

# Schools of Mass Destruction: American Universities in the U.S. Nuclear Weapons Complex



ICAN



# About the International Campaign to Abolish Nuclear Weapons and Acknowledgments

The International Campaign to Abolish Nuclear Weapons (ICAN) is a global campaign working to mobilize people in all countries to inspire, persuade and pressure their governments to sign and ratify the Treaty on the Prohibition of Nuclear Weapons. ICAN is comprised of more than 500 partner organisations in over 100 countries. More information about ICAN can be found at [www.icanw.org](http://www.icanw.org).

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Pittsburg State University	
Purdue University	
Roane State Community College	

Stanford University

Texas A&M University

Texas Tech University

University of Arizona

University of Arkansas

University of California

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    University of California - Davis

    University of California - Los Angeles

    University of California - San Diego

University of Colorado - Boulder

University of Florida

University of Illinois at Urbana-Champaign

University of Kansas

University of Michigan

University of Missouri - Kansas City

University of Nebraska

University of Nevada - Las Vegas

University of Nevada - Reno

University of New Mexico

University of Notre Dame

University of Rochester

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# Executive Summary

Current news reports suggest renewed life in the global nuclear arms race. In the United States, the Trump Administration has expanded plans to upgrade the nation's nuclear weapons arsenal.<sup>1</sup> Over the next ten years, the Congressional Budget Office estimates U.S. taxpayers will pay nearly \$500 billion to maintain and modernize their country's nuclear weapons arsenal, or almost \$100,000 per minute.<sup>2</sup> A separate estimate brings the total over the next 30 years to an estimated \$1.7 trillion.<sup>3</sup> In a July 2019 report, National Nuclear Security Administrator Lisa Gordon-Haggerty wrote, "The nuclear security enterprise is at its busiest since the demands of the Cold War era."<sup>4</sup>

In addition to large amounts of funding, enacting these upgrades requires significant amounts of scientific, technical and human capital. To a large extent, the U.S. government and its contractors have turned to the nation's universities to provide this capital.

At the same time, the United States is shirking its previous commitments to nuclear arms control and reducing nuclear risks despite its obligation under Article VI of the Nuclear Non-Proliferation Treaty to pursue good-faith measures towards nuclear disarmament. In August 2019, the United States officially withdrew from the landmark 1987 Intermediate-Range Nuclear Forces Treaty, testing a treaty-prohibited missile shortly thereafter.<sup>5</sup> The Trump Administration's 2018 Nuclear Posture Review expands the circumstances under which the United States would consider the first use of nuclear weapons and calls for the development of two new sea-based low-yield nuclear weapon systems.<sup>6</sup>

Internationally, many member states of the United Nations recently recognized the devastating humanitarian and environmental impacts of nuclear weapons: debating, adopting and now signing and ratifying the 2017 Treaty on the Prohibition of Nuclear Weapons. Three states and several major cities across the U.S. have affirmed their support for this treaty.<sup>7</sup>

Despite these debates, U.S. universities have continued to build connections to the U.S. nuclear weapons complex. Although students and faculty have opposed university participation in nuclear weapons research and development at various points in the last 70 years, such participation continues.

Universities involve themselves in the nuclear weapons complex through the four channels listed below. In return for this engagement, universities receive funding, access to research facilities, and specific career opportunities for students.

## 1) Direct Management

A handful of universities directly manage nuclear weapons related activities on behalf of the federal government, retaining contracts worth billions of dollars per year collectively. These include the University of California, Texas A&M University, Johns Hopkins University, the Massachusetts Institute of Technology, and the University of Rochester.

## 2) Institutional Partnerships

Many of the National Nuclear Security Administration's (NNSA) sites advertise collaborative agreements with local and national universities. These formal agreements allow the



institutions to cooperate on research and share personnel and expertise. They can also provide university researchers access to funding and advanced facilities in the NNSA laboratories. The report highlights more than 30 such agreements with schools in 18 states.

### 3) Research Programs and Partnerships

In addition to formal institutional partnerships, numerous connections exist between universities and the nuclear weapons complex at the research project level. In a report delivered to Congress in July 2019, the NNSA highlights that more than \$65 million in grants were delivered to academic institutions in the last year to support stockpile stewardship.<sup>8</sup> When including grants and subcontracts from the NNSA labs as well, the total amount of funding to universities for research may be higher than \$150 million per year.

### 4) Workforce Development Programs

Department of Energy Secretary Rick Perry has written that finding “the next generation workforce of world-class scientists, engineers and technicians is a major priority.”<sup>9</sup> Through university partnerships, vocational training programs and research fellowships, the NNSA creates employment pipelines for the development of its future workforce.

A primary goal of this report is to facilitate a shared understanding of university connections to nuclear weapons research and development. A common factual basis will help communities of university faculty, students and administrations engage in robust internal

debates and take action. Universities would not willingly participate today in the production of chemical and biological weapons; for the same humanitarian reasons, no university should seek an association with the other category of weapons of mass destruction: nuclear weapons.

While American universities have played a key role in the development and continuation of nuclear weapons, they can now join U.S. cities and states that have rejected U.S. nuclear weapons and called on the federal government to support nuclear reductions and the Treaty on the Prohibition of Nuclear Weapons. In light of the research presented, this report offers the following recommendations to universities:

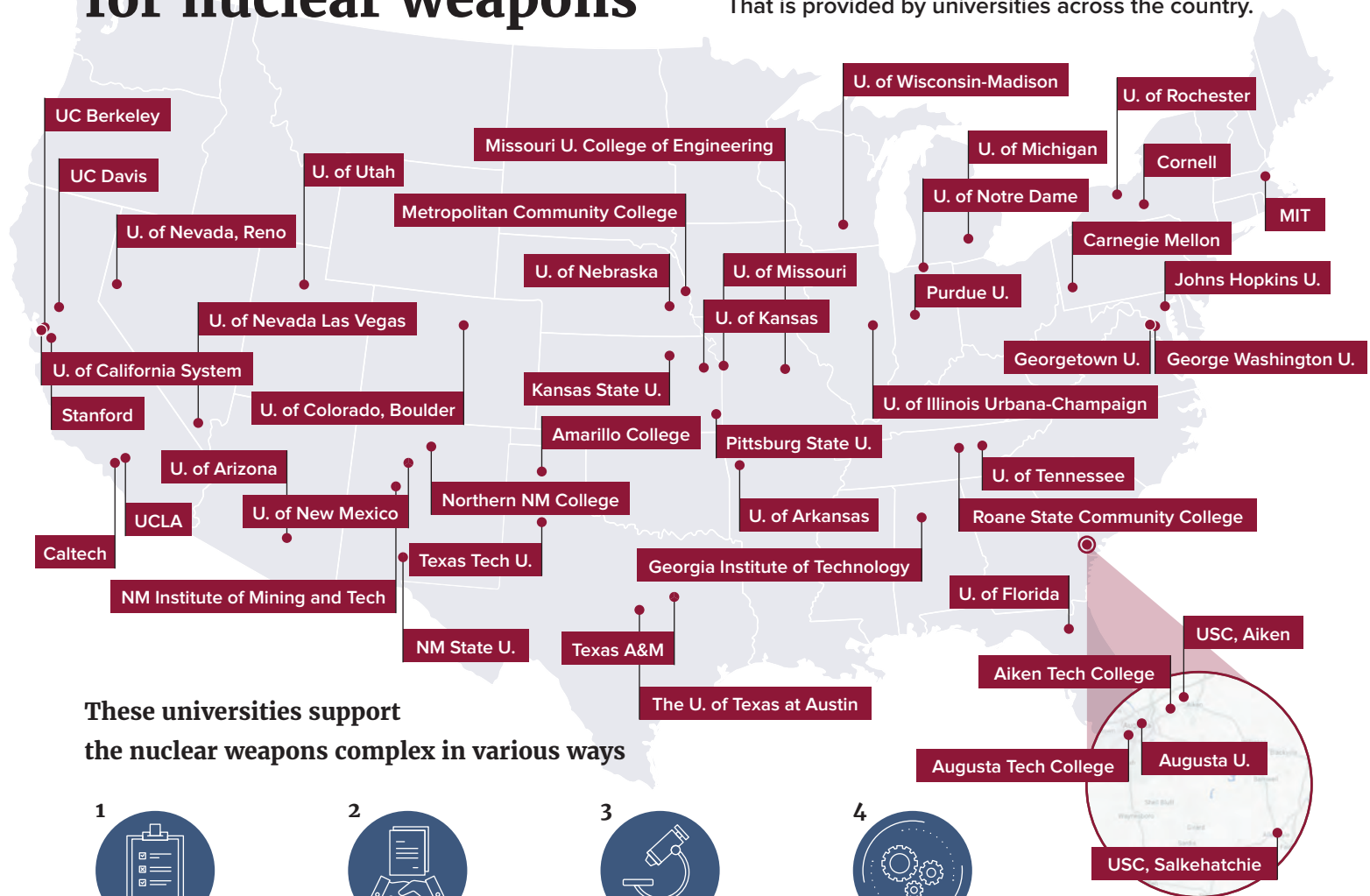
#### Recommendations

- Provide greater transparency into connections with the nuclear weapons complex;
- Stop directly managing nuclear weapons production sites and dissolve research contracts solely related to nuclear weapons production;
- For contracts with dual-purpose research applications, demand greater transparency and create specific processes for ethical review of this research;
- Advocate for reinvestment of weapons activities funding to non-proliferation and environmental remediation efforts; and
- Join cities and state legislatures in urging the federal government to support the 2017 Treaty on the Prohibition of Nuclear Weapons and reverse course on nuclear arms control backsliding.

# US plans to spend \$100,000 per minute over next 10 years for nuclear weapons



In addition to large amounts of funding, enacting nuclear weapons upgrades requires significant amounts of scientific, technical and human capital. That is provided by universities across the country.



These universities support the nuclear weapons complex in various ways



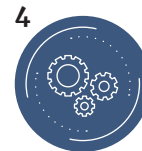
**1**  
Direct Management



**2**  
Institutional Partnerships



**3**  
Research Programs and Partnerships



**4**  
Workforce Development Programs

To move campus communities away from supporting nuclear weapons, the report offers the following recommendations:



**1**  
Transparency



**2**  
Stop Direct Management



**3**  
Ethical Review



**4**  
Reinvestment



**5**  
Support Disarmament Policies

Including the Treaty on the Prohibition of Nuclear Weapons



● DIRECT MANAGEMENT    ● INSTITUTIONAL PARTNERSHIPS    ● RESEARCH PROGRAMS AND PARTNERSHIPS    ● WORKFORCE DEVELOPMENT

○ ○ ○ ● Aiken Technical College	○ ● ○ ○ University of Arkansas
○ ○ ○ ● Amarillo College	● ○ ○ ○ University of California
○ ○ ○ ● Augusta Technical College	○ ● ○ ○ University of California - Berkeley
○ ○ ○ ● Augusta University	○ ● ○ ○ University of California - Davis
○ ● ○ ○ California Institute of Technology	○ ● ○ ○ University of California - Los Angeles
○ ● ○ ○ Carnegie Mellon University	○ ○ ● ○ University of California - San Diego
○ ● ● ○ Cornell University	○ ● ○ ○ University of Colorado - Boulder
○ ○ ● ○ George Washington University	○ ● ● ○ University of Florida
○ ● ○ ○ Georgetown University	○ ● ● ○ University of Illinois at Urbana-Champaign
○ ● ○ ○ Georgia Institute of Technology	○ ● ○ ○ University of Kansas
● ○ ○ ○ Johns Hopkins University	○ ● ● ○ University of Michigan
○ ● ○ ● Kansas State University	○ ● ○ ○ University of Missouri - Kansas City
● ● ○ ● Massachusetts Institute of Technology	● ○ ○ ○ University of Nebraska
○ ○ ○ ● Metropolitan Community College	○ ● ○ ○ University of Nevada - Las Vegas
○ ● ○ ○ Missouri University	○ ○ ○ ● University of Nevada - Reno
○ ● ○ ○ New Mexico Institute of Mining and Technology	○ ● ○ ○ University of New Mexico
○ ● ○ ○ New Mexico State University	○ ○ ● ○ University of Notre Dame
○ ● ○ ● Northern New Mexico College	● ○ ○ ○ University of Rochester
○ ● ○ ○ Pittsburg State University	○ ○ ○ ● University of South Carolina - Aiken
○ ● ○ ○ Purdue University	○ ○ ○ ● University of South Carolina - Salkehatchie
○ ○ ○ ● Roane State Community College	○ ● ○ ○ University of Tennessee
○ ● ● ○ Stanford University	○ ● ● ○ University of Texas at Austin
● ● ● ○ Texas A&M University	○ ○ ● ○ University of Utah
○ ● ○ ○ Texas Tech University	○ ● ○ ○ University of Wisconsin-Madison
○ ● ○ ○ University of Arizona	

# Acronyms

## The following acronyms are found in the report:

CNS: Consolidated Nuclear Security

CTBT: Comprehensive Test Ban Treaty

DoD: Department of Defense

DoE: Department of Energy

FY: Fiscal Year

ICAN: International Campaign to Abolish Nuclear Weapons

LLNL: Lawrence Livermore National Laboratory

MIT: Massachusetts Institute of Technology

MOU: Memorandum of Understanding

MSTS: Mission Support and Test Services

NNSA: National Nuclear Security Administration

NPR: Nuclear Posture Review

PSAAP: Predictive Science Academic Alliance Program

SNL: Sandia National Laboratories

SRNS: Savannah River Nuclear Solutions

UARC: University Affiliated Research Center

UC: University of California

URA: Universities Research Associates

# Introduction

In the United States, the Trump Administration has expanded plans to upgrade the nation's nuclear weapons arsenal.<sup>10</sup> Over the next ten years, the Congressional Budget Office estimates U.S. taxpayers will pay nearly \$500 billion to maintain and modernize its country's nuclear weapons arsenal, or almost \$100,000 per minute.<sup>11</sup>

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In addition to the ever-growing U.S. investment in its nuclear forces, the United States has walked back promises to control its nuclear arsenal and has increased the relevance of nuclear weapons in its military doctrine. The administration withdrew in August 2019 from the Intermediate-Range Nuclear Forces Treaty with Russia, despite its legal obligation under Article VI of the Nuclear Non-Proliferation Treaty to “pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race.”<sup>12</sup>

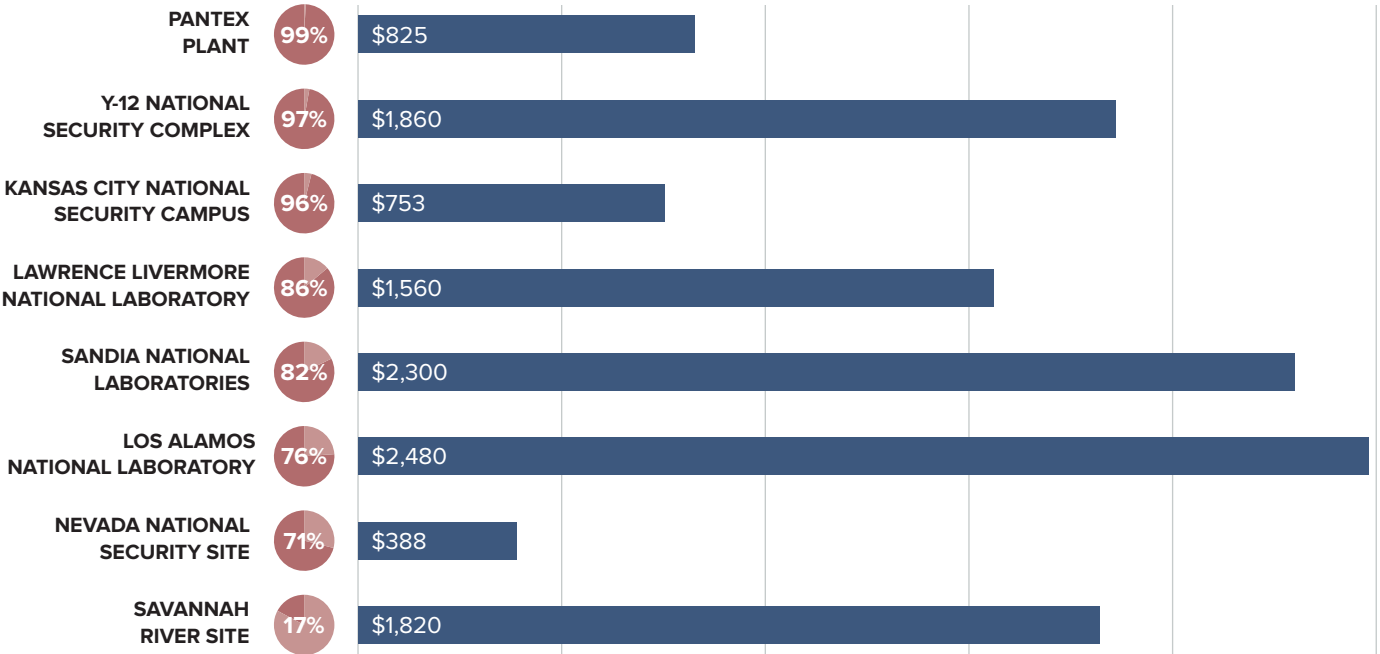
President Trump's 2018 Nuclear Posture Review (NPR) orders the development of additional “low-yield” nuclear weapons systems, directly contradicting this Article VI commitment and drawing opposition from Congress.<sup>13</sup> In

spite of the nation's status as a signatory to the Comprehensive Test Ban Treaty, the Energy Department's 2017 Stockpile Stewardship Management Plan calls for the United States to be prepared to test a nuclear weapon within 6-10 months of being ordered to do so, a dramatic reduction from the previous readiness period of 24-36 months.<sup>14</sup> The NPR also dangerously expands the circumstances under which the United States would use nuclear weapons first.<sup>15</sup> Meanwhile, recognizing the catastrophic risks posed by nuclear weapons, 122 countries adopted the 2017 Treaty on the Prohibition of Nuclear Weapons, which is now two-thirds of the way to entry into force.

NNSA Site Funding, FY 2019<sup>19</sup>

in millions

● DOE FUNDING ● % OF FUNDING FROM NNSA WEAPONS ACTIVITIES APPROPRIATIONS



The Department of Energy’s National Nuclear Security Administration (NNSA) and the Department of Defense (DoD) divide responsibilities for the nation’s nuclear weapons. The NNSA is responsible for the research, development, production and dismantlement of the nuclear warheads themselves, while the DoD manages the development of warhead delivery systems, such as missiles, aircraft, and submarines. The DoD also manages the deployment of nuclear weapons once they are fully produced.<sup>16</sup> Both sides of the nuclear weapons complex partner with universities.

For Fiscal Year 2020, the Trump Administration proposed a budget of \$16.5 billion for the NNSA and \$24.9 billion for DoD nuclear forces.<sup>17</sup> Within the NNSA proposal, three quarters of the proposed budget is dedicated to Weapons Activities, an amount six times the size of the proposed budget for the category Defense Nuclear Non-Proliferation, which supports important non-proliferation detection and verification work.<sup>18</sup>

Nonetheless, the “modernization” of the U.S. nuclear arsenal churns forward. To a large extent, the U.S. government and its contractors have turned to the nation’s universities to provide the scientific, technical and human capital necessary for this work. The nation’s nuclear weapons complex — the collection of laboratories and production sites at which nuclear weapons testing, development and production occurs —

has cultivated formal and informal relationships with universities across the country.


Cooperation between U.S. academia and the national defense industry is not new, but it is increasing. Research and development funding from the Department of Defense to higher education institutions has increased by more than 60% in the past 30 years.<sup>20</sup>

Research and development funding from the Department of Defense to higher education institutions has increased by more than 60% in the past 30 years.

The development of nuclear weapons has its roots in some of the nation's premier academic institutions, but after the second world war this activity concentrated in separate laboratories owned or funded by the government. That has not ended university involvement,

however, which now takes place primarily off-campus away from the eyes of most students. While member states of the United Nations debated, adopted, and have now begun to sign and ratify the 2017 Treaty on the Prohibition of Nuclear Weapons, U.S. universities have continued to build connections to the nuclear weapons complex. These universities are carrying out activities that will soon be banned under international law in other countries.

