

project at NASA's primary large-scale aerospace manufacturing facility, as assumed in the budget request.

Environmental Compliance and Restoration.—The recommendation includes \$74,700,000, which is \$8,200,000 less than the fiscal year 2020 appropriation and equal to the requested level, for Environmental Compliance and Restoration activities. NASA's Environmental Compliance and Restoration (ECR) program cleans up hazardous materials and waste products released to the surface or groundwater at NASA installations, NASA-owned industrial plants supporting NASA activities, current or former sites where NASA operations have contributed to environmental problems, and other sites where the Agency is legally obligated to address hazardous pollutants. Included in this amount is funding to manage costs while remediating environmental contaminants at the Santa Susana Field Laboratory.

Santa Susana Field Laboratory.—The Committee is pleased with the progress of building demolition at the Santa Susana Field Laboratory but remains concerned about soil remediation. The Committee understands that NASA is working with the State of California under the 2007 Consent Order and 2010 Administrative Order on Consent regarding soil and groundwater cleanup at the site and on expediting the State's environmental impact report. The Committee encourages NASA to continue working with the State of California on cleanup of the site.

OFFICE OF THE INSPECTOR GENERAL

The Committee recommends \$44,200,000 for the Office of the Inspector General, which is \$2,500,000 above fiscal year 2020 appropriation and equal to the requested level.

ADMINISTRATIVE PROVISIONS

(INCLUDING TRANSFERS OF FUNDS)

The Committee has included the following administrative provisions for NASA:

The bill includes a provision that makes funds for any announced prize available without fiscal year limitation until the prize is claimed or the offer is withdrawn.

The bill includes a provision that establishes terms and conditions for the transfer of funds.

The bill includes a provision that requires NASA to submit its agency spending plan at the activity level and subjects both the spending plan and specified changes to that plan to reprogramming procedures under section 505 of this Act.

The bill includes a provision that limits the availability of funds for certain activities until a plan is submitted.

NATIONAL SCIENCE FOUNDATION

The Committee recommends \$8,548,343,000 for the National Science Foundation (NSF). This significant investment, which is \$270,013,000 above fiscal year 2020 and \$806,943,000 above the request, shows the Committee's continued support for science, the academic community, and the next generation of scientists, mathematicians, astronomers, and engineers across the country. The Committee underscores the importance of basic research that both

improves the lives of Americans and expands our understanding of the Earth, the depths of our oceans, our solar system, the universe, and oceans on other planets.

In addition, the Coronavirus Aid, Relief, and Economic Security Act (CARES Act) (Public Law 116–136) included \$75,000,000 for Research and Related Activities and \$1,000,000 for Agency Operations and Award Management to prevent, prepare for, and respond to coronavirus, domestically or internationally.

The Committee supports infrastructure investments that expand our understanding of the universe and inspire students to pursue careers in the sciences. The Committee recognizes that current and future large scientific facilities represent an enormous investment of Federal resources that must be administered wisely. The Committee supports basic research in fundamental science areas and expects that as NSF uses the 10 Big Ideas as a focusing tool, the funding for the fundamental scientific disciplines will be maintained. Within amounts provided, NSF shall allocate no less than fiscal year 2020 levels to support its existing scientific research, research laboratories, observational networks, and other research infrastructure assets, including the astronomy assets, the current academic research fleet, Federally funded research and development centers, and the national high-performance computing centers, so that they may provide the support needed for cutting edge research.

Divestment activities.—The Committee is aware that NSF is working with a variety of academic, private sector, and other government agencies with respect to the future operation of some of its observatories. NSF shall continue to keep the Committee informed regarding the status of these activities. Any proposal by NSF to divest the Foundation of these facilities shall be proposed as part of any future NSF budget request and is subject to NSF administrative provisions included in the accompanying bill.

Innovation Corps.—The Committee recognizes the value of translating basic research for public benefit, and the recommendation includes \$40,000,000 for the Innovation Corps program to continue to build on the initial successes of its highly innovative public-private partnership model and recent expansion of the program to additional academic institutions.

