0.8	\$0.8
Crows Head Outfitters, LLC	\$0.0	\$0.7	\$0.0
DynAccess Ltd.	\$0.0	\$0.7	\$0.7
Thomas Erie, Inc.	\$0.0	\$0.7	\$0.7
Edge Robotics, Inc.	\$0.0	\$0.7	\$0.0
Advanced Fabrication Services, Inc.	\$0.0	\$0.7	\$0.7
General Polymeric Corporation	\$0.0	\$0.7	\$0.7
Minus 100, LLC	\$0.0	\$0.6	\$0.0
HGSI Investment Software, LLC	\$0.0	\$0.6	\$0.0
Royse Green Technologies, Inc.	\$0.0	\$0.6	\$0.0
DecisionVis, LLC	\$0.0	\$0.6	\$0.6
Waffatopia, LLC	\$0.0	\$0.6	\$0.6
Shaffer Technologies, Inc.	\$0.0	\$0.6	\$0.0
Penn-Century, Inc.	\$0.0	\$0.6	\$0.6
Wolf Technologies, LLC	\$0.0	\$0.6	\$0.6
Woodward, Inc.	\$0.0	\$0.6	\$0.0
Fidelity Flight Simulation Incorporated	\$0.0	\$0.5	\$0.0
Flexcut Tool Co., Inc.	\$0.0	\$0.5	\$0.0
Panelshop.com, LLC	\$0.0	\$0.5	\$0.5
Misco Products Corporation	\$0.0	\$0.5	\$0.0
Glen Carbide, Inc.	\$0.0	\$0.5	\$0.5
Harbor Steel, Inc.	\$0.0	\$0.5	\$0.0
Adiaon, LLC	\$0.0	\$0.5	\$0.2
Advanced Design, LLC	\$0.0	\$0.5	\$0.5
Wenzlau Engineering, Inc.	\$0.0	\$0.4	\$0.1
Wesanda Design, Inc.	\$0.0	\$0.4	\$0.4
NH Laboratories, Inc.	\$0.0	\$0.4	\$0.0
Destination Unknown, LLC Out of the Grey Coffee	\$0.0	\$0.4	\$0.4
Hach Company	\$0.0	\$0.4	\$0.4
Sinking Valley Woodworks, LLC	\$0.0	\$0.3	\$0.0
Thermal Engineering International USA	\$0.0	\$0.3	\$0.0
Payroll Command, LLC	\$0.0	\$0.3	\$0.3
Air Management Technology, Inc.	\$0.0	\$0.3	\$0.0
Erie Bearings Co.	\$0.0	\$0.2	\$0.0
Henkel Corporation	\$0.0	\$0.2	\$0.2
General Machine Products Co., Inc.	\$0.0	\$0.2	\$0.0
Conidio Tec, LLC	\$0.0	\$0.2	\$0.0
Reaction Technologies, LLC	\$0.0	\$0.2	\$0.0
Huntingdon Fiberglass Products, LLC	\$0.0	\$0.2	\$0.2
Robinson Vacuum Tanks, Inc.	\$0.0	\$0.2	\$0.0

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Sorted by 2018 Credit Awarded (Largest to Smallest)
(\$thousands)**

Taxpayer Name	2018 Credit	2016 & 2017 Credits	
	Awarded	Awarded	Utilized ¹
Tiger Optics, Inc.	\$0.0	\$0.2	\$0.2
Levan Machine Co., Inc.	\$0.0	\$0.2	\$0.2
Riley Power, Inc.	\$0.0	\$0.1	\$0.0
Hillside Equity, Inc.	\$0.0	\$0.1	\$0.0
BSC Technologies, Inc.	\$0.0	\$0.1	\$0.1
LCM Technologies, Inc.	\$0.0	\$0.1	\$0.0
Tait Farm Foods, Inc.	\$0.0	\$0.1	\$0.1
Babcock Power Environmental	\$0.0	\$0.1	\$0.0
ActivAided Orthotics, LLC	\$0.0	\$0.0	\$0.0
TOTAL	\$55,000.0	\$110,000.0	\$56,095.4

Footnote:

¹"Utilized" means that the tax credit has been applied in full or partial payment of a tax liability according to the records of the Department. If no tax liability exists for the tax and period where the credit has been applied or if previous tax credits exceed the tax liability, the utilized amount is shown as zero. Until a tax year has been closed, it is possible that the tax credits indicated as being utilized may still be transferred, sold or assigned at the option of the taxpayer. Pass through credits and unused credits that were sold or assigned are also included as utilized.