The report provides a brief historical look at university involvement in nuclear weapons development and production, then outlines the different types of current



**The only two nuclear weapons ever used in warfare killed more than 340,000 people in the Japanese cities of Hiroshima and Nagasaki immediately and in the short-term aftermath.**

Hiroshima after the dropping of the atomic bomb

National Archives and Records Administration



university involvement: Direct Management, Institutional Partnerships, Research Program Partnerships, and Workforce Development Programs.

U.S. universities must reconsider connections to the nuclear weapons complex due to the devastating humanitarian and environmental impacts of nuclear weapons and because current U.S. policies make their use more likely. Nuclear weapons do not discriminate between soldiers and civilians; the only two nuclear weapons ever used in warfare killed more than 340,000 people in the Japanese cities of Hiroshima and Nagasaki immediately and in the short-term aftermath.<sup>21</sup>

The International Committee of the Red Cross concludes that “there is no international plan nor capacity to respond adequately to even a limited use of nuclear weapons” and that their use “would cause a catastrophic and irreparable humanitarian disaster.”<sup>22</sup> With fallout carried by atmospheric winds, the effects of these weapons do not stop at national borders. In fact, a study of a hypothetical regional nuclear war predicts that 100 Hiroshima-sized bombs would result in a worldwide drop in temperature followed by a global famine, putting two billion people at risk of starvation.<sup>23</sup>

Some defend the possession of nuclear weapons through the ideology of deterrence, but deterrence implies an ethically unacceptable threat to use such weapons indiscriminately on civilians. While the world has narrowly avoided further use of nuclear weapons on many occasions in the past, the risk of such use remains and is increasing.

Further, people around the world still suffer lasting negative effects from the era of full-scale nuclear testing. Nuclear-weapon states have tested these weapons more than 2,000 times,<sup>24</sup> leaving long-term

health problems and environmental devastation in their wake. One Centers for Disease Control and Prevention study estimated that the radioactive fallout from nuclear tests would kill an additional 11,000 Americans who lived at any point in the second half of the 20th century due to an increase in fatal cancers.<sup>25</sup> Most nuclear tests occurred on or near land inhabited by indigenous or colonized peoples, from Nevada to the Marshall Islands to Algeria. Women and children are more susceptible to radioactive contamination, although regulatory agencies still base radiation exposure limits on adult male bodies.<sup>26</sup>

This report reviews the nature and breadth of U.S. university involvement in their country’s nuclear weapons complex. The findings are not exhaustive and sometimes reveal more questions than answers. Greater transparency would help communities of students, faculty and alumni determine the extent to which they are complicit in the development of these weapons of mass destruction. The goal of the report is to spark ethical reflection and action about institutional and individual involvement in the nuclear weapons complex. Several specific recommendations are offered at the conclusion of the report.

Appendix A gives an alphabetical listing of universities mentioned in this report, with details of involvement for each university. Appendix B discusses the report’s research methodology and Appendix C provides more background on the U.S. nuclear weapons complex.

The geographical scope of this report is limited to universities in the United States, but its approach could be replicated elsewhere. It follows a similar analysis produced by the Nuclear Information Service and Medact of the United Kingdom’s Atomic Weapons Establishment’s connections to universities in that country.<sup>27</sup>



## Treaty on the Prohibition of Nuclear Weapons Overview

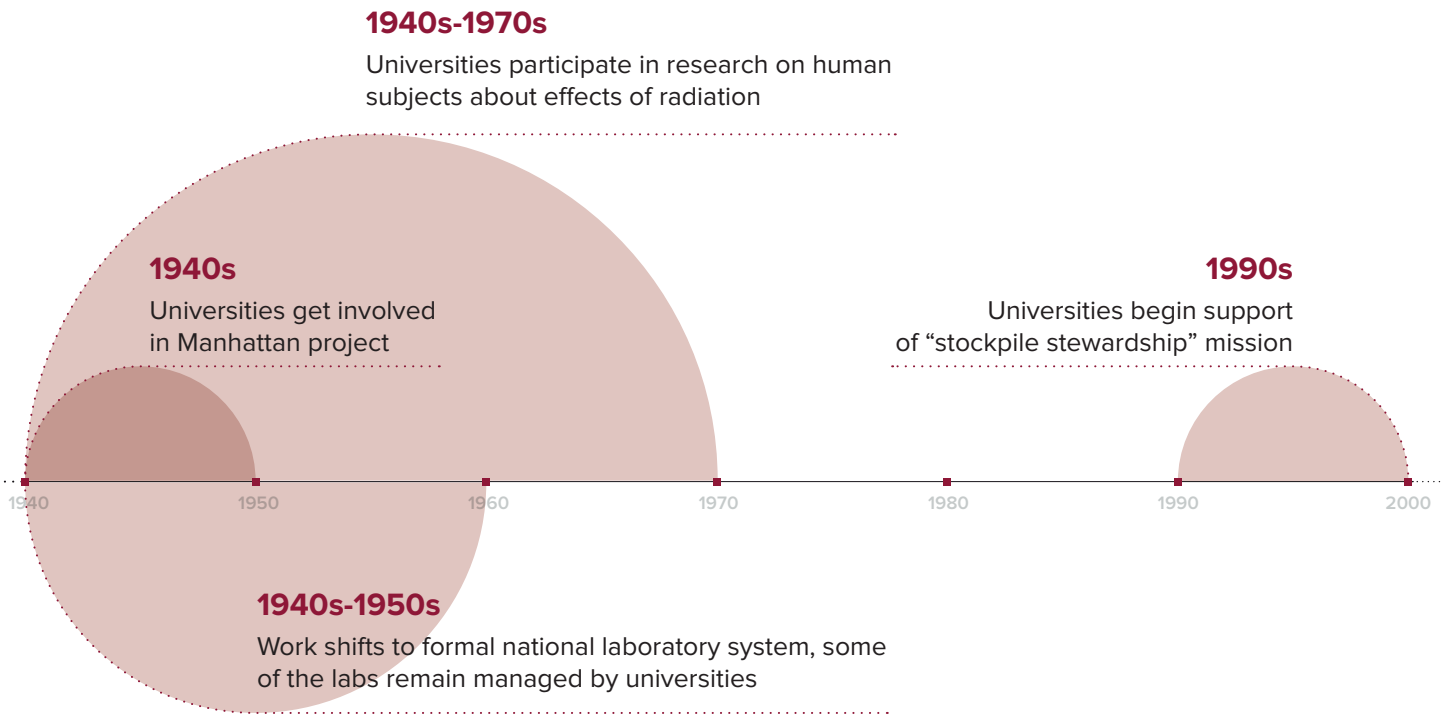
On July 7, 2017 – following a decade of advocacy by international civil society – an overwhelming majority of the world’s nations adopted a landmark global agreement to ban nuclear weapons, known officially as the Treaty on the Prohibition of Nuclear Weapons. Three successive international conferences on the humanitarian impacts of nuclear weapons in 2013 and 2014 laid the groundwork for action on the treaty, which will enter into legal force once 50 nations have signed and ratified it. As of October 31, 2019, 79 nations have signed and 33 nations are now states parties to the treaty.<sup>28</sup>

Prior to the treaty’s adoption, nuclear weapons were the only weapons of mass destruction not subject to a comprehensive ban, despite their catastrophic, widespread and persistent humanitarian and environmental consequences. The new agreement fills a significant gap in international law.

The treaty prohibits nations from developing, testing, producing, manufacturing, transferring, possessing, stockpiling, using or threatening to use nuclear weapons, or allowing nuclear weapons to be stationed on their territory. It also prohibits them from assisting, encouraging or inducing anyone to engage in any of these activities.<sup>29</sup>

The state legislatures of California, New Jersey and Oregon have urged the federal government to pursue policies of de-escalation and disarmament and sign the treaty; cities such as Anchorage, Baltimore, Berkeley, Los Angeles, Philadelphia, Salt Lake City and Washington, D.C. have done the same.<sup>30</sup> Universities can similarly add their voice in support of the treaty and a nuclear-weapon-free world.

# Historical University Involvement in the Nuclear Weapons Complex



## Facilitation...

Universities have played a role in the development of nuclear weapons from their inception. During World War II, the United States established the Manhattan Project to develop a nuclear weapon; academic research programs were critical to the scientific developments behind this program. Scientific support for the Manhattan Project came from the University of Chicago, the University of California — Berkeley, Princeton University, Harvard University, Caltech, the Massachusetts Institute of Technology, Purdue University, the University of Rochester, and Iowa State University.<sup>31</sup>

After the war ended and the Cold War began, scientists pushed for nuclear weapons to move from military to civilian control, resulting in the creation of the Atomic Energy Commission. Worried about the implications of nuclear weapons, many scientists from the University of Chicago led this push for civilian control, creating the Bulletin of the Atomic Scientists.<sup>32</sup>

The Atomic Energy Commission created the national laboratory system to continue scientific developments in nuclear physics, moving projects away from many of the universities originally involved.<sup>33</sup> Some sites began to focus more on the civilian use of nuclear energy. For example, the University of Chicago’s work moved off-campus into the new Argonne National Laboratory, which was directed by the Commission to focus on peaceful nuclear energy applications.<sup>34</sup>



**Los Alamos National Laboratory**

Source: National Nuclear Security Administration

Yet while some of the national laboratories shifted away from weapons work, two national laboratories, Los Alamos National Laboratory in New Mexico and Lawrence Livermore National Laboratory in California, remained focused on them. These two laboratories have been managed by the University of California since their creation.<sup>35</sup>

Several universities — the University of Chicago, the University of California — San Francisco, the Massachusetts Institute of Technology, the University of Rochester, the University of Washington and Columbia University — also participated in numerous unethical studies about the effects of radiation on human subjects from the 1940s through the 1970s.<sup>36</sup> While these studies have ended, some of these schools still contribute to other parts of the nuclear weapons complex.

Following the fall of the Soviet Union and the end of the Cold War, President George H.W. Bush declared a unilateral end to full-scale nuclear tests in 1992. In 1996 the United States signed the Comprehensive Test

Ban Treaty (CTBT); while the Senate has not yet ratified the agreement, subsequent presidential administrations continue to adhere to it.<sup>37</sup> However, the CTBT does not prohibit non-explosive testing or nuclear weapons research and development. In exchange for supporting the administration's position on the treaty, the national weapons laboratories received generous funding to embark on a new program of "stockpile stewardship."<sup>38</sup> Through enhanced simulations, the program was designed to enable the reliability of nuclear weapons in the absence of full-scale weapons tests. University partnerships have played a role in this stewardship science from its beginning.<sup>39</sup>

Stockpile stewardship science is perceived differently by different actors — as a necessary element of the nation's nuclear deterrent capability, as an insidious way to undermine the CTBT, as an uncertain scientific enterprise<sup>40</sup> — but it is the dominant paradigm through which nuclear weapons development and testing currently takes place. The university involvement detailed in this report occurs within this environment.

## ... and Opposition

While academia has frequently furthered the nuclear weapons complex of the United States, communities of scientists and later students have also questioned the use of nuclear weapons since before the bombs were dropped on the cities of Hiroshima and Nagasaki.<sup>41</sup> It is beyond the scope of this report to provide extensive documentation of this opposition, but two examples of protest directed at university involvement in weapons development are provided below.

In 1969, students and faculty at the Massachusetts Institute of Technology (MIT) protested the growing contractual ties between the university's research and the military. At the time, MIT received more money for military research than any other university in the country.<sup>42</sup> Since the 1950s, the school's Instrumentation Laboratory, now known as the Draper Laboratory, had been involved in the development of intercontinental ballistic missiles.<sup>43</sup>

Protestors focused their energy on the Instrumentation Laboratory. Some students demanded "conversion" of the lab's research activities to more peaceful applications; instead, the administration chose a path of divestment, which would allow its research activities to continue with less interference from student activists. In 1970, the Laboratory was designated an independent division of MIT and subsequently became fully independent a few years later.<sup>44</sup> The Draper Laboratory continues to perform significant defense-related research, including ongoing work on nuclear weapons systems.<sup>45</sup>

The University of California arguably has the

longest-standing and highest profile connection to the nuclear weapons complex of any university. While the UC administration has continued to pursue such connections, it has done so at points without the support of many of its constituent faculty and students. In 1970, student protests caused university officials to consider whether to maintain its ties to the weapons labs it managed, ultimately deciding to do so.<sup>46</sup> When the federal government decided to competitively bid the contract for the management of Los Alamos National Laboratory in 2005, students protested against UC involvement again.<sup>47</sup> When the Lawrence Livermore National Laboratory contract was awarded to the UC system and its partners in 2007, students embarked on a hunger strike.<sup>48</sup>

UC faculty have also voiced concerns about the system's direct connection to the nuclear weapons laboratories over the years. In 1989, a UC Academic Senate Committee found this connection and the classified work at the labs to be "contrary to the fundamental nature of the university." In a 1990 vote across all the UC campuses, 64% of faculty voted to end the relationship with the labs. In 1991, the UC Academic Senate voted 50 to two for the same.<sup>49</sup>

In 2004, when the management of the labs was again an open question, another poll of the faculty was taken. This time, 67% of the faculty preferred to keep the university connection with the labs, with one significant caveat. Only 25% of faculty felt that the production of plutonium pits, a key ingredient for nuclear warheads, was "an appropriate activity" for the lab.<sup>50</sup> In 2008, after the university had been awarded the new management contracts, the UC Academic Senate endorsed a formal statement about plutonium pits:

**In 2004, only 25% of University of California faculty felt that the production of plutonium pits, a key ingredient for nuclear warheads, was "an appropriate activity" for the lab.**



Should any National Laboratory managed by UC directly or through a lab management partnership begin either to produce or to manage the production of plutonium pits for any purpose beyond current low levels, or for the purpose of nuclear warhead replacement or production, UC should reassess its participation in the management of that Laboratory.<sup>51</sup>

Current proposals by the National Nuclear Security Administration call for renewed investments at the Los Alamos lab to support the expanded production of plutonium pits.<sup>52</sup>

**Only 25%** of UC faculty consider production of plutonium pits an appropriate activity for Los Alamos

UC Academic Senate resolution calls for reassessment of UC relationship with labs if plutonium pit production is expanded

University of California continues as lab manager after competing for and winning new contract

Trump administration calls for expanding pit production at Los Alamos

2004 2005 2006 2007 **2008** 2009 2010 2011 2012 2013 2014 2015 2016 2017 **2018**

# University Involvement

Across the United States, colleges and universities participate in the research, development, production and evaluation of the country's nuclear weapons. Some of this involvement is direct and unabashed; a number of universities are proud to support what they consider national security interests and the nation's nuclear weapons capabilities. Other involvement is far less direct, such as the performance of basic research with multiple potential applications, one of which may be useful to the government's nuclear weapons scientists.

A few institutions receive multi-million and even billion dollar contracts from the government to participate in the nuclear weapons complex. Many more academics receive millions of dollars in grants from the nuclear weapons complex within the Department of Energy and the Department of Defense. These academics partner actively with scientists in the government-owned, contractor-operated national laboratories, often on projects seemingly unrelated to nuclear weapons. Given the federal government's dominant role in funding scientific research, universities face difficult choices and must give serious ethical consideration to their participation, and its potential implications, in the nuclear weapons complex. Many potential positive collaborations could be formed in areas such as non-proliferation, nuclear disarmament verification and environmental remediation, but funding for weapons activities is prioritized over these areas.

Even when partnerships with National Nuclear Security Administration labs concern areas of sciences that appear distant from nuclear weapons research, university communities should create space to fully reflect on the ethical dimensions of such partnership for the following reasons.

First, the primary mission of these laboratories, and the majority of their funding, remains nuclear weapons development, modernization and maintenance (through stockpile stewardship programs), even though they may advertise



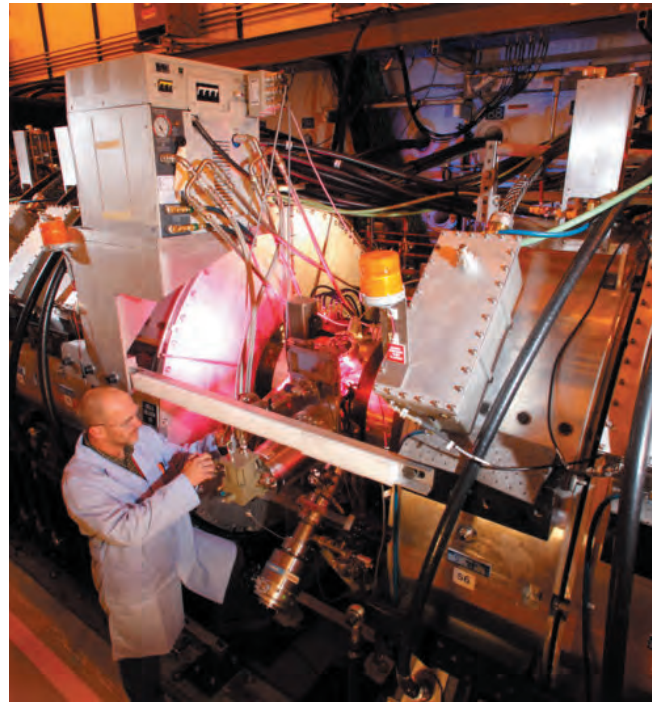
significant scientific advances in other areas.<sup>53</sup> Second, the NNSA funds basic unclassified research with the explicit goal of supporting its stockpile stewardship programs; a certain line of research may have multiple applications, but the NNSA is primarily interested in one strand of them. Third, connections to universities and a diverse scientific program provide valuable recruiting pipelines for the laboratory workforce; even if individuals start work in areas separate from nuclear weapons, laboratory executives see these employees as potential recruits for the lab's nuclear weapons work.<sup>54</sup> Finally, links to well-regarded universities bring academic credibility to the laboratories, which is leveraged to attract employees and secure funding from Congress.

This section divides university participation in the nuclear weapons complex into four categories: Direct Management, Institutional Partnerships, Research Programs and Partnerships and Workforce Development Programs. The following pages provide more details about each of these categories.

Ultimately, this report raises fundamental questions for both institutions and individuals, questions that must lead to discussion and action. When the devastating humanitarian and environmental consequences of nuclear weapons are clear, should universities train students to become the next generation of weapons scientists?

At the individual level, the report raises questions about the ethical implications of conducting research connected to the nuclear weapons establishment. How much responsibility should scientists hold when others apply their discoveries to weapons of mass destruction? How should students consider internship or employment opportunities at nuclear weapons facilities? What ethical frameworks should be used in these situations?