HBCU Student Diversity and Success Research.—The Committee recognizes the value of understanding how students of diverse racial and ethnic backgrounds may succeed in an academic setting. Of the funds appropriated, NSF is encouraged to support research to identify and understand how HBCUs with diverse academic cultures successfully graduate African American students at a higher rate than other institutions; produce a higher rate of African American STEM students receiving PhDs; and instill in students a greater sense of well-being. Within 180 days of enactment of this Act, NSF shall provide a report to the Committee on how NSF funded research is contributing to the success of HBCUs.

Foundation for Evidence-Based Policymaking Act Implementation.—Within 90 days of enactment of this Act, the Committee directs NSF to report on the implementation of the Foundations for Evidence-Based Policymaking Act of 2018 (Public Law 115 435) and progress being made by NSF in this area.

Agency-wide Evidence Participation.—The Committee encourages NSF to develop guidance to ensure that all relevant internal and external stakeholders are involved in Agency-wide processes for prioritizing and conducting evidence generation activities.

RESEARCH AND RELATED ACTIVITIES

The Committee recommends \$6,967,123,000 for Research and Related Activities, which is \$229,923,000 above fiscal year 2020 and \$754,103,000 above the request. The Committee believes that strategic investments in the physical sciences are vitally important for the United States to remain the global leader in innovation, productivity, economic growth, and high-paying jobs for the future.

This Committee commends the National Science Foundation for issuing its plan entitled, *Increasing Access to the Results of Research Funded by the National Science Foundation*, on March 18, 2015. The Committee urges the National Science Foundation to continue its efforts of the plan and requires an update on the agency's activities be included in its fiscal year 2022 budget request.

Artificial intelligence (AI).—The Committee believes it is important to maintain leadership in artificial intelligence and commends NSF for its significant investments in this area. The Committee recognizes the potential of artificial intelligence to transform the economy, foster economic growth, support national security, and enhance well-being.

To continue the progress in this emerging field, the Committee recommends no less than the fiscal year 2020 levels to support AI-related grants and interdisciplinary research initiatives. The committee encourages NSF to continue its efforts in workforce development for AI and other emerging technologies, with focused outreach to community colleges, Historically Black Colleges and Universities, Hispanic Serving Institutions, and Minority Serving Institutions.

The Committee continues to urge NSF to invest in the ethical and safe development of AI. The Committee acknowledges receiving the NSF Leadership and Investments in Artificial Intelligence Research Report and further encourages NSF to report to the Committee on any cooperative projects on Artificial Intelligence between United States entities and international partners.

Established Program to Stimulate Competitive Research (EPSCoR).—The recommendation includes no less than \$205,000,000 for the EPSCoR program to help targeted jurisdictions strengthen STEM capacity and capability to broaden the expertise base, impact jurisdictional economic growth, and develop a skilled workforce capable of generating high-tech jobs in all states of the nation. EPSCoR states have many unmet needs including equipment and computing/networking resources, sufficient numbers of researchers, especially at the graduate and post-doctoral levels, and better integration into regular NSF programs, which co-funding can help overcome.

Existing astronomy assets.—The Committee underscores that a critical component of the nation's scientific enterprise is the infrastructure that supports researchers in discovery science, including planetary protection. Investments to advance the frontiers of research and education in science and engineering are critical to the nation's innovation enterprise. U.S.-based astronomy facilities con-

tinue to make groundbreaking discoveries and maintain excellent world-class scientific research. The Committee instructs NSF to sustain support for the programs and scientific facilities funded by the Astronomical Sciences Division at no less than the fiscal year 2020 levels to maintain full scientific and educational operations. The Committee is aware that NSF is working with Federal, academic, and private sector partners to develop plans to share future operations and maintenance costs of NSF astronomical infrastructure. NSF shall keep the Committee informed of these activities. Further, any proposal by NSF to divest the Foundation of these facilities shall be proposed as part of any future NSF budget request and is subject to NSF administrative provisions included in the accompanying bill.

