

(4) Current radioisotope power systems supplies and production will not fully support NASA missions planned even in the next decade and, without a new domestic production capability, the United States will no longer have the means to explore the majority of the solar system by the end of this decade.

(5) Continuing to rely on Russia or other foreign sources for radioisotope power system fuel production is not a secure option.

(6) Reestablishing domestic production will require a long lead-time. Thus, meeting future space exploration mission needs requires that a restart project begin at the earliest opportunity.

(b) In general

The Administrator shall, in coordination with the Secretary of Energy, pursue a joint approach beginning in fiscal year 2011 towards restarting and sustaining the domestic production of radioisotope thermoelectric generator material for deep space and other science and exploration missions. Funds authorized by this chapter for NASA shall be made available under a reimbursable agreement with the Department of Energy for the purpose of reestablishing facilities to produce fuel required for radioisotope thermoelectric generators to enable future missions.

(c) Report

Within 120 days after October 11, 2010, the Administrator and the Secretary of Energy shall submit a joint report to the appropriate committees of Congress on coordinated agreements, planned implementation, and anticipated schedule, production quantities, and mission applications under this section.

(Pub. L. 111-267, title VIII, §806, Oct. 11, 2010, 124 Stat. 2833.)

§ 18386. Collaboration with ESMD and SOMD on robotic missions

The Administrator shall ensure that the Exploration Systems Mission Directorate and the Space Operations Mission Directorate coordinate with the Science Mission Directorate on an overall approach and plan for interagency and international collaboration on robotic missions that are NASA or internationally developed, including lunar, Lagrangian, near-Earth orbit, and Mars spacecraft, such as the International Lunar Network. Within 90 days after October 11, 2010, the Administrator shall provide a plan to the appropriate committees of Congress for implementation of the collaborative approach required by this section. The Administrator may not cancel or initiate any Exploration Systems Mission Directorate or Science Mission Directorate robotic project before the plan is submitted to the appropriate committees of Congress.

(Pub. L. 111-267, title VIII, §807, Oct. 11, 2010, 124 Stat. 2834.)

§ 18387. Near-Earth object survey and policy with respect to threats posed

(a) Policy reaffirmation

Congress reaffirms the policy set forth in section 20102(g) of title 51 relating to surveying near-Earth asteroids and comets.

(b) Implementation

The Director of the OSTP shall implement, before September 30, 2012, a policy for notifying Federal agencies and relevant emergency response institutions of an impending near-Earth object threat if near-term public safety is at risk, and assign a Federal agency or agencies to be responsible for protecting the United States and working with the international community on such threats.

(Pub. L. 111-267, title VIII, §808, Oct. 11, 2010, 124 Stat. 2834.)

CODIFICATION

In subsec. (a), “section 20102(g) of title 51” substituted for “section 102(g) of the National Aeronautics and Space Act of 1958 (42 U.S.C. 2451(g))” on authority of Pub. L. 111-314, §5(e), Dec. 18, 2010, 124 Stat. 3443, which Act enacted Title 51, National and Commercial Space Programs.

§ 18388. Space weather

(a) Findings

The Congress finds the following:

(1) Space weather events pose a significant threat to modern technological systems.

(2) The effects of severe space weather events on the electric power grid, telecommunications and entertainment satellites, airline communications during polar routes, and space-based position, navigation and timing systems could have significant societal, economic, national security, and health impacts.

(3) Earth and Space Observing satellites, such as the Advanced Composition Explorer, Geostationary Operational Environmental Satellites, Polar Operational Environmental Satellites, and Defense Meteorological Satellites, provide crucial data necessary to predict space weather events.

(b) Action required

The Director of OSTP shall—

(1) improve the Nation’s ability to prepare, avoid, mitigate, respond to, and recover from potentially devastating impacts of space weather events;

(2) coordinate the operational activities of the National Space Weather Program Council members, including the NOAA Space Weather Prediction Center and the U.S. Air Force Weather Agency; and

(3) submit a report to the appropriate committees of Congress within 180 days after October 11, 2010, that—

(A) details the current data sources, both space- and ground-based, that are necessary for space weather forecasting; and

(B) details the space- and ground-based systems that will be required to gather data necessary for space weather forecasting for the next 10 years.

(Pub. L. 111-267, title VIII, §809, Oct. 11, 2010, 124 Stat. 2834.)

EX. ORD. NO. 13744. COORDINATING EFFORTS TO PREPARE THE NATION FOR SPACE WEATHER EVENTS

Ex. Ord. No. 13744, Oct. 13, 2016, 81 F.R. 71573, provided:

By the authority vested in me as President by the Constitution and the laws of the United States of America, and to prepare the Nation for space weather events, it is hereby ordered as follows:

SECTION 1. Policy. Space weather events, in the form of solar flares, solar energetic particles, and geomagnetic disturbances, occur regularly, some with measurable effects on critical infrastructure systems and technologies, such as the Global Positioning System (GPS), satellite operations and communication, aviation, and the electrical power grid. Extreme space weather events—those that could significantly degrade critical infrastructure—could disable large portions of the electrical power grid, resulting in cascading failures that would affect key services such as water supply, healthcare, and transportation. Space weather has the potential to simultaneously affect and disrupt health and safety across entire continents. Successfully preparing for space weather events is an all-of-nation endeavor that requires partnerships across governments, emergency managers, academia, the media, the insurance industry, non-profits, and the private sector.