#### A test facility used for stockpile stewardship science

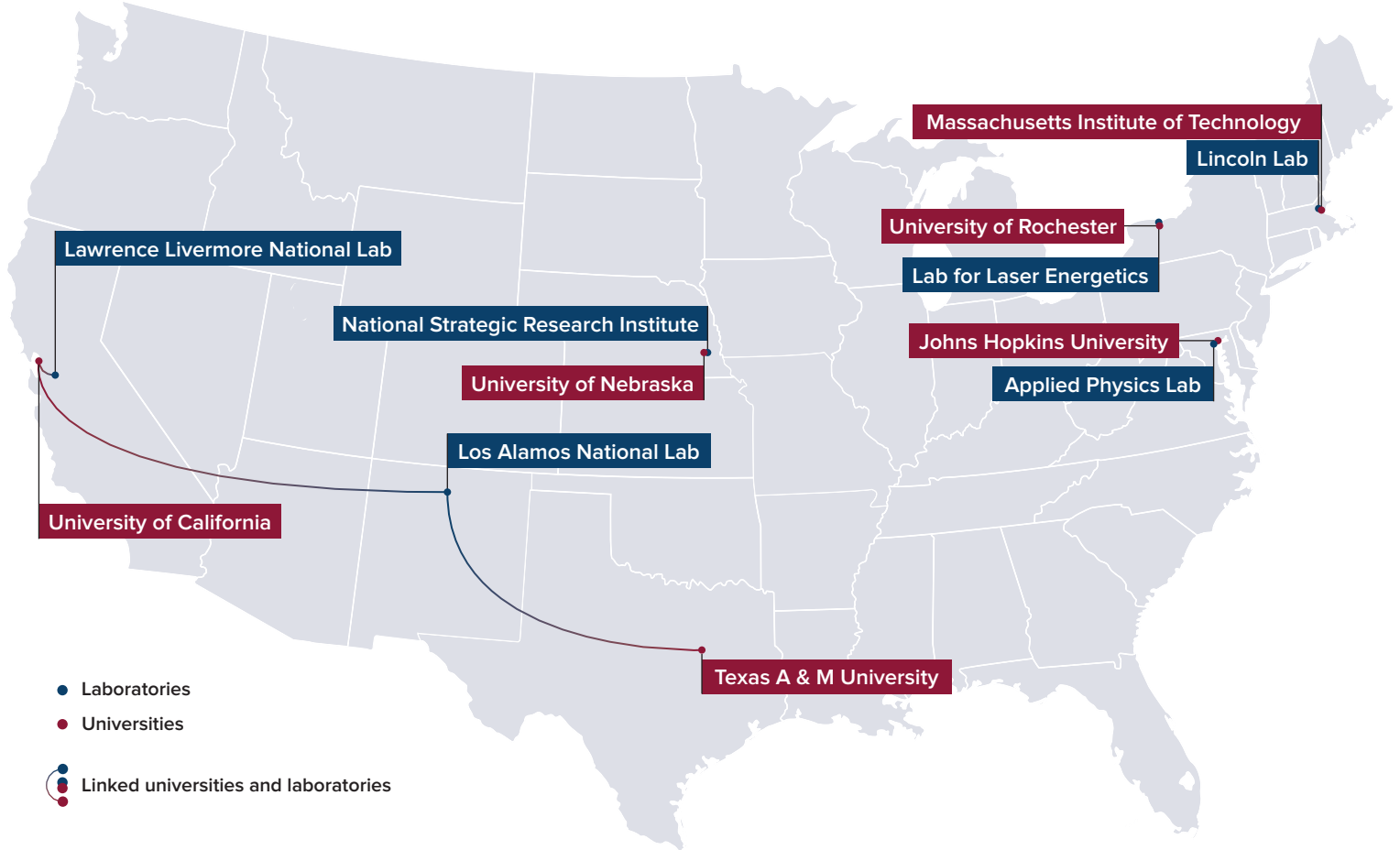


Source: Los Alamos National Laboratory

A primary goal of this report is to facilitate a shared understanding of university connections to nuclear weapons research and development. A common factual basis will help communities of university faculty, students and administrations engage in robust internal debates and take action.



## Category 1: Direct Management

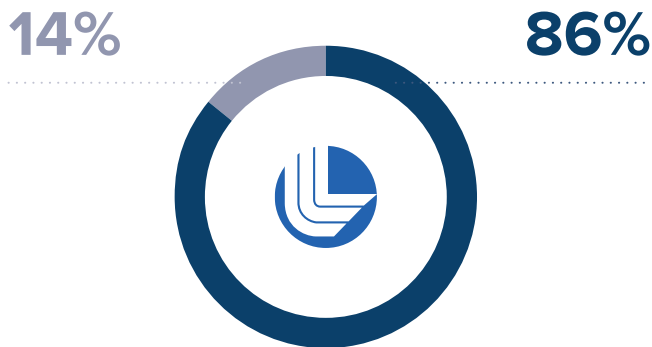


A handful of universities directly manage nuclear weapons-related activities on behalf of the federal government. Collectively, these contracts are worth billions of dollars every year, although it is unclear in some cases how much funding actually trickles back to support other functions of the university.

### University of California and Texas A&M University: *Los Alamos and Lawrence Livermore National Laboratories*

Two of the three primary laboratories in the National Nuclear Security Administration's (NNSA) nuclear weapons complex, Los Alamos National Laboratory and Lawrence Livermore National Laboratory, are managed by legal partnerships that include universities. Most prominently, the University of California has

been involved in each of these labs since their inception and was the sole institutional manager of each until the 2000s. At that time, the federal government decided to ask for competitive bids to manage each contract due to heightened concerns about mismanagement.<sup>55</sup>

**Lawrence Livermore National Laboratory**

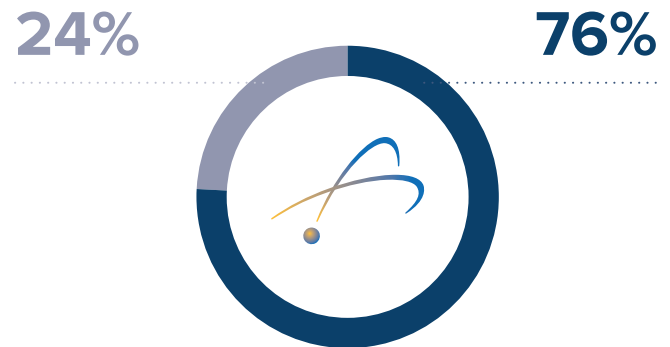
● DOE FUNDING FROM WEAPONS ACTIVITIES APPROPRIATIONS

● NON-WEAPONS DOE ACTIVITIES

In 2006, the Los Alamos National Laboratory contract was awarded to Los Alamos National Security, LLC, which included the University of California and private companies Bechtel, Babcock & Wilcox, and URS Corporation.<sup>56</sup> Due to continued concerns about safety and performance issues, another round of bidding led to a new contract to be issued to Triad, LLC in 2018.<sup>57</sup> This contract runs for five years with five additional one-year options.<sup>58</sup> Triad, LLC consists of the University of California Regents, the Texas A&M University System and Battelle Memorial Institute.

The Lab provides design and engineering for several nuclear warhead types, conducts simulated experiments to evaluate warheads, and has the capacity to produce plutonium pits, the core material for nuclear warheads.<sup>59</sup>

The fixed fee awarded to Triad for executing the contract is about \$20 million per year, with an additional \$25-30 million available through award fees should it meet certain performance benchmarks.<sup>60</sup> This is the money Triad receives above the costs of operating the facility. The University of California estimated that it would receive \$8.9 million in net fee revenue from Triad for FY2019, which it plans to reinvest in lab oversight functions and

**Los Alamos National Laboratory**

funding for research partnerships between UC campuses and the labs.<sup>61</sup> Officials at Texas A&M reported that its fee information is considered proprietary.<sup>62</sup>

In 2007, the management of Lawrence Livermore National Laboratory was awarded to a University of

**Casting a plutonium pit**

Source: Los Alamos National Laboratory

California-led LLC called Lawrence Livermore National Security, LLC.<sup>63</sup> The partners in this LLC are the University of California, Bechtel National, BWX Technologies, and AECOM.<sup>64</sup> The current contract runs through September 30, 2023.<sup>65</sup> Prior to 2007, the University of California had managed the Laboratory since its inception.<sup>66</sup>

Similar to the Los Alamos lab, the Lawrence Livermore lab provides design and engineering for several nuclear warhead types and conducts simulated experiments to evaluate warheads.<sup>67</sup>

Shortly after the 2007 contract was awarded, the LLC announced an additional affiliation with Texas A&M University, noting that the university's proposed role would be "to operate an institute at LLNL dedicated to national security education and research."<sup>68</sup> When asked about its current role at the laboratory, Texas A&M officials said its system "provides graduate and executive level training to Lawrence Livermore staff related to the safeguarding of nuclear materials, the reduction of nuclear threats and nonproliferation."<sup>69</sup>

The management organization is scheduled to receive a fixed fee of nearly \$13 million in FY2019, with performance incentive fees of up to \$30 million also available.<sup>70</sup> It is unclear exactly how the partners in the LLC divide the fees. The University of California estimated that it would receive \$13.6 million in net fee revenue from this lab for FY2019, which it would reinvest in lab oversight functions and funding for research partnerships between UC campuses and the labs.<sup>71</sup>

The University of California and the Texas A&M University System have cited several reasons for their participation as managers of nuclear weapons facilities. Texas A&M views its participation as a

national service; an administration official stated in 2018 that "[n]uclear safety and security are paramount to our national defense."<sup>72</sup> Historically, the University of California has also seen its management of the labs as a national service. This notion was challenged when the NNSA put the contracts out to bid in 2003. At this stage, university administration debated whether to submit a bid, wondering whether participation in a competitive process could lead to a decline in scientific integrity or academic standards.<sup>73</sup> In the end, the administration continued its participation; a recurring argument in favor of UC management is that it is more appropriate for the labs to be managed by a public university than a private for-profit institution.<sup>74</sup> Those who oppose university involvement have countered that doing so provides valuable academic legitimacy in support of the labs and their nuclear weapons functions.<sup>75</sup>

In many ways, the labs are seen as part of the UC system; the dependents of laboratory employees at Los Alamos, for example, can receive in-state tuition rates for UC schools.<sup>76</sup> After commenting that questions are frequently raised about how management of NNSA labs relates to the UC's mission, a July 2018 report to the UC Board of Regents summarizes this debate from the university's point of view:

Thus, while there are numerous benefits to UC from its many cooperative unclassified research programs with the NNSA Laboratories, it is the service-to-the-nation aspect of the University's role that provides the most compelling argument for maintaining UC's connection to these Laboratories.<sup>77</sup>

While the University of California and Texas A&M University are the only two systems that currently



manage NNSA labs in the nuclear weapons complex, other schools have competed for the opportunity to do so. Purdue and the University of Texas participated in separate bids for the management of Los Alamos in the process won by Triad.<sup>78</sup> When a new contract for management of Sandia National Laboratories was up for bid in 2016, multiple universities participated in

bids. One consortium included Boeing, Battelle, the University of New Mexico, the University of Texas, and the Texas A&M University System; another included Lockheed Martin, Purdue University, New Mexico Tech, and New Mexico State University.<sup>79</sup> Ultimately, management was awarded to an affiliate of Honeywell International in 2017.<sup>80</sup>

### **Johns Hopkins University:** *Johns Hopkins University Applied Physics Laboratory*

The Department of Defense (DoD) has established long-term relationships with a number of university laboratories grouped into a category called University Affiliated Research Centers (UARCs).<sup>81</sup> Due to the opaque nature of military contracts, it is difficult to determine how many of the universities with DoD contracts are directly connected to nuclear weapons development.

One UARC that participates directly in nuclear weapons development is the Johns Hopkins University Applied Physics Laboratory, a division of Johns Hopkins University. Started in 1942, the Applied Physics Laboratory takes up 453 acres in its off-campus location.<sup>82</sup> Its stated goal is “to create defining innovations that ensure our nation’s preeminence in the 21st century.”<sup>83</sup> This stands in contrast to the mission of the university overall:

to educate its students and cultivate their capacity for lifelong learning, to foster independent and original research, and to bring the benefits of discovery to the world.<sup>84</sup>

Due in large part to the laboratory, Johns Hopkins University received \$828 million in research and development grants from DoD in FY2017, more than

twice as much as any other American university.<sup>85</sup> It has been the site of repeated protests in previous decades.<sup>86</sup> For example, in 1995 a Catholic nun and peace activist served a 30-day jail sentence for refusing to stop passing out leaflets on the lab’s campus when asked to leave.<sup>87</sup>

The Applied Physics Laboratory received a renewed 7-year contract in 2017 for up to \$92 million “for continuing the Air Force Nuclear Weapons Center’s (AFNWC) strategic partnership.”<sup>88</sup> This is only one piece of the lab’s work; in 2019, the funding ceiling for its ongoing multi-year contract with the Department of Defense was extended beyond \$7 billion.<sup>89</sup>

**Sister Ardeth Platte**



Source: The International Campaign to Abolish Nuclear Weapons

**The work of the Applied Physics Lab does not align with the mission of Johns Hopkins which is “to educate its students and cultivate their capacity for lifelong learning, to foster independent and original research, and to bring the benefits of discovery to the world.”**

Johns Hopkins' classified research policy creates a distinction between the laboratory and the rest of campus. While classified research is generally not

allowed, the policy explicitly exempts the Applied Physics Laboratory as the only "non-academic division."<sup>90</sup>

### **Massachusetts Institute of Technology: *Lincoln Laboratory***

Similar to the Department of Energy's national laboratories, the Department of Defense also funds two government-owned, contractor-operated laboratories. One of those is the Lincoln Laboratory, operated by the Massachusetts Institute of Technology.<sup>91</sup>

The Lincoln Laboratory produces an enormous volume of research for the Department of Defense. In 2019, it received a contract modification that brought its total multi-year contract face value to \$9.6 billion. This contract involves "advanced technology research and development activities that focus on long-term technology development as well as rapid system prototyping and demonstration." The Air Force Life Cycle Management Center is the contracting agency.

References to nuclear weapons development are hard to find on the laboratory's website, but one profile of a highlighted engineer notes her work on command and control terminals that "underpin the highly assured SATCOM system for the nation's nuclear weapon forces."<sup>92</sup> A 2018 statement to Congress from Department of Energy Secretary Rick Perry also noted the department's intention to initiate at Lincoln a new line of production of radiation-hardened microelectronics necessary for maintenance of the nuclear stockpile.<sup>93</sup> The NNSA's FY2020 Stockpile Stewardship Management Plan notes that the NNSA is "engaging" with the Lincoln Laboratory in this regard.<sup>94</sup>

The Lincoln Lab has been closely involved in work on ballistic missile defense systems, which many experts

have argued decrease strategic stability and lead to further nuclear weapons development.<sup>95</sup> The lab maintains a staff presence at the Reagan Test Site in the Marshall Islands, which is a facility responsible for tests of both ballistic missiles and missile defense systems.<sup>96</sup>

MIT also maintains some connections with the Draper Laboratory, a lab that used to be part of the university but became independent in the 1970s in response to student protests.<sup>97</sup> The Draper Laboratory is currently fulfilling a \$370 million contract for nuclear missile guidance systems.<sup>98</sup> MIT students are eligible to become fellows at Draper and the immediate past president of MIT sits on Draper Laboratory's Board of Directors.<sup>99</sup>

Similar to Johns Hopkins University, MIT's classified research policy creates two standards. The policy states, "the profound merits of a policy of open research and free interchange of information among scholars is essential to MIT's institutional responsibility and to the interests of the nation as a whole." Any limited exceptions to this policy in the national interest must be approved by the Provost, except if they take place at Lincoln Laboratory, which receives a blanket exemption from the policy.<sup>100</sup>



### **University of Rochester:** *Laboratory for Laser Energetics*

The University of Rochester hosts the Laboratory for Laser Energetics. While not a national laboratory, it nonetheless receives substantial funding from the Weapons Activities Appropriation in the NNSA, \$80 million in FY2019 and an estimated \$409.9 million for FY2019-2023.<sup>101</sup> The lab hosts the OMEGA Laser Facility and, according to the lab's director, the lab's primary mission is to support the NNSA and the nation's nuclear weapons capabilities.<sup>102</sup> Its funding supports the laboratory facilities and staff as well as a number of fellowships for graduate students at other universities. Laboratory employees only conduct basic, unclassified research at the lab; on rare occasions, the facility will close to allow national laboratory researchers to conduct classified research.<sup>103</sup>

Early in 2018, the Trump Administration proposed major cuts to the laboratory for FY2019 and eliminating all funding over three years time. A lobbying campaign

### **University of Nebraska:** *National Strategic Research Institute*

Another UARC that may have nuclear weapons connections is the University of Nebraska's National Strategic Research Institute, which received a five-year, \$92 million contract renewal in 2018.<sup>106</sup> It is affiliated with the U.S. Strategic Command, which has "assigned responsibilities [that] include strategic deterrence; nuclear operations; space operations; joint electronic spectrum operations; global strike; missile defense;

### **Laboratory for Laser Energetics at the University of Rochester**



Source: Daniel Penfield

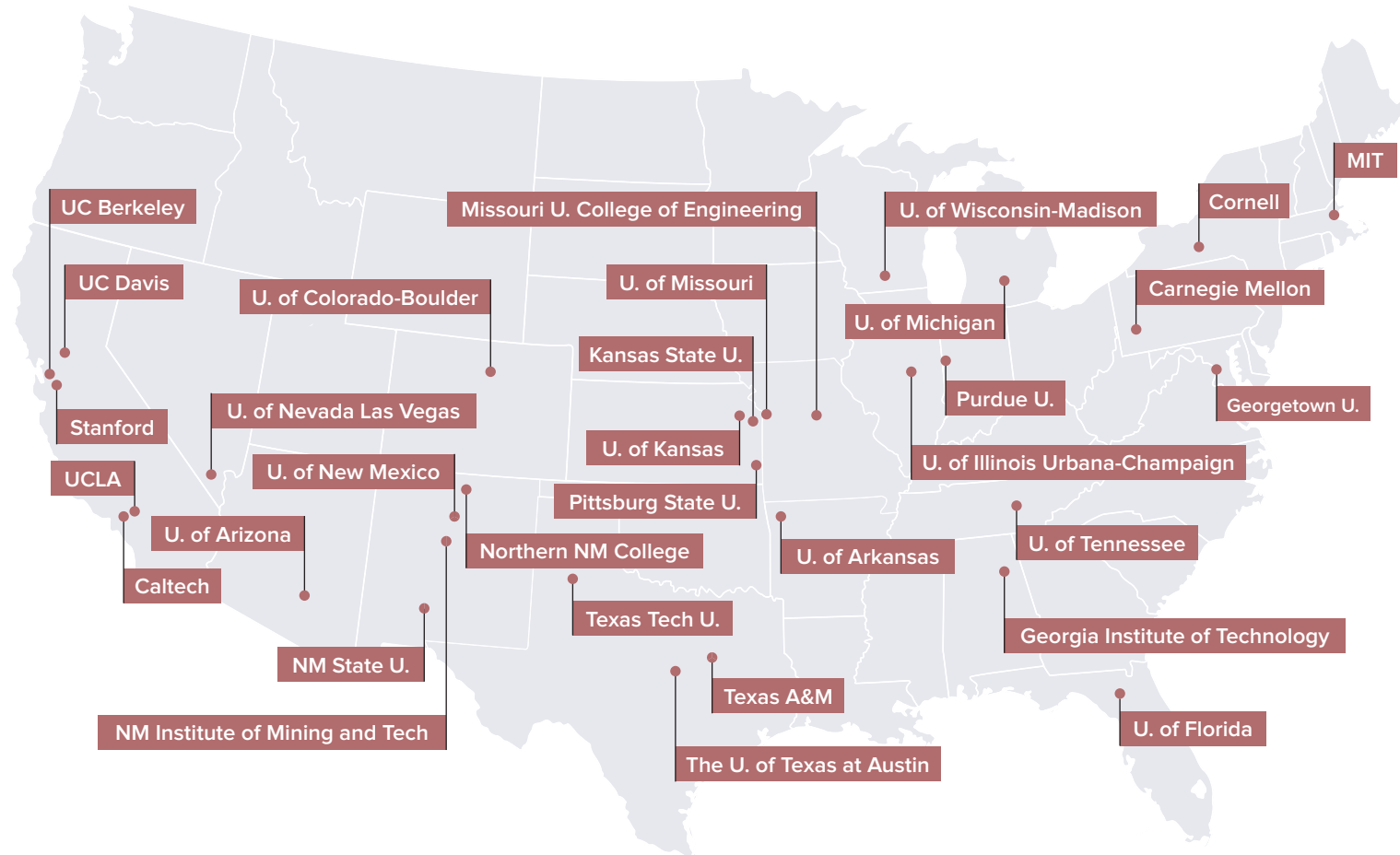
led by New York's Congressional delegation successfully reversed the proposal and increased funding to the laboratory. In addition to highlighting the jobs at the lab, both Senators Chuck Schumer and Kirsten Gillibrand noted its importance to national security.<sup>104</sup>

The president of the University of Rochester claimed it was the "largest university-based U.S. Department of Energy program in the U.S."<sup>105</sup>

and analysis and targeting."<sup>107</sup> However, the five research focus areas listed for the institute emphasize detection and defense from weapons of mass destruction, not nuclear weapons capabilities.<sup>108</sup> University of Nebraska administration did not respond to requests for clarification about the Institute's connection to U.S. nuclear weapons capabilities.