Quantum initiative.—The Committee supports NSF’s research program in quantum information science and technology in support of the authorized activities included in section 401 and section 402 of the National Quantum Initiative Act (Public Law 115 368). This emerging field of science promises to yield revolutionary new approaches to computing, sensing, and communication. NSF should remain committed to developing and supporting systems that facilitate tremendous leaps in computational simulation, including artificial intelligence, storage, quantum computing, and data analyses that enable a broad range of scientific research. Leading edge high-performance computing infrastructure is vital for continued U.S. world leadership and international scientific competitiveness, particularly given computational investments and technical achievements in high-performance computing by other nations. The recommendation provides no less than the fiscal year 2020 level for these activities.

Historically Black Colleges and Universities Excellence in Research Program.—The agreement includes \$20,000,000 for the Historically Black Colleges and Universities Excellence in Research Program.

Arctic Research.—As NSF continues its Navigating the New Arctic program, the Committee encourages NSF to formulate research programs that also address non-Arctic populations in the continental United States, funding research and training initiatives that focus on global impacts of Arctic change. Specifically, NSF should consider change in the North Atlantic sector of the Arctic and resultant impacts on communities in North America.

Harmful Algal Blooms (HABs).—The Committee supports the work of the Oceans and Human Health program to better understand the public health risk of environmental exposures and encourages NSF to continue to support research into the human health impacts of HABs in marine coastal regions, the Great Lakes Basin, and other freshwater systems. HABs jeopardize the integrity of drinking water resources in these regions. The recommendation provides no less than the fiscal year 2020 level for HAB research activities.

Social, Behavioral, and Economic Sciences (SBE).—The Committee supports SBE and recognizes the fundamental importance of the research it supports in advancing our understanding of human behavior and its application to a wide range of human systems, including public health, national defense and security, education and learning, and the integration of human and machine. SBE funds

over half of our nation's university-based social and behavioral science research but remains one of the smallest NSF directorates. The Committee believes this research provides an evidence-based understanding of the human condition, resulting in more-informed policymaking and better-informed spending on a full range of national issues. The committee believes SBE-supported research makes the US unique among other nations and recommends no less than the fiscal year 2020 levels for SBE activities.

Decadal Survey on Astronomy and Astrophysics 2020 (Astro2020).—NSF funding enables astronomical research in the U.S., at facilities across the globe, and through its flagship observatories at NSF's National Optical-Infrared Astronomy Research Laboratory, the National Radio Astronomy Observatory, the National Astronomy and Ionosphere Center, and the National Solar Observatory. NSF should continue its support for existing astronomical facilities in its budget planning, including through its Windows on the Universe Big Idea. As Congress awaits recommendations from the 2020 Astrophysics and Astronomy Decadal Survey, the Committee also reiterates its support for preliminary investments in emerging priority facilities, such as the next generation Very Large Array and the Extremely Large Telescopes. The Committee is aware that NSF is providing funding in preparation for these future facilities, and the Committee encourages NSF to continue to do so over the coming year.

Algorithmic bias research.—The Committee encourages NSF to continue to partner with non-government organizations, academic institutions, and other government agencies including the National Institute of Standards and Technology, to fund research on algorithmic bias in artificial intelligence, machine learning and intelligent systems and its impacts on decisions related to employment, housing, creditworthiness, and many other areas, and to develop methods, tools, and programs for resolving bias within an algorithm. The Committee recognizes that the science sponsored through such collaboration is important for studying the impact that algorithms have on protected classes and for developing an understanding of what kinds of discrimination and bias protected classes face in these particular activities.

The Committee directs NSF to prepare a report on artificial intelligence and bias. This report should include but is not limited to: (1) a description of the current NSF research related to the issue of artificial intelligence and bias; (2) an outline of what research could be done to better understand the issue of artificial intelligence and bias; (3) a description of current NSF initiatives to promote diversity in computer science and machine learning; (4) recommendations for what could be done to further promote diversity in computer science and machine learning; (5) recommendations for how NSF-funded artificial intelligence research can help prevent biased results and (6) any other relevant observations or recommendations within the field of artificial intelligence and bias. Some specific topics could include transparency, explainability, accountability, potential adverse biases and effects, mitigation strategies, validation of fairness, and consideration of inclusivity. This report shall be made publicly available on the NSF website within 270 days after the date of enactment of this Act.