## Category 2: Institutional Partnerships



A second layer of connection between nuclear weapons facilities and universities exists at the level of institutional agreements. Many of the NNSA's sites advertise collaborative agreements with local and national universities. These formal agreements allow the institutions to cooperate on research and share personnel and expertise. They can also provide university researchers access to funding and advanced facilities in the NNSA laboratories. In some cases, they offer learning opportunities and employment avenues for students.

It should be noted that many of the agreements with NNSA labs cover areas of scientific discovery distinct from nuclear weapons. The three national laboratories detailed in this report receive funding from sources beyond the NNSA, including the Department of Energy's Office of Science. While the NNSA is the lead agency for these three laboratories, the Office of Science is the lead agency for ten other laboratories and provides some level of research funding in all of the DoE's laboratories.<sup>109</sup>

The additional funding sources and the wide range of scientific inquiry performed at the national laboratories make it difficult to determine when certain partnerships facilitate nuclear weapons design versus when they advance scientific knowledge in other arenas. Staff in some areas at the national laboratories and partnering research institutions make

valuable contributions that improve the health and well-being of society and the environment. At the same time, for the reasons noted in the introduction of this section, university communities should fully reflect on the ethical dimensions of partnership with any of these three labs.

Partnerships with the NNSA production facilities, however, are less ambiguous in nature. The purpose of these facilities is the production and maintenance of nuclear weapons; university partnerships with these facilities can be reasonably interpreted as direct support of nuclear weapons.

What follows is a brief overview of the high-level partnerships between NNSA sites in the nuclear weapons complex and universities, organized by site.

### **Sandia National Laboratories**

The Sandia National Laboratories are a collection of labs operated as one entity. The primary campuses are located in Albuquerque, NM and Livermore, CA. For almost 25 years, Sandia was operated by Lockheed Martin. Then in 2016, the NNSA awarded the management and operation contract to National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc.<sup>110</sup> The current contract runs through 2022.<sup>111</sup>

The work at Sandia National Laboratories focuses on the non-nuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety, reliability and lethality of nuclear weapons.<sup>112</sup>

Sandia has established formal partnerships with a large number of universities at two primary levels. In

#### **Testing a nuclear bomb at Sandia National Laboratories**



Source: Sandia National Laboratories

2016, it created the designation of “Academic Alliance” universities to highlight its closest partnering schools.<sup>113</sup> These institutions are Georgia Tech, Purdue University, University of Illinois Urbana-Champaign, University of New Mexico, and The University of Texas at Austin. None of these schools have made public their formal agreements with Sandia.

These partnerships help Sandia “identify promising candidates at top universities before graduation and promote joint technology development research between graduate students and SNL researchers, pursuing topics with national security applications.”<sup>114</sup> Universities consider it advantageous to participate in

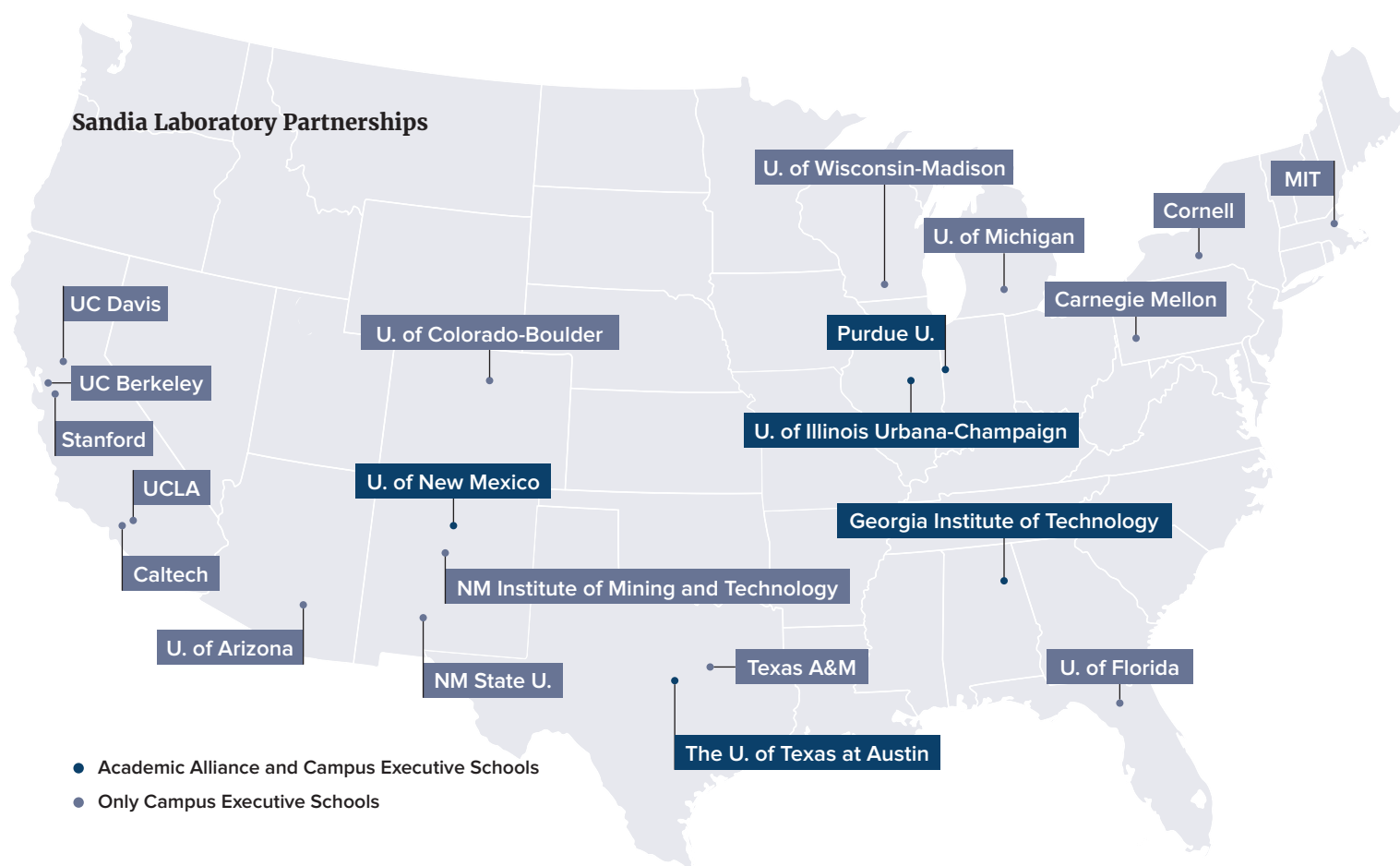
issues deemed of national significance; engage in research projects and partnerships that often come with funding; and create career opportunities for students.<sup>115</sup> The agreement between Sandia and the University of Illinois, acquired through a Freedom of Information Act request, notes how the two entities “will have visible and substantive presences on each others’ campuses. This includes offices, shared staff, sabbaticals, and programmatic integration of researchers, faculty and students.”<sup>116</sup>

In a June 2017 Performance Evaluation Report of Sandia’s contractor, the NNSA evaluator concluded, “Sandia’s Technology Partnerships Program was improved with the implementation of the Academic Alliance program, generating increased cooperative research and development opportunities that attract new personnel with critical skills that sustain and enhance capabilities.”<sup>117</sup>

Sandia also has a longer-standing collaborative venture with “Campus Executive” universities. This program, started in 1997, aims to build deeper relational connections with universities.<sup>118</sup>

The current list of Campus Executive universities includes the five Academic Alliance schools and sixteen others: Caltech, Carnegie Mellon, Cornell, MIT, New Mexico State University, New Mexico Institute of Mining and Technology, Stanford, Texas A&M University, University of Arizona, University of CA-Berkeley, University of CA-Davis, UCLA, University of Colorado-Boulder, University of Florida, University of Michigan, University of Wisconsin-Madison.<sup>119</sup>

A 2016 memorandum of understanding between Sandia and the University of Florida highlights the objectives of each party in such an agreement. The agreement notes that each side wants to benefit from



the capabilities of the other, partner in research and create job opportunities for students.<sup>120</sup>

In FY2018, Sandia invested \$18.7 million in research at Campus Executive and Academic Alliance universities.<sup>121</sup>

In addition to the Academic Alliance and Campus Executive programs, Sandia also has an institutional connection with Universities Research Association (URA), a consortium of more than 90 universities, which is listed as a subcontractor to the main lab operator.<sup>122</sup> It is unclear what services URA provides, but the URA Executive Director sits on the Board of Managers for the primary contractor.<sup>123</sup> On its IRS Form 990 for the latest year available, FY2017, URA lists Sandia as its largest program in terms of expenses, which totaled \$527,423 that year.<sup>124</sup>

## Los Alamos National Laboratory

In 2006 Los Alamos National Laboratory helped form the New Mexico Consortium, which is a non-profit institution that connected the lab with three university partners, the University of New Mexico, New Mexico State University and the New Mexico Institute of Mining and Technology. The Consortium works to foster research collaborations and economic development opportunities in a variety of scientific areas.<sup>125</sup>

In addition, the managing contractor for Los Alamos, Triad, recently signed a five-year institutional agreement with the University of New Mexico that allows reciprocal access to the lab and university settings for researchers in both institutions.<sup>126</sup> In response to questions about its connections to Los Alamos and Sandia, university administration noted that the high-level agreements make collaborations between faculty and lab staff easier to facilitate.<sup>127</sup>

Triad also signed a five-year agreement with Northern New Mexico College in 2019 to form an associate's degree program in Radiation Protection.<sup>128</sup> While declining to share details about the agreement, Northern New Mexico College staff noted the career opportunities that the program will provide to students and the program's support of the laboratory's national security mission.<sup>129</sup>

## Lawrence Livermore National Laboratory

Limited information exists about institutional agreements between Lawrence Livermore National Laboratory and universities. The laboratory's website states,

Academic collaborations play a vital role in keeping LLNL at the leading edge of innovation... We focus on research areas that lie at the intersection between emerging frontiers and the national security mission. Research collaborations with universities ensure a pipeline of new ideas, people, and engagement with the larger academic community.<sup>130</sup>

The metrics page of the Laboratory-Directed Research and Development Annual Report for 2018 notes 74 projects with formal partnerships with external institutions, but it does not specify how many of these external institutions are universities.<sup>131</sup> Laboratory staff did not respond to requests for more specific information.

While the laboratory does not advertise a specific designation for key partners such as "Academic Alliance," it does list several universities as examples of partners on its webpage. These include Texas A&M University, Georgetown University, and six campuses in the University of California system: UC San Francisco, UC Berkeley, UC Merced, UC Davis, UC Santa Barbara and UC San Diego.<sup>132</sup>



As described in the section above about direct lab management, Texas A&M University is a subcontractor to the managing entity for the laboratory. According to administration at Georgetown, the university has collaborated with the laboratory in the areas of neuroscience, physics and cancer, with the lab hosting graduate students for summer internships.<sup>133</sup> As the University of California has managed the laboratory since its inception, it is not surprising that there are partnerships with many UC campuses. When asked for more information, the responses from these campuses have shown varied levels of partnership, mostly at the level of research collaborations between faculty and the lab in different scientific areas.

### **Pantex Plant and Y-12 National Security Complex**

Starting in July 2014, these two production sites have been administered under one contract. The purpose of combining the two sites into one contract was to achieve cost savings, but those savings have not materialized.<sup>134</sup> The contract was awarded to Consolidated Nuclear Security, LLC, a corporate subsidiary of Bechtel National, Leidos, ATK Launch Systems, and SOC, LLC.<sup>135</sup> The base contract expired in June 2019, but optional terms can extend it through June 2024.<sup>136</sup>

The Pantex Plant is responsible for the dismantling of retired warheads and the reassembly of warheads undergoing life extension projects and is the storage location for thousands of plutonium pits. The Y-12 Complex sources the enriched uranium necessary for nuclear weapons.<sup>137</sup>

Consolidated Nuclear Security's (CNS) website notes that its university partnerships increases its "ability to solve complex problems."<sup>138</sup> Three schools, the University of Tennessee, Texas Tech University, and Texas A&M University are considered "Key University Partners."<sup>139</sup>

### **Y-12 National Security Complex**



Source: National Nuclear Security Administration

In 2018, Texas A&M University System announced an agreement with CNS that also includes leased space in the new building, which the Texas A&M System leadership viewed "as a natural extension of the System's commitment to the nuclear weapons industry."<sup>140</sup> The Texas A&M Engineering Experiment Station has an ongoing umbrella agreement with CNS for "collaborative research and education support;" individual tasks are requested and funded under this agreement. The funding ceiling was initially \$199,000 in 2017, but increased substantially to nearly \$3 million by early 2019.<sup>141</sup>

Formal partnership between Y-12 and the University of Tennessee, Knoxville dates to 2011. A press release at the time noted, "Under the MOU, the two plan to expand their partnership and are considering several jointly funded research projects and the possibility of initiating joint research institutes or centers of excellence to solve complex national security and manufacturing-related problems facing our nation."<sup>142</sup>

A 2014 article from the business school gave an update, "Today, both sites are reaping the benefits of this unique partnership, which brings valuable expertise to Y-12 in a variety of disciplines while providing



unique educational and research opportunities for UT students and faculty.”<sup>143</sup>

### Kansas City National Security Campus

The Kansas City National Security Campus is operated by Honeywell Federal Manufacturing & Technologies, LLC. Honeywell’s current base contract expires in September 2020, but contains five additional one-year options.<sup>144</sup>

The work at this site centers on the manufacturing of non-nuclear components necessary for nuclear weapons.<sup>145</sup>

Honeywell has initiated at least ten “Master Collaboration Agreements” with universities since 2015 “to facilitate closer collaboration on research and development of new technology to meet national security needs.”<sup>146</sup>

Individual news releases confirm agreements with the following seven universities, all of which explicitly reference national security as a primary purpose of the

collaboration: Kansas State University (November 11, 2015),<sup>147</sup> University of Kansas (February 16, 2016),<sup>148</sup> University of New Mexico (June 6, 2016),<sup>149</sup> University of Missouri – Kansas City (March 14, 2017),<sup>150</sup> Pittsburg State University (March 28, 2017),<sup>151</sup> University of Arkansas (May 8, 2017),<sup>152</sup> and Missouri University College of Engineering (June 6, 2017).<sup>153</sup>

A copy of Honeywell’s agreement with Kansas State University does not commit specific funding to the university, but facilitates the submission of purchase orders from the site contractor to the university for specific “[r]esearch and development projects as well as testing and/or evaluation services projects.” In addition, the agreement allows for “non-monetary collaborative engagements” such as “faculty/engineer exchanges and technical information exchanges.”<sup>154</sup>

When asked, Kansas City National Security Campus staff declined to reveal the other universities with which it has signed agreements.



## Nevada National Security Site

The Nevada National Security Site is managed by Mission Support and Test Services, LLC, which is a partnership between Honeywell International Inc., Jacobs Engineering Group Inc., and Huntington Ingalls Industries Nuclear, Inc. MSTS won the contract for managing the site in 2017. The contract runs for five years, with options for five additional years.<sup>155</sup>

The Nevada National Security Site is the location of nearly 1,000 tests of nuclear weapons in past decades, leading to serious health impacts for nearby residents and participating military personnel.<sup>156</sup> Currently, staff at the site conduct simulated experiments to test the reliability and performance of nuclear weap-

**The Nevada National Security Site is the location of nearly 1,000 tests of nuclear weapons in past decades, leading to serious health impacts for nearby residents and participating military personnel.**

ons.<sup>157</sup> The site also hosts “subcritical experiments” that allow for the evaluation of nuclear weapons materials under certain conditions, but do not cause a “self-sustaining nuclear chain reaction.”<sup>158</sup>

In 2016, the University of Nevada - Las Vegas entered into a subcontracting agreement with the contractor for the Nevada National Security Site. The agreement lasts through September 2020 and, at the time of

signing, had an estimated value of \$8,000,000. The university agreed to provide “research, services, and fabrication support” in a number of specified scientific and engineering domains. Specific work and funding provided under the contract is determined by individual task orders.<sup>159</sup>

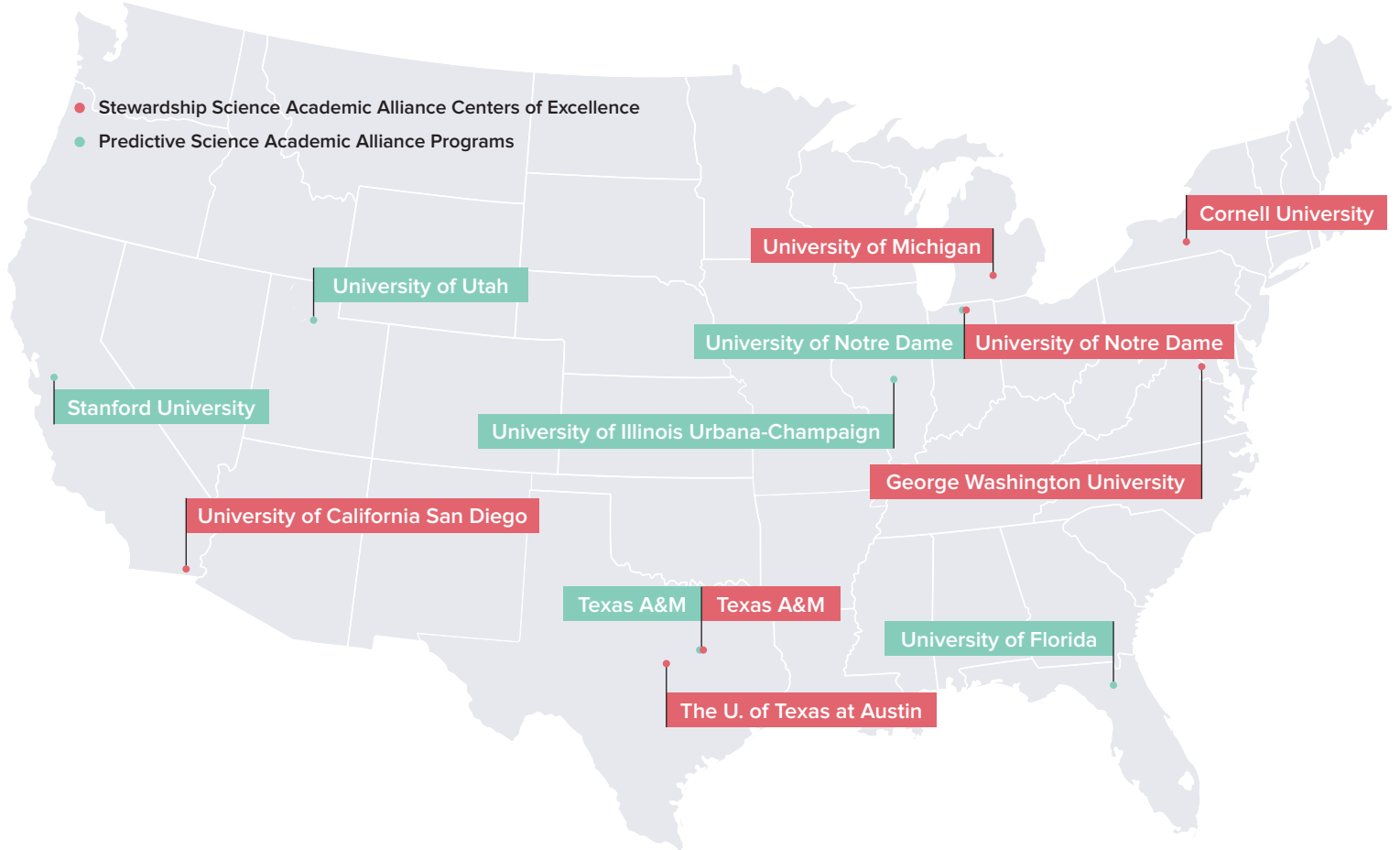
## Sedan Crater, Nevada Test Site



Nevada National Security Site



## Category 3: Research Programs and Partnerships



In addition to formal institutional partnerships, numerous connections exist between universities and the nuclear weapons complex at the research project level. These links are formed through several different channels as outlined

below. The NNSA's FY2020 Stockpile Stewardship and Management Plan delivered to Congress boasts that more than \$65 million in grants were delivered to academic institutions from the NNSA in the last year to support stockpile stewardship.<sup>160</sup> When including grants and subcontracts from the labs as well, the total amount of funding to universities for research may be higher than \$150 million. While these amounts appear small relative to the total external research funding received by universities, this funding allows universities to sustain the scientific foundation of the nuclear weapons complex.<sup>161</sup>

**The NNSA's FY2020 Stockpile Stewardship and Management Plan delivered to Congress boasts that more than \$65 million in grants were delivered to academic institutions from the NNSA in the last year to support stockpile stewardship.**

The NNSA also provides research grants to universities under its Defense Nuclear Nonproliferation program budget. These efforts support international safeguards for non-proliferation and could be an intentional focus area for expanded academic research. For example, the NNSA supported new research from MIT that seeks to improve techniques for verifying nuclear warhead disarmament.<sup>162</sup> Currently, however, the NNSA funds weapons activities at a level six times greater than the Defense Nuclear Nonproliferation program.<sup>163</sup>

It should be noted that the NNSA labs receive some funding from sources other than the Department of Energy and NNSA; while they perform research in a wide variety of areas, their core mission - and the source of the majority of their funding - remains nuclear weapons programs. Because of the opaque nature of nuclear weapons research, it can be difficult to parse out what research feeds the nuclear weapons mission and what may be unrelated. Non-weapons research areas at the labs include energy, cybersecurity, biomedical science and environmental management, to name just a few.

However, most NNSA research funding comes with a requirement that the research has some relevance to its core mission of stockpile stewardship. It is important for university departments and researchers to consider how their research might be used to advance nuclear weapons.

### **Stewardship Science Academic Programs**

Since the United States halted explosive nuclear weapons testing in 1992, the work of the NNSA has shifted to “stewardship science,” a term that is used to describe research and simulations that ensure the safety and ongoing reliability of the nation’s nuclear

weapons arsenal. To support this effort, the NNSA disburses more than \$50 million annually to research programs at universities across the country under its Stewardship Science Academic Programs.

According to the 2019 Stewardship Science Annual Report,

These research elements support U.S. research at universities in scientific areas important to stockpile stewardship. A fundamental objective is the support and training of doctoral and masters degree students studying science and engineering with a view towards some of these students becoming future stewards of the stockpile. A second fundamental objective is to connect highly skilled academic and NNSA scientists so that new ideas and techniques can be introduced into the NNSA’s arsenal. A third fundamental objective is to ensure that there is a strong community of technical peers throughout the country, external to the NNSA national laboratories...that is capable of providing peer review, scientific competition, and depth and breadth to the basic fields of research important to NNSA.<sup>164</sup>

The term Stewardship Science Academic Programs is an umbrella term that incorporates four subprograms: Stewardship Science Academic Alliances, High Energy Density Laboratory Plasmas, the National Laser Users’ Facility, and the Predictive Science Academic Alliance Program. New Funding Opportunity Announcements for the four different programs have all been made in the last two years.<sup>165</sup>

Overall, the 2019 Stewardship Science Annual Report lists 83 funded projects at various universities across the country.<sup>166</sup> While this research is basic, unclassified



**A research symposium  
at Lawrence Livermore National Laboratory**



Source: Lawrence Livermore National Laboratory

research with multiple potential applications, the NNSA explicitly seeks projects with relevance to its stockpile stewardship mission. For example, the funding announcement for the Stewardship Science Academic Alliance subprogram states, “Proposals should have an appropriate balance between advancing theory and understanding, simulation, and experimental efforts, and be of relevance to the NNSA Defense Program’s stockpile stewardship mission.”<sup>167</sup>

The NNSA funded eight university Centers of Excellence in the Stewardship Sciences Academic Alliance subprogram in the last two years. These centers receive larger funding awards than other projects. The recently created centers are located at the University of Notre Dame, Cornell University (with several partners), the University of Texas at Austin, two separate centers at Texas A&M University (one with several partners), George Washington University, the University of California San Diego, and the University of Michigan.<sup>168</sup> While many of the involved faculty did not respond to

requests for more details about their work, one center noted that it is evaluated on the quality of their research and their ability to connect students to the NNSA labs.<sup>169</sup>

The Predictive Science Academic Alliance Program (PSAAP) is an Advanced Simulation and Computing initiative funded by the NNSA with roots that date back to 1997.<sup>170</sup> Since the NNSA can no longer actively test nuclear weapons, it funds universities to develop advanced simulation capabilities.

The most recent iteration of this initiative, titled PSAAP II, started in 2014 and provided \$14.4 million annually for five years. This program has funded centers at six universities: University of Utah, University of Illinois Urbana-Champaign, Stanford University, University of Florida, Texas A&M University, and University of Notre Dame.<sup>171</sup> In 2019, a funding opportunity announcement was made for the next five years, with award announcements expected late in 2019 and estimated to total \$20 million per year, subject to appropriation authority. The announcement emphasized that proposals should consider simulation capabilities within a discipline “of interest” to the NNSA’s mission.<sup>172</sup>

### **Minority Serving Institutions Partnership Program**

Under the Weapons Activities Appropriation designation in the NNSA FY 2019 budget, \$20 million is directed toward a Minority Serving Institution Partnership Program.<sup>173</sup>

The NNSA’s Budget Justification document states that the goal of this program is to build research connections and recruiting pipelines between at Historically Black Colleges and Universities, Hispanic Serving Institutions, and Tribal Colleges and Universities.<sup>174</sup>

According to the NNSA website, this initiative supports



programs at 40 colleges and universities through ten consortiums.<sup>175</sup>

### Laboratory Research Partnerships

Each of the three NNSA laboratories partner extensively with universities, often at a researcher-to-researcher level. For example, Sandia researchers partner with roughly 100 universities each year on different research priorities.<sup>176</sup> And in FY2018, Los Alamos National Laboratory researchers reported collaborations with more than 400 institutions (not all of them academic).<sup>177</sup> Lawrence Livermore reported more than 200 projects that involved external collaborations in the same year.<sup>178</sup> Lawrence Livermore also recently started a “mini-sabbatical” program for university faculty, inviting them to participate as paid researchers at the lab for 1-3 months.<sup>179</sup>

**Sandia researchers partner with roughly 100 universities each year on different research priorities.**

To reiterate, some of these projects may not have direct relevance to the primary nuclear weapons mission of the labs; some funding at the laboratories come from sources other than the NNSA. However, many university partnerships support the core national security work of the labs. A 2016 Sandia report quotes one of the lab’s executives, “Partnering with major national research universities helps Sandia nurture talent, solve big scientific problems, create intellectual property, and accelerate technology transfer. Universities’ contributions to important national security programs are increasing.”<sup>180</sup>

The laboratories also provide grant funding directly to universities. In FY2018, Sandia invested \$32.7 million in university research efforts.<sup>181</sup> Los Alamos National Laboratory has subcontracts to universities worth more than \$50 million, more than half of which stay in the southwest region.<sup>182</sup> Lawrence Livermore National Laboratory staff declined to respond to requests for similar information.

**Lawrence Livermore recently started a “mini-sabbatical” program for university faculty, inviting them to participate as paid researchers at the lab for 1-3 months.**

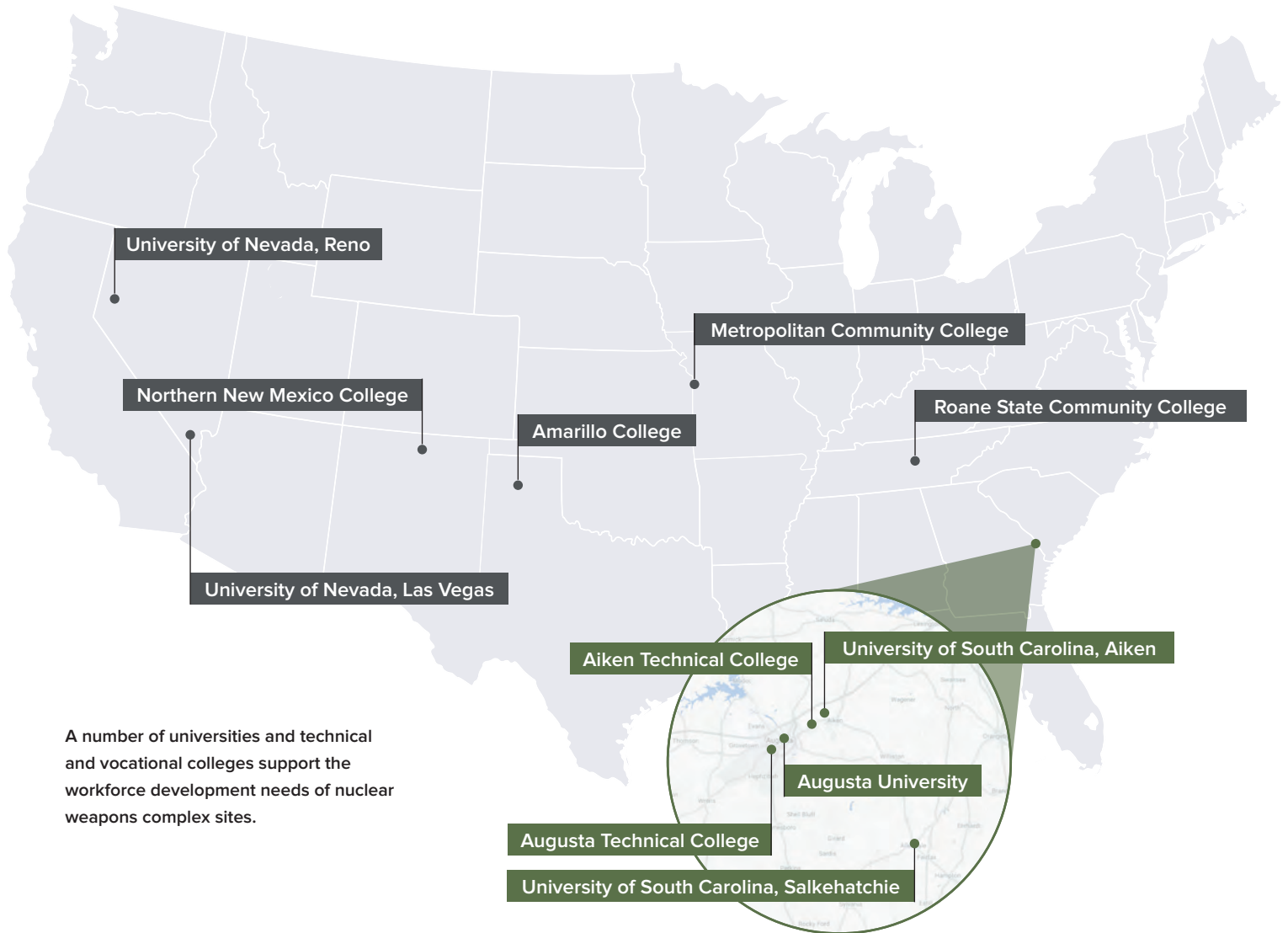
### Deterrence and Assurance Academic Alliance

In addition to the NNSA’s research activities in the academic arena, the Department of Defense’s U.S. Strategic Command coordinates a Deterrence and Assurance Academic Alliance.

The Deterrence and Assurance Academic Alliance seeks to “Develop an academic community of interest focused on research and analysis of deterrence, assurance, and associated strategic level national security themes in a rapidly changing, multi-domain global threat environment.”<sup>183</sup> It organizes conferences, calls for papers on specific questions, and publishes a newsletter to build a community of academics focused on this issue. Representatives from 46 different institutions attended its 2019 annual conference.<sup>184</sup>



## Category 4: Workforce Development Programs



A number of universities and technical and vocational colleges support the workforce development needs of nuclear weapons complex sites.

In a preface to the NNSA's FY2020 Stockpile Stewardship and Management Plan, Department of Energy Secretary Rick Perry writes that finding "the next generation workforce of world-class scientists, engineers and technicians is a major priority."<sup>185</sup> Through its various university partnerships, the NNSA creates employment pipelines for the development of its future workforce. At a hearing in May 2019, NNSA Administrator Lisa Gordon-Hagerty noted that 40% of the NNSA workforce would be eligible for retirement in the next five years. Later in the same hearing she cited the importance of university partnerships in this endeavor:



**LISA GORDON-HAGERTY**  
NNSA Administrator

Source: National Nuclear  
Security Administration

We are finding different ways of trying to resource, if you will, or source the next generation, the best and brightest. And those are scientists. Those are engineers. Those are technicians. Those are people that put hands on weapons. Those people that put hands in glove boxes, as well as the primary and secondary designers. We are trying to find different ways of finding that pipeline, if you will. We have a number of very interesting programs now where we support universities and colleges around the United States where we can actually grow our workforce through those endeavors.<sup>186</sup>

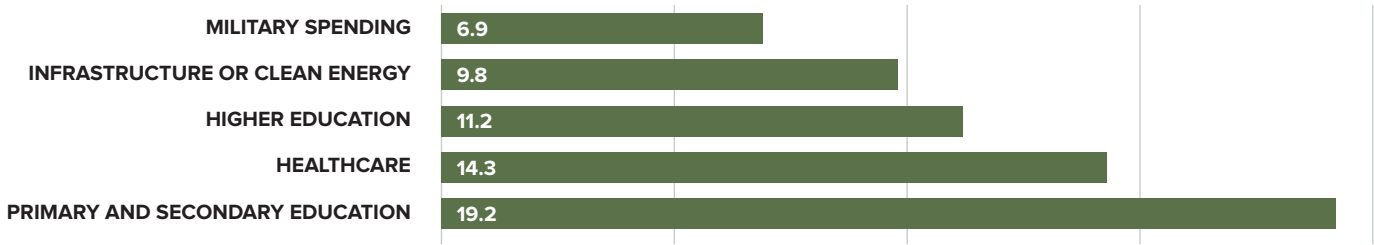
Frequently, workforce development initiatives fall to local technical and vocational schools. The mission of these schools is to provide relevant skills and education to local residents that allow them to meet local employment offerings. When these employment needs are driven by national decisions to continue and in

some cases expand development of the nuclear weapons arsenal, local colleges become participants in the production of these weapons of mass destruction. The information below provides some windows into this participation.

### What investments create jobs?

Jobs created for every \$1 million invested

Source: Brown University, 2017



Many politicians and supporters of the nuclear weapons complex in the United States argue that funding for these weapons are important because of the jobs that are created by that funding. When the Trump administration proposed phasing out funding for the University of Rochester’s Laboratory for Laser Energetics, New York Senators Chuck Schumer and Kirsten Gillibrand fought to restore the funding to keep the 350 jobs supported by the lab.<sup>187</sup> Across the country, the nuclear weapons complex does indeed support thousands of jobs, both through the National Nuclear Security Administration’s sites and through the work performed by Department of Defense contractors.<sup>188</sup>

What nuclear weapons proponents ignore, however, is that an even greater number of jobs at all pay levels would be created if the same level of funding were to be invested in other sectors. A 2017 study out of Brown University finds that, on average, \$1 million in military spending creates 6.9 jobs, but the same amount would create 19.2 jobs in primary and secondary education, 14.3 jobs in healthcare, 11.2 jobs in higher education, or 9.8 jobs in infrastructure or clean energy.<sup>189</sup> Other studies have reached similar conclusions.<sup>190</sup>

The bottom line is clear: nuclear weapons do not provide jobs, they take them away.

## Vocational Training Programs

In recent years, the NNSA has supported increased funding for job training programs and degrees directly related to its workforce needs. Often this collaboration is with smaller technical and vocational schools near NNSA sites. The following are a few examples of how universities and colleges become partners in the nuclear weapons complex through the lens of workforce development. This should not be considered an exhaustive list.

In New Mexico, the contractor for Los Alamos National Laboratory signed in 2019 a five-year agreement with Northern New Mexico College to form an associate's degree program in Radiation Protection.<sup>191</sup> NNSA Administrator Gordon-Haggerty highlighted this program when speaking to Congress as a way for the lab to "bring in a new pipeline of radiological technicians to do work in plutonium operations."<sup>192</sup>

In South Carolina, the NNSA started providing \$1 million per year in 2016 for workforce development grants to regional institutions, then announced it would double this amount in 2019 in order to fill workforce

needs at the Savannah River Site. Staff at this site help recycle tritium from old warheads, an element that increases the yield of nuclear weapons, to reuse in new warheads. The Trump administration proposed that this site begin production of plutonium pits in addition to those produced at Los Alam-

**Staff at the Savannah River Site help recycle tritium from old warheads, an element that increases the yield of nuclear weapons, to reuse in new warheads. The Trump Administration proposed that this site begin production of plutonium pits in addition to those produced at Los Alamos.**

## A July 2019 NNSA job fair



Source: National Nuclear Security Administration

os.<sup>193</sup> If this proposal is approved, the site's workforce needs would grow more acute. These grants flow through a non-profit organization to Aiken Technical College, Augusta Technical College, University of South Carolina – Aiken, Augusta University, and the University of South Carolina – Salkehatchie.<sup>194</sup>

In Kansas City, proposals from the Obama and Trump Administrations to modernize the nuclear arsenal have likewise created increased workforce needs. A 2019 Government Accountability Office report states,

Kansas City site contractors noted that they have taken actions to mitigate this challenge. These actions, which contractor site representatives have characterized as largely successful, include participation in and development of university relations programs, involvement in research and development partnerships and consortiums, recruitment from area trade schools and technical schools, and expanding the market area in which the site searches for recruits.<sup>195</sup>

The Metropolitan Community College partners with Honeywell, the site contractor, to provide machinist



### Kansas City National Security Campus

Source: National Nuclear Security Administration



and toolmaker trainings.<sup>196</sup> A 2018 NNSA performance review of Honeywell notes how its multi-partner consortiums create links to students who become “prime candidates” for hiring.<sup>197</sup>

In Nevada, the 2017 contract for the entity that operates the Nevada National Security Site states, “The Contractor shall initiate a technical cooperative program with the Nevada state universities system that builds technical capability in the universities based on programmatic funding and deliverables and fosters a resource pool for next generation of staff to support the national security missions.”<sup>198</sup> A Nevada National Security Site engineer was the first to complete a new Graduate Certificate in Nuclear Packaging offered at the University of Nevada - Reno, a program the university developed in partnership with the Department of Energy.<sup>199</sup> At the University of Nevada – Las Vegas, the Nevada National Security Site helped to

offer a new graduate certificate in Nuclear Criticality Safety Engineering.<sup>200</sup>

In Tennessee, the Y-12 National Security Complex won a state Department of Labor grant for workforce development, then partnered with Roane State Community College to provide necessary training.<sup>201</sup>

In Texas, Amarillo College partners with the Pantex facility to provide hazardous materials training to thousands of employees.<sup>202</sup> The Pantex website also notes that it cooperates with “area colleges and universities to ensure that personnel with essential skills are available for future work at Pantex,” listing several schools.<sup>203</sup> The nature and extent of this cooperation is unclear; when asked for more information, some of the named institutions stated they did not have any formal agreements with Pantex.<sup>204</sup>



## Research Programs and Fellowships

As noted in the section detailing research partnerships, an explicit goal of the NNSA's grants to universities is to develop a pipeline of future workers among the graduate students at those universities. The 2019 Stewardship Science Annual Report states,

A fundamental objective is the support and training of doctoral and masters degree students studying science and engineering with a view towards some of these students becoming future stewards of the stockpile.<sup>205</sup>

The latest funding announcement for Stewardship Science Academic Alliance grants encourages students involved in funded projects to spend time in the NNSA labs.<sup>206</sup> In the funding announcement for the PSAAP III program, it notes participating students would be required to do so.<sup>207</sup>

Similarly, the Minority Serving Institution Partnership Program seeks to “increase the number of minority

graduates and post-doctoral students hired into NNSA/DOE's technical and scientific workforce.”<sup>208</sup> A goal of individual laboratory partnerships with universities is to raise the visibility of the laboratory as a future employer.<sup>209</sup>

The NNSA has also created several fellowship programs in a more direct attempt to connect graduate students with its labs. In 2006, it created the NNSA Stewardship Science Graduate Fellowship, which “builds a community of talented and committed doctoral students, program alumni, DOE laboratory staff and university researchers who share a common goal to further their science while advancing national defense.”<sup>210</sup> In 2017, the agency created the NNSA Laboratory Residency Graduate Fellowship to further these efforts.<sup>211</sup> The oldest program, the NNSA Graduate Fellowship Program, started in 1995; half of the 2017-2018 class of fellows became NNSA employees after their fellowship.<sup>212</sup>

# Conclusion and Recommendations

As this report shows, American colleges and universities involve themselves in many facets of the nation's nuclear weapons complex, directly and indirectly. In contrast, in 2017, 122 countries recognized the humanitarian and environmental consequences of nuclear weapons and adopted the Treaty on the Prohibition of Nuclear Weapons. This new movement creates an opportune moment for university communities to re-evaluate their connections to these weapons of mass destruction.