Solar Astronomy.—The Committee commends NSF’s ongoing efforts to partner with academic institutions and the National Solar Observatory (NSO) to operate the Richard B. Dunn Solar Telescope (DST) that provides opportunities for solar astronomers to continue to use DST and its associated instrumentation, in the continental United States, in addition to the Daniel K. Inouye Solar Telescope. The Committee encourages NSF to continue its partnerships to ensure this valuable resource is available for continued research.

Facility Operations.—The Committee is supportive of NSF’s role in building and operating groundbreaking research facilities, especially in areas that maintain or enhance U.S. leadership in key disciplines. Furthermore, the need for continued investment in world-class major research facilities is not expected to diminish over the coming decade. The Committee supports NSF’s acknowledgement of the findings and recommendations of National Science Board Report 2018–17, including the Facility Operation Transition pilot program. Within 90 days of the enactment of this Act, NSF shall report to the Committee how it is implementing the report findings and how NSF will ensure continued health of existing facilities.

MAJOR RESEARCH EQUIPMENT AND FACILITIES CONSTRUCTION

The Committee recommends \$243,230,000 for Major Research Equipment and Facilities Construction, which is equal to the fiscal year 2020 level and \$13,480,000 above the request. The recommendation includes \$1,000,000, as requested, for enhanced oversight. NSF shall continue to provide quarterly briefings to the Committee on the activities funded in this account.

Antarctica Infrastructure Modernization for Science (AIMS).—The recommendation includes \$97,890,000 for AIMS to replace major facilities at McMurdo Station, Antarctica. The Committee supports the AIMS program and the recommendations for increased efficiencies included in the U.S. Antarctic Program Blue Ribbon Panel report, *More and Better Science in Antarctica through Increased Logistical Effectiveness*.

High Luminosity-Large Hadron Collider Upgrade (HL-LHC).—The recommendation includes \$33,000,000 for upgrades to the detectors at the Large Hadron Collider, as requested.

Vera C. Rubin Observatory.—The recommendation includes \$40,750,000, equal to the requested level, for the Vera C. Rubin Observatory, which was ranked as the top large ground-based astronomy project by the National Research Council 2010 Decadal Survey. This observatory will produce the deepest, widest-field sky image ever and issue alerts for moving and transient objects within 60 seconds of discovery.

Mid-scale research infrastructure.—The recommendation includes \$70,590,000, within the MREFC account, for mid-scale research infrastructure. The Committee commends NSF for its planned investments in mid-scale research infrastructure, including the provision of larger mid-scale instrumentation and the facility operation transition program to better enable support for facilities over their complete lifespan.

The Committee directs NSF to report, within 180 days of the enactment of this Act, on the implementation of the recommendations in the National Science Board 2018 report entitled *Bridging the*

Gap: Building a Sustained Approach to Mid-scale Research Infrastructure and Cyberinfrastructure at NSF.

Infrastructure planning.—The Committee is concerned about NSF's planning for the construction and development of the next-generation of competitive large-scale facilities to support NSF-funded science disciplines, including ground-based telescopes. Failure to plan for the next generation of facilities handicaps the U.S. science community and risks our nation's global leadership in science. The Committee encourages NSF to develop a comprehensive and prioritized list of large-scale facilities requested by NSF-supported science disciplines.

EDUCATION AND HUMAN RESOURCES

The Committee recommends \$970,000,000 for Education and Human Resources, which is \$30,000,000 above fiscal year 2020 and \$39,070,000 above the request.

Broadening participation programs.—To broaden the participation of underrepresented populations in STEM education programs and, ultimately, the STEM workforce, the recommendation provides no less than \$51,000,000 for the Louis Stokes Alliance for Minority Participation; no less than \$70,000,000 for the Robert Noyce Teacher Scholarship Program; no less than \$75,000,000 for the Advanced Technological Education Program; and no less than \$18,000,000 for the Tribal Colleges and Universities Program.