While American universities have played a key role in the development and continuation of nuclear weapons, they can now act to lead the United States away from these weapons. In light of the research presented, this report offers the following recommendations to universities:

## Recommendation 1



### **Provide greater transparency into connections with the nuclear weapons complex**

In most of the cases discussed, greater transparency about the nature and scope of connections would be an appropriate first step by university administrations. The nuclear weapons complex exists in layers of secrecy, something that denies the pursuit of academic excellence and counters the ideals of academic communities. Many universities avoided direct responses to requests for information about this report. University professionals, students and prospective students should have comprehensive information about what takes place on their campus or through their university systems. Any agreements between universities and the federal government and its contractors should be disclosed and made available so that the entire university community - students, faculty, staff, alumni - can educate themselves about this topic. Universities should also provide more information about their partnerships with the for-profit companies that receive contracts to produce nuclear weapons and determine whether such partnerships facilitate nuclear weapons production.<sup>213</sup>

As part of efforts to improve transparency, universities should consider prohibiting classified research. By its nature, classified research prevents universities from being fully transparent about the nature of their connections to the nuclear weapons complex. Classified research also runs

counter to the principles of intellectual inquiry. For that reason, many universities already forbid the performance of classified research.<sup>214</sup> Universities that choose to have one policy regarding classified research on campus and a different policy for off-campus activities should reassess this practice. Universities without policies that prohibit classified research should consider adopting them.

## Recommendation 2



### **Stop directly managing nuclear weapons production sites and dissolve research contracts solely related to nuclear weapons production**

While indirect research connections may raise questions of ethical complexity, the production sites of the nuclear weapons complex are unambiguous in their mission of producing weapons of mass destruction. Similarly, research contracts with the Department of Defense for the sole purpose of producing nuclear weapons systems facilitate the deployment of such weapons. Universities engaged in direct laboratory management or research partnerships with nuclear weapons producers solely for nuclear weapons production should cease these partnerships at the earliest opportunity, otherwise risking association with weapons of mass destruction. Universities would not willingly participate today in research enabling the production of chemical and biological weapons. Nuclear weapons are morally equivalent to these other weapons of mass destruction.

### Recommendation 3



**For contracts with dual-purpose research applications, demand greater transparency and create specific processes for ethical review of this research**

For some of the research connections to the nuclear weapons complex, in particular the more indirect ones, the ethical questions and implications are complex. Some research has applications both for nuclear weapons production and other areas of science, for example supercomputing. The specifics of each particular research project and its potential applications matter. Rather than dictate an answer to such questions, this report attempts to ensure that enough information is available for these conversations to take place on campuses - and suggests that they should take place in circles broader than individual research departments. These are questions with which prospective and current students, faculty and staff, administration and alumni can engage.

### Recommendation 4



**Advocate for reinvestment of weapons activities funding to non-proliferation and environmental remediation efforts**

As noted elsewhere in this report, the Department of Energy and the National Nuclear Security Administration perform work outside of nuclear weapons activities, including in valuable areas like nuclear non-proliferation and nuclear disarmament verification research and remediation of the environmental damage caused by nuclear weapons. Universities actively lobby the federal government for

funding in a variety of areas; they should specifically advocate that funding currently allocated to weapons activities be reallocated to such activities. Doing so would allow universities to continue partnerships with the government in research areas with potential benefits to society.

### Recommendation 5



**Join cities and state legislatures in urging the federal government to support the 2017 Treaty on the Prohibition of Nuclear Weapons and reverse course on nuclear arms control backsliding**

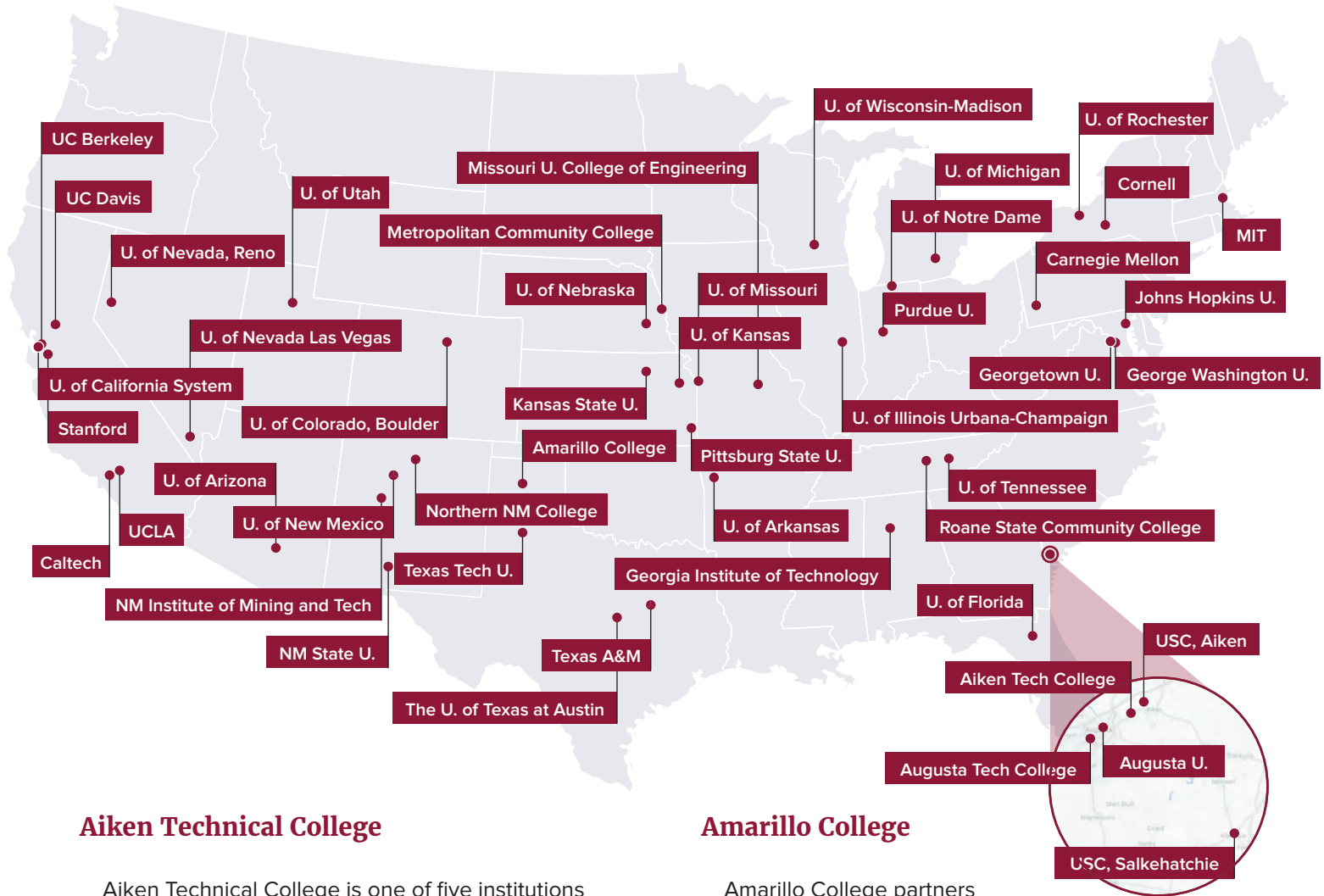
Nuclear weapons used to be the only weapons of mass destruction not banned by an international agreement, but the 2017 treaty fills this gap. While the United States refuses to sign it, municipal and state governments have begun to express their support for the treaty. Given the growing domestic and international support for the stigmatization of nuclear weapons, university administrations should consider joining American cities and states in urging the federal government to support the 2017 treaty and uphold its existing nuclear disarmament and arms control obligations.

Specifically, the United States should honor its commitment as a signatory of the Comprehensive Test Ban Treaty not to take steps that run counter to the object and purpose of this treaty, like moving closer toward nuclear weapons testing. The United States should also honor its legal obligation under Article VI of the Nuclear Non-Proliferation Treaty to work in good faith toward nuclear disarmament by upholding arms control agreements and cancelling the development of new low-yield nuclear weapons systems.

No university should choose to associate itself with weapons of mass destruction. But the questions and recommendations here reach beyond universities. To redirect scientific capital and effort away from weapons of mass destruction toward more productive ends requires ethical reflection and action from both those who work in academia and those who do not. Cities and states have already called on the federal government to join the Treaty on the Prohibition of Nuclear Weapons; they can also call on their local universities to cease cooperating in the research and development of nuclear weapons.

# Appendix A: Involvement by University

Listed Alphabetically



## Aiken Technical College

Aiken Technical College is one of five institutions that divide \$2 million in annual funding from the National Nuclear Security Administration for workforce development grants in support of staffing needs at the Savannah River Site.<sup>215</sup> Staff at this site help recycle tritium from old warheads, an element that increases the yield of nuclear weapons, to reuse in new warheads. The Trump Administration proposed that this site begin production of plutonium pits in addition to those produced at Los Alamos.<sup>216</sup> If this proposal is approved, the site's workforce needs would grow more acute.

## Amarillo College

Amarillo College partners with the Pantex facility to provide hazardous materials training to thousands of Pantex employees.<sup>217</sup> The Pantex Plant is responsible for the dismantling of retired warheads and the reassembly of warheads undergoing life extension projects.<sup>218</sup>

## Augusta Technical College

Augusta Technical College is one of five institutions that divide \$2 million in annual funding from the National Nuclear Security Administration for work-

force development grants in support of staffing needs at the Savannah River Site.<sup>219</sup> Staff at this site help recycle tritium from old warheads, an element that increases the yield of nuclear weapons, to reuse in new warheads. The Trump Administration proposed that this site begin production of plutonium pits in addition to those produced at Los Alamos.<sup>220</sup> If this proposal is approved, the site's workforce needs would grow more acute.

### Augusta University

Augusta University is one of five institutions that divide \$2 million in annual funding from the National Nuclear Security Administration for workforce development grants in support of staffing needs at the Savannah River Site.<sup>221</sup> Staff at this site help recycle tritium from old warheads, an element that increases the yield of nuclear weapons, to reuse in new warheads. The Trump Administration proposed that this site begin production of plutonium pits in addition to those produced at Los Alamos.<sup>222</sup> If this proposal is approved, the site's workforce needs would grow more acute.

### California Institute of Technology (Caltech)

Caltech is listed by Sandia National Laboratories as a partner in its Campus Executive Program, but the Caltech communications office noted they were not aware of an active partnership with Sandia.<sup>223</sup> The Campus Executive program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>224</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>225</sup> National Laboratories focuses on the

nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>226</sup>

### Carnegie Mellon University

Carnegie Mellon University is a partner in Sandia National Laboratories' Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>227</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>228</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>229</sup>

### Cornell University

Cornell University is a partner in Sandia National Laboratories' Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>230</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>231</sup> Sandia National Laboratories focuses on the non-nuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems.



Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>232</sup>

Cornell University, in partnership with others, was awarded funding in 2017 for a Stewardship Science Academic Alliance Center of Excellence. The Multi-University Center of Excellence for Pulsed-Power-Driven High Energy Density Science will receive \$15 million in research grants in total.<sup>233</sup> While the Stewardship Science Academic Alliance program funds basic, unclassified research, it seeks and funds proposals that have relevance to the stewardship of the nation's nuclear stockpile.

### George Washington University

George Washington University was awarded funding in 2018 for a Stewardship Science Academic Alliance Center of Excellence. The Capital/DOE Alliance Center will receive \$12.5 million in research grants over five years.<sup>234</sup> While the Stewardship Science Academic Alliance program funds basic, unclassified research, it seeks and funds proposals that have relevance to the stewardship of the nation's nuclear stockpile.

### Georgetown University

Georgetown is listed as a university partner on the website of Lawrence Livermore National Laboratory. According to administration at Georgetown, the university has a formal agreement with the laboratory and collaborates in the areas of neuroscience, physics and cancer, with the lab hosting graduate students for summer internships.<sup>235</sup> The Lawrence Livermore lab provides design and engineering for several nuclear warhead types and conducts simulated experiments to evaluate warheads.<sup>236</sup>

### Georgia Institute of Technology

### (Georgia Tech)

Georgia Tech is one of Sandia National Laboratories' five Academic Alliance partner universities. These partnerships help Sandia "identify promising candidates at top universities before graduation and promote joint technology development research between graduate students and SNL researchers, pursuing topics with national security applications."<sup>237</sup> All Academic Alliance schools are also designated as a Campus Executive university partner by Sandia. In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>238</sup> Sandia National Laboratories focuses on the non-nuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>239</sup>

### Johns Hopkins University

Johns Hopkins has a "university affiliated research center" for the Department of Defense that participates directly in nuclear weapons development called the Johns Hopkins University Applied Physics Laboratory. Started in 1942, the Applied Physics Laboratory takes up 453 acres in its off-campus location.<sup>240</sup> Its stated goal is "to create defining innovations that ensure our nation's preeminence in the 21st century."<sup>241</sup> This stands in contrast to the mission of the university overall: "To educate its students and cultivate their capacity for lifelong learning, to foster independent and original research, and to bring the benefits of discovery to the world."<sup>242</sup>

Due in large part to the laboratory, Johns Hopkins

University received \$828 million in research and development grants from DoD in FY2017, more than twice as much as any other American university.<sup>[243]</sup> It has been the site of repeated protests in previous decades.<sup>244</sup> For example, in 1995 a Catholic nun and peace activist served a 30-day jail sentence for refusing to stop passing out leaflets on the lab's campus when asked to leave.<sup>245</sup>

The Applied Physics Laboratory received a renewed 7-year contract in 2017 for up to \$92 million “for continuing the Air Force Nuclear Weapons Center’s (AFNWC) strategic partnership.”<sup>246</sup> This is only one piece of the lab’s work; in 2019, the funding ceiling for its ongoing multi-year contract with the Department of Defense was extended beyond \$7 billion.<sup>247</sup>

Johns Hopkins’ classified research policy creates a distinction between the laboratory and the rest of campus. While classified research is generally not allowed, the policy explicitly exempts the Applied Physics Laboratory as the only “non-academic division.”<sup>248</sup>

## Kansas State University

Kansas State University entered into a Master Collaboration Agreement with the operator of the Kansas City National Security Campus on November 11, 2015.<sup>249</sup> The operator Honeywell has initiated at least ten “Master Collaboration Agreements” with universities since 2015 “to facilitate closer collaboration on research and development of new technology to meet national security needs.”<sup>250</sup> The work at the Kansas City National Security Campus centers on the manufacturing of nonnuclear components necessary for nuclear weapons.<sup>251</sup>

A copy of Honeywell’s agreement with Kansas State University does not commit specific funding to the

university, but facilitates the submission of purchase orders from the site contractor to the university for specific “[r]esearch and development projects as well as testing and/or evaluation services projects.” In addition, the agreement allows for “non-monetary collaborative engagements” such as “faculty/engineer exchanges and technical information exchanges.”<sup>252</sup>

## Massachusetts Institute of Technology (MIT)

MIT operates the Lincoln Laboratory, a research center funded by the Department of Defense. The Lincoln Laboratory produces an enormous volume of research for the Department of Defense. In 2019, it received a contract modification that brought its total multiyear contract face value to \$9.6 billion. This contract involves “advanced technology research and development activities that focus on long-term technology development as well as rapid system prototyping and demonstration.” The Air Force Life Cycle Management Center is the contracting agency.<sup>253</sup>

References to nuclear weapons development are hard to find on the laboratory’s website, but one profile of a highlighted engineer notes her work on command and control terminals that “underpin the highly assured SATCOM system for the nation’s nuclear weapon forces.”<sup>254</sup> A 2018 statement to Congress from Department of Energy Secretary Rick Perry also noted the department’s intention to initiate at Lincoln a new line of production of radiation-hardened microelectronics necessary for maintenance of the nuclear stockpile.<sup>255</sup> The NNSA’s FY2020 Stockpile Stewardship Management Plan notes that the NNSA is “engaging” with the Lincoln Laboratory in this regard.<sup>256</sup>

The Lincoln Lab has been closely involved in work on ballistic missile defense systems, which many experts have argued decrease strategic stability and lead to further nuclear weapons development.<sup>257</sup> It maintains a staff presence at the Reagan Test Site in the Marshall Islands, which is a facility responsible for tests of both ballistic missiles and missile defense systems.<sup>258</sup>

MIT also maintains some connections with the Draper Laboratory, a lab that used to be part of the university but became independent in the 1970s in response to student protests.<sup>259</sup> The Draper Laboratory is currently fulfilling a \$370 million contract for nuclear missile guidance systems.<sup>260</sup> MIT students are eligible to become fellows at Draper and the immediate past president of MIT sits on Draper Laboratory's Board of Directors.<sup>261</sup>

MIT's classified research policy creates two standards. The policy states, "The profound merits of a policy of open research and free interchange of information among scholars is essential to MIT's institutional responsibility and to the interests of the nation as a whole." Any limited exceptions to this policy in the national interest must be approved by the Provost, except if they take place at Lincoln Laboratory, which receives a blanket exemption from the policy.<sup>262</sup>

MIT is also a partner in Sandia National Laboratories' Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>263</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>264</sup> Sandia National Laboratories focuses on the nonnuclear components

of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>265</sup>

## **Metropolitan Community College**

The Metropolitan Community College partners with the site contractor at Kansas City National Security Campus to provide machinist and toolmaker trainings.<sup>266</sup> The work at the Kansas City National Security Campus centers on the manufacturing of nonnuclear components necessary for nuclear weapons.<sup>267</sup>

## **Missouri University**

The Missouri University College of Engineering entered into a Master Collaboration Agreement with the operator of the Kansas City National Security Campus on June 6, 2017.<sup>268</sup> The operator Honeywell has initiated at least ten "Master Collaboration Agreements" with universities since 2015 "to facilitate closer collaboration on research and development of new technology to meet national security needs."<sup>269</sup> The work at the Kansas City National Security Campus centers on the manufacturing of nonnuclear components necessary for nuclear weapons.<sup>270</sup>

## **New Mexico Institute of Mining and Technology (New Mexico Tech)**

New Mexico Tech is connected to Los Alamos National Laboratory through the New Mexico Consortium. The Consortium works to foster research collaborations and economic development opportunities in a variety of scientific areas.<sup>271</sup> The Los Alamos National Laboratory provides design and

engineering for several nuclear warhead types, conducts simulated experiments to evaluate warheads, and has the capacity to produce plutonium pits, the core material for nuclear warheads.<sup>272</sup>

New Mexico Tech is a partner in Sandia National Laboratories' Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>273</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>274</sup> In 2016, New Mexico Tech joined Lockheed Martin, Purdue University, and New Mexico State University in an unsuccessful bid to manage Sandia.<sup>275</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>276</sup>