Inclusion across the Nation of Communities of Learners of Underrepresented Discoverers in Engineering and Science (NSF INCLUDES).—The Committee supports the NSF INCLUDES program, which is a comprehensive national initiative designed to enhance U.S. leadership in science, technology, engineering and mathematics discoveries and innovations focused on NSF's commitment to diversity, inclusion, and broadening participation in these fields. The recommendation includes no less than \$20,000,000 for the NSF INCLUDES program.

IUSE Program.—The Committee supports the Improving Undergraduate STEM Education (IUSE) Program and the recommendation provides no less than \$95,000,000 for program activities.

Hispanic Serving Institutions (HSIs).—Hispanic Serving Institutions and the HSI grant program play an important role in increasing the recruitment, retention, and graduation rates of Hispanic students pursuing STEM degrees, particularly at institutions of higher education that typically do not receive high levels of NSF funding. The recommendation includes no less than \$48,000,000 for the HSI program.

The Committee is concerned by the severe underrepresentation of Hispanic Ph.D. graduates in the STEM fields and directs NSF to collaborate with stakeholders in preparing a plan that addresses this issue and leads to an increase in the rate of Hispanic Ph.D. graduates in the STEM fields. NSF shall report back to the Committee on the status of this plan not later than 120 days after the enactment of this Act.

Historically Black Colleges and Universities Undergraduate Program (HBCU-UP).—The recommendation provides no less than \$38,000,000 for the HBCU-UP. This initiative provides strategic programs and opportunities for Historically Black Colleges and Universities (HBCUs) that stimulate sustainable improvement in

their research and development capacity and competitiveness. The Committee encourages NSF to continue to use research infrastructure improvement grants, co-funding programs, and other innovative mechanisms to boost HBCU participation and capacity throughout NSF research programs.

Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs).—The Committee notes that among the minority-serving institutions with whom NSF provides grant opportunities, AANAPISIs are not designated. The Committee urges NSF to increase grant funding opportunities for AANAPISIs, and to reach out to these institutions to raise awareness regarding these grants.

Computer Science for All (CSforAll).—CSforAll will help facilitate research into effective approaches to the teaching and learning of computer science across grades Pre-K–12; it is critical to NSF’s mission and to ensure America’s children are prepared for a 21st century economy. The Committee supports this new program and is encouraged by its promise.

Early Childhood STEM Education.—The Committee urges NSF, in awarding grants under its Discovery Research Pre-K–12 program, to consider age distribution in order to more equitably allocate funding for research studies with a focus on early childhood.

Cybersecurity research.—The Committee encourages NSF to form partnerships with Hispanic Serving Institutions and Historically Black Colleges and Universities with respect to cybersecurity research.

CyberCorps.—The Committee provides no less than \$58,000,000 for CyberCorps: Scholarships for Service program and urges NSF to use the CyberCorps Faculty Fellows pilot program to address the critical shortage of cybersecurity faculty in U.S. institutions of higher education. In addition, the Committee urges NSF to continue work with qualified community colleges including through providing scholarships and apprenticeship opportunities.

AGENCY OPERATIONS AND AWARD MANAGEMENT

The Committee recommends \$345,640,000 for Agency Operations and Award Management, which is \$8,740,000 above fiscal year 2020 and the same as the request.

OFFICE OF THE NATIONAL SCIENCE BOARD

The Committee recommends \$4,500,000 for the National Science Board, which is the same as fiscal year 2020 and \$290,000 above the request.

OFFICE OF INSPECTOR GENERAL

The Committee recommends \$17,850,000 for the Office of Inspector General, which is \$1,350,000 above fiscal year 2020 and the equal to the request.

ADMINISTRATIVE PROVISIONS

(INCLUDING TRANSFER OF FUNDS)

The bill includes a provision that establishes thresholds for the transfer of funds.