### New Mexico State University

New Mexico State is connected to Los Alamos National Laboratory through the New Mexico Consortium. The Consortium works to foster research collaborations and economic development opportunities in a variety of scientific areas.<sup>277</sup> The Los Alamos National Laboratory provides design and engineering for several nuclear warhead types, conducts simulated experiments to evaluate warheads, and has the capacity to produce plutonium pits, the core material for nuclear warheads.<sup>278</sup>

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between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>279</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>280</sup> In 2016, New Mexico State joined Lockheed Martin, Purdue University, and New Mexico Tech in an unsuccessful bid to manage Sandia.<sup>281</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>282</sup>

### Northern New Mexico College

Northern New Mexico College signed a five-year agreement in 2019 with the operator of Los Alamos National Laboratory to form an associates degree program in Radiation Protection.<sup>283</sup> While declining to share details about the agreement, Northern New Mexico College staff noted the career opportunities that the program will provide to students and the program's support of the laboratory's national security mission.<sup>284</sup> National Nuclear Security Administration Administrator Lisa Gordon-Haggerty highlighted this program when speaking to Congress as a way for the lab to "bring in a new pipeline of radiological technicians to do work in plutonium operations."<sup>285</sup> The Los Alamos National Laboratory provides design and engineering for several nuclear warhead types, conducts simulated experiments to evaluate warheads, and has the capacity to produce plutonium pits, the core material for nuclear warheads.<sup>286</sup>

### Pittsburg State University

Pittsburg State University entered into a Master Collaboration Agreement with the operator of the Kansas City National Security Campus on March 28, 2017.<sup>287</sup> The operator Honeywell has initiated at least ten “Master Collaboration Agreements” with universities since 2015 “to facilitate closer collaboration on research and development of new technology to meet national security needs.”<sup>288</sup> The work at the Kansas City National Security Campus centers on the manufacturing of nonnuclear components necessary for nuclear weapons.<sup>289</sup>

## Purdue University

Purdue University is one of Sandia National Laboratories’ five Academic Alliance partner universities. These partnerships help Sandia “identify promising candidates at top universities before graduation and promote joint technology development research between graduate students and SNL researchers, pursuing topics with national security applications.”<sup>290</sup> All Academic Alliance schools are also designated as a Campus Executive university partner by Sandia. In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>291</sup> In 2016, Purdue joined Lockheed Martin, New Mexico State University, and New Mexico Tech in an unsuccessful bid to manage Sandia.<sup>292</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>293</sup>

## Roane State Community College

Roane State Community College partnered with the

Y-12 National Security Complex to provide workforce development training with funding from a state Department of Labor grant.<sup>294</sup> The Y-12 Complex sources the enriched uranium necessary for nuclear weapons.<sup>295</sup>

## Stanford University

Stanford is a partner in Sandia National Laboratories’ Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>296</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>297</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>298</sup>

Stanford also receives funding under the Predictive Science Academic Alliance Program (PSAAP) II for its Exascale Computing Center. PSAAP is an Advanced Simulation and Computing initiative funded by the National Nuclear Security Administration (NNSA) that has roots that date back to 1997.<sup>299</sup> Since the NNSA can no longer actively test nuclear weapons, it funds universities to develop advanced simulation capabilities. PSAAP II, the recent iteration of this initiative, started in 2014 and provided \$14.4 million annually for five years to six different centers.<sup>300</sup> In 2019, a funding opportunity announcement was made for the next five years, with award announcements expected late in 2019 and estimated to total \$20 million per year, subject to appropriation authority. The announcement emphasized that proposals



should consider simulation capabilities within a discipline “of interest” to the NNSA’s mission.<sup>301</sup>

## Texas A&M University

The Texas A&M University System is a partner in Triad National Security, LLC, along with the University of California Regents and Battelle Memorial Institute. Triad won the contract to operate the Los Alamos National Laboratory in 2018.<sup>302</sup> The Lab provides design and engineering for several nuclear warhead types, conducts simulated experiments to evaluate warheads, and has the capacity to produce plutonium pits, the core material for nuclear warheads.<sup>303</sup> Department of Energy funding for the lab in FY2019 was \$2.48 billion, of which 76% comes from the NNSA’s Weapons Activities Appropriations.<sup>304</sup>

The fixed fee awarded to Triad for executing the contract is about \$20 million per year, with an additional \$25-30 million available through award fees should it meet certain performance benchmarks.<sup>305</sup> This is the money Triad receives above the costs of operating the facility - essentially its profit. Officials at Texas A&M reported that its fee information is considered proprietary.<sup>306</sup>

Texas A&M University is also a subcontractor to Lawrence Livermore National Security, LLC, which manages the Lawrence Livermore National Laboratory. In 2007, at the beginning of this partnership, an announcement noted that the university’s proposed role would be “to operate an institute at LLNL dedicated to national security education and research.”<sup>307</sup> When asked about its current role at the laboratory, Texas A&M officials said its system “provides graduate and executive level training to Lawrence Livermore staff related to the safeguard-

ing of nuclear materials, the reduction of nuclear threats and nonproliferation.”<sup>308</sup>

Similar to the Los Alamos lab, the Lawrence Livermore lab provides design and engineering for several nuclear warhead types and conducts simulated experiments to evaluate warheads.<sup>309</sup> Department of Energy funding for the lab in FY2019 was \$1.56 billion, of which 86% comes from the NNSA’s Weapons Activities Appropriations.<sup>310</sup>

Texas A&M is a partner in Sandia National Laboratories’ Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>311</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>312</sup> In 2016, the Texas A&M University System joined Boeing, Battelle, the University of New Mexico and the University of Texas in an unsuccessful bid to manage Sandia.<sup>313</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>314</sup>

Texas A&M is listed as a “Key University Partner” by Consolidated National Security, LLC, the managing contractor for the Pantex Plant and the Y-12 National Security Complex, “demonstrating expertise in aligned research interests, strength in academic and research disciplines, successful working relationships with university faculty and administration, and extensive programmatic and research interactions supporting key CNS initiatives.”<sup>315</sup> In 2018, the Texas

A&M System announced an agreement with CNS that also includes leased space in the new building, which Texas A&M System leadership viewed “as a natural extension of the System’s commitment to the nuclear weapons industry.”<sup>316</sup> The Texas A&M Engineering Experiment Station has an ongoing umbrella agreement with CNS for “collaborative research and education support;” individual tasks are requested and funded under this agreement. The funding ceiling was initially \$199,000 in 2017, but increased substantially to nearly \$3 million by early 2019.<sup>317</sup>

The Pantex Plant is responsible for the dismantling of retired warheads and the reassembly of warheads undergoing life extension projects and is the storage location for thousands of plutonium pits. The Y-12 Complex sources the enriched uranium necessary for nuclear weapons.<sup>318</sup>

Texas A&M also receives funding under the Predictive Science Academic Alliance Program (PSAAP) II for its Center for Exascale Radiation Transport. PSAAP is an Advanced Simulation and Computing initiative funded by the National Nuclear Security Administration (NNSA) that has roots that date back to 1997.<sup>319</sup> Since the NNSA can no longer actively test nuclear weapons, it funds universities to develop advanced simulation capabilities. PSAAP II, the recent iteration of this initiative, started in 2014 and provided \$14.4 million annually for five years to six different centers.<sup>320</sup> In 2019, a funding opportunity announcement was made for the next five years, with award announcements expected late in 2019 and estimated to total \$20 million per year, subject to appropriation authority. The announcement emphasized that proposals should consider simulation capabilities within a discipline “of interest” to the

NNSA’s mission.<sup>321</sup>

Texas A&M was awarded funding in 2018 for two separate Stewardship Science Academic Alliance Centers of Excellence. The Center for Excellence in Nuclear Training and University-based Research will receive \$10 million in research grants over five years.<sup>322</sup> The Center for Research Excellence on Dynamically Deformed Solids will receive \$12.5 million in research grants over five years.<sup>323</sup> While the Stewardship Science Academic Alliance program funds basic, unclassified research, it seeks and funds proposals that have relevance to the stewardship of the nation’s nuclear stockpile.

## Texas Tech University

Texas Tech is listed as a “Key University Partner” by Consolidated National Security, LLC, the managing contractor for the Pantex Plant and the Y-12 National Security Complex, “demonstrating expertise in aligned research interests, strength in academic and research disciplines, successful working relationships with university faculty and administration, and extensive programmatic and research interactions supporting key CNS initiatives.”<sup>324</sup> The Pantex Plant is responsible for the dismantling of retired warheads and the reassembly of warheads undergoing life extension projects and is the storage location for thousands of plutonium pits. The Y-12 Complex sources the enriched uranium necessary for nuclear weapons.<sup>325</sup>

## University of Arizona

The University of Arizona is a partner in Sandia National Laboratories’ Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collabora-

tion and future workforce recruitment.<sup>326</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>327</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>328</sup>

## University of Arkansas

The University of Arkansas entered into a Master Collaboration Agreement with the operator of the Kansas City National Security Campus on May 8, 2017.<sup>329</sup> The operator Honeywell has initiated at least ten “Master Collaboration Agreements” with universities since 2015 “to facilitate closer collaboration on research and development of new technology to meet national security needs.”<sup>330</sup> The work at the Kansas City National Security Campus includes the manufacturing, evaluation, and testing of nonnuclear components necessary for nuclear weapons.<sup>331</sup>

## University of California

The University of California has been involved in the management of the Los Alamos National Laboratory and the Lawrence Livermore National Laboratory since their inception and was the sole institutional manager of each until the 2000s.

Currently, at a system level, the University of California is a partner in Triad National Security, LLC, along with Texas A&M University and Battelle Memorial Institute. Triad won the contract to operate the Los Alamos National Laboratory in 2018.<sup>332</sup> The lab provides design and engineering for several nuclear warhead types, conducts simulated experiments to

evaluate warheads, and has the capacity to produce plutonium pits, the core material for nuclear warheads.<sup>333</sup> Department of Energy funding for the Lab in FY2019 was \$2.48 billion, of which 76% comes from the NNSA’s Weapons Activities Appropriations.<sup>334</sup>

The fixed fee awarded to Triad for executing the contract is about \$20 million per year, with an additional \$25-30 million available through award fees should it meet certain performance benchmarks.<sup>335</sup> This is the money Triad receives above the costs of operating the facility. The University of California estimated that it would receive \$8.9 million in net fee revenue from Triad for FY2019, which it plans to reinvest in lab oversight functions and funding for research partnerships between UC campuses and the labs.<sup>336</sup>

In 2007, the management of Lawrence Livermore National Laboratory was awarded to a University of California-led LLC called Lawrence Livermore National Security, LLC.<sup>337</sup> The partners in this LLC are the University of California, Bechtel National, BWX Technologies, and AECOM.<sup>338</sup>

Similar to the Los Alamos lab, the Lawrence Livermore lab provides design and engineering for several nuclear warhead types and conducts simulated experiments to evaluate warheads.<sup>339</sup> Department of Energy funding for the Lab in FY2019 was \$1.56 billion, of which 86% comes from the NNSA’s Weapons Activities Appropriations.<sup>340</sup>

The management organization is scheduled to receive a fixed fee of nearly \$13 million in FY2019, with performance incentive fees of up to \$30 million also available.<sup>341</sup> It is unclear exactly how the partners in the LLC divide the fees. The University of

California estimated that it would receive \$13.6 million in net fee revenue from this lab for FY2019, which it would reinvest in lab oversight functions and funding for research partnerships between UC campuses and the labs.<sup>342</sup>

Several individual campuses in the University of California system are listed as partners on the Lawrence Livermore National Laboratory website.<sup>343</sup> When asked for more information, the responses from these campuses have shown varied levels of partnership, mostly at the level of research collaborations between faculty and the lab in different scientific areas.

Three campuses - UC Berkeley, UC Davis and UCLA - are partners in Sandia National Laboratories' Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>344</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>345</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>346</sup>

UC San Diego was awarded funding in 2018 for a Stewardship Science Academic Alliance Center of Excellence. The Center for Matter under Extreme Conditions will receive \$10.5 million in research grants over five years.<sup>347</sup> While the Stewardship Science Academic Alliance program funds basic, unclassified research, it seeks and funds proposals that have relevance to the stewardship of the

nation's nuclear stockpile.

## University of Colorado - Boulder

The University of Colorado - Boulder is a partner in Sandia National Laboratories' Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>348</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>349</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>350</sup>

## University of Florida

The University of Florida is a partner in Sandia National Laboratories' Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>351</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>352</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>353</sup>

A 2016 memorandum of understanding between Sandia and the University of Florida highlights the

objectives of each party in such an agreement. The agreement notes that each side wants to benefit from the capabilities of the other, partner in research and create job opportunities for students.<sup>354</sup>

The University of Florida also receives funding under the Predictive Science Academic Alliance Program (PSAAP) II for its Center for Compressible Multiphase Turbulence. PSAAP is an Advanced Simulation and Computing initiative funded by the National Nuclear Security Administration (NNSA) that has roots that date back to 1997.<sup>355</sup> Since the NNSA can no longer actively test nuclear weapons, it funds universities to develop advanced simulation capabilities. PSAAP II, the recent iteration of this initiative, started in 2014 and provided \$14.4 million annually for five years to six different centers.<sup>356</sup> In 2019, a funding opportunity announcement was made for the next five years, with award announcements expected late in 2019 and estimated to total \$20 million per year, subject to appropriation authority. The announcement emphasized that proposals should consider simulation capabilities within a discipline “of interest” to the NNSA’s mission.<sup>357</sup>

## University of Illinois at Urbana-Champaign

The University of Illinois at Urbana-Champaign is one of Sandia National Laboratories’ five Academic Alliance partner universities. These partnerships help Sandia “identify promising candidates at top universities before graduation and promote joint technology development research between graduate students and SNL researchers, pursuing topics with national security applications.”<sup>358</sup> The agreement between Sandia and the University of Illinois, acquired through a Freedom of Information Act request, notes how the two entities “will have visible

and substantive presences on each others’ campuses. This includes offices, shared staff, sabbaticals, and programmatic integration of researchers, faculty and students.”<sup>359</sup> All Academic Alliance schools are also designated as a Campus Executive university partner by Sandia. In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>360</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>361</sup>

The University of Illinois also receives funding under the Predictive Science Academic Alliance Program (PSAAP) II for its Center for Exascale Simulation of Plasma-Coupled Combustion. PSAAP is an Advanced Simulation and Computing initiative funded by the National Nuclear Security Administration (NNSA) that has roots that date back to 1997.<sup>362</sup> Since the NNSA can no longer actively test nuclear weapons, it funds universities to develop advanced simulation capabilities. PSAAP II, the recent iteration of this initiative, started in 2014 and provided \$14.4 million annually for five years to six different centers.<sup>363</sup> In 2019, a funding opportunity announcement was made for the next five years, with award announcements expected late in 2019 and estimated to total \$20 million per year, subject to appropriation authority. The announcement emphasized that proposals should consider simulation capabilities within a discipline “of interest” to the NNSA’s mission.<sup>364</sup>

## University of Kansas

The University of Kansas entered into a Master



Collaboration Agreement with the operator of the Kansas City National Security Campus on February 16, 2016.<sup>365</sup> The operator Honeywell has initiated at least ten “Master Collaboration Agreements” with universities since 2015 “to facilitate closer collaboration on research and development of new technology to meet national security needs.”<sup>366</sup> The work at the Kansas City National Security Campus centers on the manufacturing of nonnuclear components necessary for nuclear weapons.<sup>367</sup>

### University of Michigan

The University of Michigan is a partner in Sandia National Laboratories’ Campus Executive Program. This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>368</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>369</sup> Sandia National Laboratories focuses on the non-nuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>370</sup>

The university was awarded funding in 2018 for a Stewardship Science Academic Alliance Center of Excellence. The Center for Laboratory Astrophysics will receive \$5 million in research grants over five years.<sup>371</sup> While the Stewardship Science Academic Alliance program funds basic, unclassified research, it seeks and funds proposals that have relevance to the stewardship of the nation’s nuclear stockpile.

### University of Missouri - Kansas City

The University of Missouri - Kansas City entered into a Master Collaboration Agreement with the operator of the Kansas City National Security Campus on March 14, 2017.<sup>372</sup> The operator Honeywell has initiated at least ten “Master Collaboration Agreements” with universities since 2015 “to facilitate closer collaboration on research and development of new technology to meet national security needs.”<sup>373</sup> The work at the Kansas City National Security Campus centers on the manufacturing of non-nuclear components necessary for nuclear weapons.<sup>374</sup>

### University of Nebraska

The University of Nebraska manages the National Strategic Research Institute, a university affiliated research center with the Department of Defense that received a five-year, \$92 million contract renewal in 2018.<sup>375</sup> The Institute is affiliated with the U.S. Strategic Command, which has “assigned responsibilities [that] include strategic deterrence; nuclear operations; space operations; joint electronic spectrum operations; global strike; missile defense; and analysis and targeting.”<sup>376</sup> However, the five research focus areas listed for the institute emphasize detection and defense from weapons of mass destruction, not nuclear weapons capabilities.<sup>377</sup>

### University of Nevada - Las Vegas

In 2016, the University of Nevada - Las Vegas entered into a subcontracting agreement with the contractor for the Nevada National Security Site. The agreement lasts through September 2020 and, at the time of signing, had an estimated value of \$8,000,000. The university agreed to provide “research, services, and fabrication support” in a number of specified scientific and engineering

domains. Specific work and funding provided under the contract is determined by individual task orders.<sup>378</sup> The Nevada National Security Site is the location of nearly 1,000 tests of nuclear weapons in past decades, leading to serious health impacts for nearby residents and participating military personnel.<sup>379</sup> Currently, staff at the site conduct simulated experiments to test the reliability and performance of nuclear weapons.<sup>380</sup> The site also hosts “subcritical experiments” that allow for the evaluation of nuclear weapons materials under certain conditions, but do not cause a “self-sustaining nuclear chain reaction.”<sup>381</sup>

Also at the University of Nevada - Las Vegas, the Nevada National Security Site helped to offer a new graduate certificate in Nuclear Criticality Safety Engineering.<sup>382</sup>

## University of Nevada - Reno

The University of Nevada - Reno developed a new Graduate Certificate in Nuclear Packaging in partnership with the Department of Energy. A Nevada National Security Site engineer was the first to complete the program.<sup>383</sup> The Nevada National Security Site is the location of nearly 1,000 tests of nuclear weapons in past decades, leading to serious health impacts for nearby residents and participating military personnel.<sup>384</sup> Currently, staff at the site conduct simulated experiments to test the reliability and performance of nuclear weapons.<sup>385</sup> The site also hosts “subcritical experiments” that allow for the evaluation of nuclear weapons materials under certain conditions, but do not cause a “self-sustaining nuclear chain reaction.”<sup>386</sup>

## University of New Mexico

The University of New Mexico is connected to Los

Alamos National Laboratory through the New Mexico Consortium. The Consortium works to foster research collaborations and economic development opportunities in a variety of scientific areas.<sup>387</sup> The Los Alamos National Laboratory provides design and engineering for several nuclear warhead types, conducts simulated experiments to evaluate warheads, and has the capacity to produce plutonium pits, the core material for nuclear warheads.<sup>388</sup>

In addition, the managing contractor for Los Alamos, Triad, recently signed a five-year institutional agreement with the University of New Mexico that allows reciprocal access to the lab and university settings for researchers in both institutions.<sup>389</sup> In response to questions about its connections to Los Alamos and Sandia, university administration noted that the high-level agreements make collaborations between faculty and lab staff easier to facilitate.<sup>390</sup>

The University of New Mexico is one of Sandia National Laboratories’ five Academic Alliance partner universities. These partnerships help Sandia “identify promising candidates at top universities before graduation and promote joint technology development research between graduate students and SNL researchers, pursuing topics with national security applications.”<sup>391</sup> All Academic Alliance schools are also designated as a Campus Executive university partner by Sandia. In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>392</sup> In 2016, the University of New Mexico joined Boeing, Battelle, the University of Texas and Texas A&M University in an unsuccessful bid to manage Sandia.<sup>393</sup> Sandia National Laboratories focuses on the nonnuclear components of nuclear weapons and on nuclear weapons systems integration, for example

connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>394</sup>

The University of New Mexico entered into a Master Collaboration Agreement with the operator of the Kansas City National Security Campus on June 6, 2016.<sup>395</sup> The operator Honeywell has initiated at least ten “Master Collaboration Agreements” with universities since 2015 “to facilitate closer collaboration on research and development of new technology to meet national security needs.”<sup>396</sup> The work at the Kansas City National Security Campus centers on the manufacturing of nonnuclear components necessary for nuclear weapons.<sup>397</sup>

### University of Notre Dame

The University of Notre Dame was awarded funding in 2017 for a Stewardship Science Academic Alliance Center of Excellence. The Actinide Center of Excellence will receive \$12.5 million in research grants in total.<sup>398</sup> While the Stewardship Science Academic Alliance program funds basic, unclassified research, it seeks and funds proposals that have relevance to the stewardship of the nation’s nuclear stockpile.

The University of Notre Dame also receives funding under the Predictive Science Academic Alliance Program (PSAAP) II for its Center for Shock Wave-processing of Advanced Reactive Materials. PSAAP is an Advanced Simulation and Computing initiative funded by the National Nuclear Security Administration (NNSA) that has roots that date back to 1997.<sup>399</sup> Since the NNSA can no longer actively test nuclear weapons, it funds universities to develop advanced simulation capabilities. PSAAP II, the recent iteration of this initiative, started in 2014 and

provided \$14.4 million annually for five years to six different centers.<sup>400</sup> In 2019, a funding opportunity announcement was made for the next five years, with award announcements expected late in 2019 and estimated to total \$20 million per year, subject to appropriation authority. The announcement emphasized that proposals should consider simulation capabilities within a discipline “of interest” to the NNSA’s mission.<sup>401</sup>

### University of Rochester

The University of Rochester hosts the Laboratory for Laser Energetics. While not a national laboratory, it nonetheless receives substantial funding from the Weapons Activities Appropriation in the NNSA, \$80 million in FY2019 and an estimated \$409.9 million for FY2019-2023.<sup>402</sup> The lab hosts the OMEGA Laser Facility and, according to the lab’s director, the lab’s primary mission is to support the NNSA and the nation’s nuclear weapons capabilities.<sup>403</sup> Its funding supports the laboratory facilities and staff as well as a number of fellowships for graduate students at other universities. Laboratory employees only conduct basic, unclassified research at the lab; on rare occasions, the facility will close to allow national laboratory researchers to conduct classified research.<sup>404</sup>

Early in 2018, the Trump’s Administration proposed major cuts to the laboratory for FY2019 and eliminating all funding over three years time. A lobbying campaign led by New York’s Congressional delegation successfully reversed the proposal and increased funding to the laboratory. In addition to highlighting the jobs at the lab, both Senators Chuck Schumer and Kirsten Gillibrand noted its importance to national security.<sup>405</sup> The president of the University of Rochester claimed it was the “largest university-based U.S.

Department of Energy program in the U.S.”<sup>406</sup>

### University of South Carolina - Aiken

The University of South Carolina - Aiken is one of five institutions that divide \$2 million in annual funding from the National Nuclear Security Administration for workforce development grants in support of staffing needs at the Savannah River Site.<sup>407</sup> Staff at this site help recycle tritium from old warheads, an element that increases the yield of nuclear weapons, to reuse in new warheads. The Trump Administration proposed that this site begin production of plutonium pits in addition to those produced at Los Alamos.<sup>408</sup> If this proposal is approved, the site’s workforce needs would grow more acute.

### University of South Carolina - Salkehatchie

The University of South Carolina - Salkehatchie is one of five institutions that divide \$2 million in annual funding from the National Nuclear Security Administration for workforce development grants in support of staffing needs at the Savannah River Site.<sup>409</sup> Staff at this site help recycle tritium from old warheads, an element that increases the yield of nuclear weapons, to reuse in new warheads. The Trump Administration proposed that this site begin production of plutonium pits in addition to those produced at Los Alamos.<sup>410</sup> If this proposal is approved, the site’s workforce needs would grow more acute.

### University of Tennessee

The University of Tennessee is listed as a “Key University Partner” by Consolidated National Security, LLC, the managing contractor for the Pantex Plant and the Y-12 National Security Complex, “demon-

strating expertise in aligned research interests, strength in academic and research disciplines, successful working relationships with university faculty and administration, and extensive programmatic and research interactions supporting key CNS initiatives.”<sup>411</sup>

Formal partnership between Y-12 and the University of Tennessee, Knoxville dates to 2011. A press release at the time noted, “Under the MOU, the two plan to expand their partnership and are considering several jointly funded research projects and the possibility of initiating joint research institutes or centers of excellence to solve complex national security and manufacturing-related problems facing our nation.”<sup>412</sup> A 2014 article from the business school gave an update, “Today, both sites are reaping the benefits of this unique partnership, which brings valuable expertise to Y-12 in a variety of disciplines while providing unique educational and research opportunities for UT students and faculty.”<sup>413</sup> The Y-12 Complex sources the enriched uranium necessary for nuclear weapons.<sup>414</sup>

### University of Texas at Austin

The University of Texas at Austin is one of Sandia National Laboratories’ five Academic Alliance partner universities. These partnerships help Sandia “identify promising candidates at top universities before graduation and promote joint technology development research between graduate students and SNL researchers, pursuing topics with national security applications.”<sup>415</sup> All Academic Alliance schools are also designated as a Campus Executive university partner by Sandia. In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>416</sup> In 2016, the University of Texas joined Boeing, Battelle, the

University of New Mexico and Texas A&M University in an unsuccessful bid to manage Sandia.<sup>417</sup>

Sandia National Laboratories focuses on the non-nuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>418</sup>

The university was awarded funding in 2018 for a Stewardship Science Academic Alliance Center of Excellence. The Center for Astrophysical Plasma Properties will receive \$7 million in research grants over five years.<sup>419</sup> While the Stewardship Science Academic Alliance program funds basic, unclassified research, it seeks and funds proposals that have relevance to the stewardship of the nation's nuclear stockpile.

## University of Utah

The University of Utah receives funding under the Predictive Science Academic Alliance Program (PSAAP) II for its Carbon-Capture Multidisciplinary Simulation Center. PSAAP is an Advanced Simulation and Computing initiative funded by the National Nuclear Security Administration (NNSA) that has roots that date back to 1997.<sup>420</sup> Since the NNSA can no longer actively test nuclear weapons, it funds universities to develop advanced simulation capabilities. PSAAP II, the recent iteration of this initiative, started in 2014 and provided \$14.4 million annually for five years to six different centers.<sup>421</sup> In 2019, a funding opportunity announcement was made for the next five years, with award announcements expected late in 2019 and estimated to total \$20 million per year, subject to appropriation authority.

The announcement emphasized that proposals should consider simulation capabilities within a discipline “of interest” to the NNSA's mission.<sup>422</sup>

## University of Wisconsin – Madison

The University of Wisconsin - Madison is listed as a partner by Sandia National Laboratories in its Campus Executive Program, although the university's public records office did not find any record of a formal partnership agreement between the two entities.<sup>423</sup> This program aims to build deeper relational connections between the laboratory and different universities for the purpose of research collaboration and future workforce recruitment.<sup>424</sup> In FY2018, Sandia invested \$18.7 million in research across its Campus Executive and Academic Alliance universities.<sup>425</sup> Sandia National Laboratories focuses on the non-nuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety and reliability of nuclear weapons.<sup>426</sup>



## Appendix B:

# Research Methodology

The details in this report are sourced from public information available on the Internet or provided by university representatives and government agencies. In a general sense, International Campaign to Abolish Nuclear Weapons (ICAN) staff attempted to “follow the money,” first examining federal government budget sources for nuclear weapons activities, determining which facilities received these funds, and then exploring connections between these facilities and universities.

Within the National Nuclear Security Administration budget, ICAN scrutinized activities funded under the Weapons Activities account. Other NNSA budget sections, including the Defense Nuclear Nonproliferation account, were not explored in detail. Department of Defense funding was tracked through extensive searches of its contracts database, but it should be noted that the information provided in its contract announcements is limited.

When determining which NNSA sites to include, staff reviewed the level of Weapons Activities dollars provided to each site as a total amount and as a percentage of total Department of Energy funding. With the exception of the Savannah River Site, all of the NNSA sites included here receive greater than 70% of their Department of Energy funding from the Weapons Activities account. The Savannah River Site was also included due to the high dollar amount received from the Weapons Account.

ICAN staff reviewed contract documents, press releases, reports, news articles, and web sites to find the information included in this report. Once a list of

identified connections to universities was created, questions were sent to university representatives to better understand the nature of partnerships between the universities and the NNSA from the universities’ perspectives. Some university officials provided direct answers, some deferred to public records request processes, some declined to give information, and some did not respond. A small number of public records requests were filed, primarily when that route was recommended by university contacts.

Similarly, clarifying questions and requests for further information were also sent to staff at the NNSA sites, some of whom provided responses. ICAN is grateful to those civil servants and university officials who took time to respond to its requests, and also to experts in the nuclear policy and scientific communities who provided input about the content of this report. Before the report was finalized, each university listed in Appendix A was given a week to review and provide comments or corrections to the section concerning their school.

The nuclear weapons complex in the United States is opaque by nature. Even when the core mission of national laboratories is to support this work, their public documents more frequently advertise work in other arenas. Universities likewise do not tend to advertise connections to the nuclear weapons industry. Given these realities, the work of this report should not be considered an exhaustive look at the topic of university connections to nuclear weapons in the United States. Greater transparency is needed to better understand the full scope of university involvement in this arena.

## Appendix C:

# United States Nuclear Weapons Complex Overview

The Department of Energy's National Nuclear Security Administration (NNSA) and the Department of Defense (DoD) divide responsibilities for the nation's nuclear weapons. The NNSA is responsible for the research, development, production and dismantlement of the nuclear warheads themselves, while the DoD manages the development of warhead delivery systems, such as missiles, aircraft, and submarines. The DoD also manages the deployment of nuclear weapons once they are fully produced.<sup>427</sup>

For Fiscal Year 2020, the Trump Administration proposed a budget of \$16.5 billion for the NNSA and \$24.9 billion for DoD nuclear forces.<sup>428</sup> Within the NNSA proposal, three quarters of the proposed budget is dedicated to Weapons Activities, an amount six times the size of the proposed budget for the category Defense Nuclear Nonproliferation, which supports important non-proliferation detection and verification work.<sup>429</sup> Over the next ten years, the Congressional Budget Office estimates U.S. taxpayers will pay nearly \$500 billion to maintain and modernize its country's nuclear weapons arsenal.<sup>430</sup> A separate estimate brings the total over the next 30 years to an estimated \$1.7 trillion.<sup>431</sup> Proposals for nuclear weapons spending have increased under President Trump.<sup>432</sup>

## Department of Defense

The DoD maintains what it terms a “nuclear triad,” which means the ability to launch nuclear weapons from land, sea and air. To support this triad, the DoD signs contracts with numerous private companies worth billions of dollars every year. For a thorough list of nuclear weapons producers and their contract details, see Don't Bank on the Bomb's 2019 report “Producing Mass Destruction: Private companies and the nuclear weapons industry.”<sup>433</sup>

The DoD also creates and maintains deep connections to many universities. Due to the often classified nature of military contracts, it is difficult to determine which universities with DoD contracts are directly connected to nuclear weapons development. The information below reviews military spending at universities in general.

According to the National Science Foundation, from 1990 to 2017, the Department of Defense increased its spending on Research and Development in the fields of science and engineering at universities and colleges by 62%, after adjusting for inflation.<sup>434</sup> In 2017, the latest year with comprehensive data available, DoD spent \$3.6 billion for these purposes at universities and colleges.<sup>435</sup>

The DoD has also established long-term relationships with a number of university laboratories grouped into a category called University Affiliated Research Centers (UARCs).<sup>436</sup> According to a July 2010 DoD Management Plan, a UARC “provides or maintains DoD essential engineering, research, and/or development capabilities defined as core.” To receive this designation, a center must now receive

non-competitive contract dollars worth at least \$6 million per year on average – but often much more – and maintain a “long-term strategic relationship” with the department.<sup>437</sup>

Universities with a UARC account for nine of the ten schools that received the most DoD funding for research and development in FY2017. Between the nine universities, the DoD supported almost \$2 billion in research.<sup>438</sup>

## National Nuclear Security Administration

The majority of this report details connections between universities and the NNSA. The NNSA nuclear weapons activities occur at a handful of core sites. These sites are owned by the government but operational management is contracted out to private entities. For an in-depth review of these sites, a helpful resource is the Congressional Research Service report “The U.S. Nuclear Weapons Complex: Overview of Department of Energy Sites.”<sup>439</sup> The following brief summary relies on information from this report as well as NNSA budget materials.

The nuclear weapons complex consists of three primary laboratories: the Los Alamos National Laboratory in New Mexico, the Lawrence Livermore National Laboratory in California, and the Sandia National Laboratories in multiple locations, primarily New Mexico and California. It should be noted that these labs receive some funding from sources other than the Department of Energy and NNSA; while they perform research in a wide variety of areas, their core mission - and the source of the majority of their funding - remains nuclear weapons programs. Because of the opaque nature of nuclear weapons research, it

can be difficult to parse out what research feeds the nuclear weapons mission and what may be unrelated. Non-weapons research areas at the labs include energy, cybersecurity, biomedical science and environmental management, to name just a few.

In addition to the labs, the NNSA nuclear weapons complex also includes one experimental testing site, the Nevada National Security Site (formerly known as the Nevada Nuclear Test Site), and four production facilities, the Kansas City National Security Campus in Missouri, the Savannah River Site in South Carolina, the Pantex Plant in Texas, and the Y-12 National Security Campus in Tennessee.

### Los Alamos National Laboratory

The University of California has been involved in the management of the Los Alamos lab since its founding. The Los Alamos National Laboratory is now run by Triad National Security, LLC, a legal entity that consists of the Battelle Memorial Institute, the Regents of the University of California, and Texas A&M University. In 2018, Triad took over the management contract from a different LLC that consisted of Battelle, the University of California, Babcock and Wilcox, and the URS Corporation.<sup>440</sup> The contract runs for five years, with five additional one-year options.<sup>441</sup>

The lab provides design and engineering for several nuclear warhead types, conducts simulated experiments to evaluate warheads, and has the capacity to produce plutonium “pits,” the core material for nuclear warheads.<sup>442</sup>

Department of Energy funding for the Lab in FY2019 was \$2.48 billion, of which 76% comes from the NNSA’s Weapons Activities Appropriations.<sup>443</sup>

### Lawrence Livermore National Laboratory

Since 2007, Lawrence Livermore National Security, LLC has managed the Lawrence Livermore National Laboratory. This LLC consists of Bechtel National, the Regents of the University of California, BWX Technologies, and AECOM.<sup>444</sup> The current contract runs through September 30, 2023.<sup>445</sup> Prior to 2007, the University of California had managed the Laboratory since its inception.<sup>446</sup>

Similar to the Los Alamos lab, the Lawrence Livermore lab provides design and engineering for several nuclear warhead types and conducts simulated experiments to evaluate warheads.<sup>447</sup>

Department of Energy funding for the Lab in FY2019 was \$1.56 billion, of which 86% comes from the NNSA's Weapons Activities Appropriations.<sup>448</sup>

### Sandia National Laboratories

The Sandia National Laboratories are a collection of labs operated as one entity. The primary campuses are located in Albuquerque, NM and Livermore, CA. For almost 25 years, Sandia was operated by Lockheed Martin. Then in 2016, the NNSA awarded the management and operation contract to National Technology and Engineering Solutions of Sandia, LLC, a wholly owned subsidiary of Honeywell International, Inc.<sup>449</sup> The current contract runs through 2022.<sup>450</sup>

Sandia National Laboratories focuses on the non-nuclear components of nuclear weapons and on nuclear weapons systems integration, for example connecting warheads to their missile delivery systems. Sandia also performs simulated experiments to test the safety, reliability and lethality of nuclear weapons.<sup>451</sup>

Department of Energy funding for the Lab in FY2019 was \$2.30 billion, of which 82% comes from the NNSA's Weapons Activities Appropriations.<sup>452</sup>

### Nevada National Security Site

The Nevada National Security Site is managed by Mission Support and Test Services, LLC, which is a partnership between Honeywell International Inc., Jacobs Engineering Group Inc., and Huntington Ingalls Industries Nuclear, Inc. MSTs won the contract for managing the NNSS in 2017. The contract is a five-year contract with options for five additional years.<sup>453</sup>

The Nevada National Security Site is the location of nearly 1,000 tests of nuclear weapons in past decades, leading to serious health impacts for nearby residents and participating military personnel.<sup>454</sup> Currently, staff at the site conduct simulated experiments to test the reliability and performance of nuclear weapons.<sup>455</sup> The site also hosts "subcritical experiments" that allow for the evaluation of nuclear weapons materials under certain conditions, but do not cause a "self-sustaining nuclear chain reaction."<sup>456</sup>

Department of Energy funding for the site in FY2019 was \$388 million, of which 71% comes from the NNSA's Weapons Activities Appropriations.<sup>457</sup>

### Kansas City National Security Campus

The Kansas City National Security Campus is operated by Honeywell Federal Manufacturing & Technologies, LLC. Honeywell's current base contract expires at the end of September 2020, but contains five additional one-year options.<sup>458</sup>

The work at this site centers on the manufacturing of non-nuclear components necessary for nuclear

weapons.<sup>459</sup>

Department of Energy funding for the site in FY2019 was \$753 million, of which 96% comes from the NNSA's Weapons Activities Appropriations.<sup>460</sup>

### **Savannah River Site**

The Savannah River Site is managed by Savannah River Nuclear Solutions, LLC, a partnership including Fluor, Newport News Nuclear, and Honeywell. SRNS' original contract started in 2008 and lasted through July 2018; it has since received two extensions that extend the contract to September 2020.<sup>461</sup>

Staff at this site help recycle tritium from old warheads, an element that increases the yield of nuclear weapons, to reuse in new warheads. The Trump Administration has also proposed that this site begin production of plutonium pits in addition to those produced at Los Alamos.<sup>462</sup>

Department of Energy funding for the site in FY2019 was \$1.82 billion, of which 17% comes from the NNSA's Weapons Activities Appropriations.<sup>463</sup> While this is a smaller percentage than other sites, it still constitutes a high weapons activities expenditure of \$300 million. This appropriation does not include the production of new plutonium pits, as those plans have yet to clear the environmental impact assessment process. Environmental clean up activities constitute the largest portion of spending at this site.

### **Pantex Plant and Y-12 National Security Complex**

Starting in July 2014, these two production sites have been administered under one contract. The purpose of combining the two sites into one contract was to achieve cost savings, but those savings have

not materialized.<sup>464</sup> The contract was awarded to Consolidated Nuclear Security, LLC, a corporate subsidiary of Bechtel National, Leidos, ATK Launch Systems, and SOC, LLC.<sup>465</sup> The base contract expired in June 2019, but optional terms can extend it through June 2024.<sup>466</sup>

The Pantex Plant is responsible for the dismantling of retired warheads and the reassembly of warheads undergoing life extension projects and is the storage location for thousands of plutonium pits. The Y-12 Complex sources the enriched uranium necessary for nuclear weapons.<sup>467</sup>

Department of Energy funding for the Pantex Plant in FY2019 was \$825 million, of which 99% comes from the NNSA's Weapons Activities Appropriations.<sup>468</sup>

Department of Energy funding for the Y-12 site in FY2019 was \$1.86 billion, of which 97% comes from the NNSA's Weapons Activities Appropriations.<sup>469</sup>

### **Other Facilities**

A number of other national laboratories receive small amounts of weapons activities funding from the NNSA, but since these amounts are small relative to their overall budgets (less than 5% of total funding from the Department of Energy) the facilities are not included here.



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