It is the policy of the United States to prepare for space weather events to minimize the extent of economic loss and human hardship. The Federal Government must have (1) the capability to predict and detect a space weather event, (2) the plans and programs necessary to alert the public and private sectors to enable mitigating actions for an impending space weather event, (3) the protection and mitigation plans, protocols, and standards required to reduce risks to critical infrastructure prior to and during a credible threat, and (4) the ability to respond to and recover from the effects of space weather. Executive departments and agencies (agencies) must coordinate their efforts to prepare for the effects of space weather events.

SEC. 2. Objectives. This order defines agency roles and responsibilities and directs agencies to take specific actions to prepare the Nation for the hazardous effects of space weather. These activities are to be implemented in conjunction with those identified in the 2015 National Space Weather Action Plan (Action Plan) and any subsequent updates. Implementing this order and the Action Plan will require the Federal Government to work across agencies and to develop, as appropriate, enhanced and innovative partnerships with State, tribal, and local governments; academia; non-profits; the private sector; and international partners. These efforts will enhance national preparedness and speed the creation of a space-weather-ready Nation.

SEC. 3. Coordination. (a) The Director of the Office of Science and Technology Policy (OSTP), in consultation with the Assistant to the President for Homeland Security and Counterterrorism and the Director of the Office of Management and Budget (OMB), shall coordinate the development and implementation of Federal Government activities to prepare the Nation for space weather events, including the activities established in section 5 of this order and the recommendations of the National Science and Technology Council (NSTC), established by Executive Order 12881 of November 23, 1993 (Establishment of the National Science and Technology Council).

(b) To ensure accountability for and coordination of research, development, and implementation of activities identified in this order and in the Action Plan, the NSTC shall establish a Space Weather Operations, Research, and Mitigation Subcommittee (Subcommittee). The Subcommittee member agencies shall conduct activities to advance the implementation of this order, to achieve the goals identified in the 2015 National Space Weather Strategy and any subsequent updates, and to coordinate and monitor the implementation of the activities specified in the Action Plan and provide subsequent updates.

SEC. 4. Roles and Responsibilities. To the extent permitted by law, the agencies below shall adopt the following roles and responsibilities, which are key to ensuring enhanced space weather forecasting, situational awareness, space weather preparedness, and continuous

Federal Government operations during and after space weather events.

(a) The Secretary of Defense shall ensure the timely provision of operational space weather observations, analyses, forecasts, and other products to support the mission of the Department of Defense and coalition partners, including the provision of alerts and warnings for space weather phenomena that may affect weapons systems, military operations, or the defense of the United States.

(b) The Secretary of the Interior shall support the research, development, deployment, and operation of capabilities that enhance the understanding of variations of the Earth's magnetic field associated with solar-terrestrial interactions.

(c) The Secretary of Commerce shall:

(i) provide timely and accurate operational space weather forecasts, watches, warnings, alerts, and real-time space weather monitoring for the government, civilian, and commercial sectors, exclusive of the responsibilities of the Secretary of Defense; and

(ii) ensure the continuous improvement of operational space weather services, utilizing partnerships, as appropriate, with the research community, including academia and the private sector, and relevant agencies to develop, validate, test, and transition space weather observation platforms and models from research to operations and from operations to research.

(d) The Secretary of Energy shall facilitate the protection and restoration of the reliability of the electrical power grid during a presidentially declared grid security emergency associated with a geomagnetic disturbance pursuant to 16 U.S.C. 824o-1.

(e) The Secretary of Homeland Security shall:

(i) ensure the timely redistribution of space weather alerts and warnings that support national preparedness, continuity of government, and continuity of operations; and

(ii) coordinate response and recovery from the effects of space weather events on critical infrastructure and the broader community.

(f) The Administrator of the National Aeronautics and Space Administration (NASA) shall:

(i) implement and support a national research program to understand the Sun and its interactions with Earth and the solar system to advance space weather modeling and prediction capabilities applicable to space weather forecasting;

(ii) develop and operate space-weather-related research missions, instrument capabilities, and models; and

(iii) support the transition of space weather models and technology from research to operations and from operations to research.

(g) The Director of the National Science Foundation (NSF) shall support fundamental research linked to societal needs for space weather information through investments and partnerships, as appropriate.

(h) The Secretary of State, in consultation with the heads of relevant agencies, shall carry out diplomatic and public diplomacy efforts to strengthen global capacity to respond to space weather events.

(i) The Secretaries of Defense, the Interior, Commerce, Transportation, Energy, and Homeland Security, along with the Administrator of NASA and the Director of NSF, shall work together, consistent with their ongoing activities, to develop models, observation systems, technologies, and approaches that inform and enhance national preparedness for the effects of space weather events, including how space weather events may affect critical infrastructure and change the threat landscape with respect to other hazards.

(j) The heads of all agencies that support National Essential Functions, defined by Presidential Policy Directive 40 (PPD-40) of July 15, 2016 (National Continuity Policy), shall ensure that space weather events are adequately addressed in their all-hazards preparedness planning, including mitigation, response, and recovery, as directed by PPD-8 of March 30, 2011 (National Preparedness).

(k) NSTC member agencies shall coordinate through the NSTC to establish roles and responsibilities beyond those identified in section 4 of this order to enhance space weather preparedness, consistent with each agency's legal authority.

SEC. 5. *Implementation.* (a) Within 120 days of the date of this order, the Secretary of Energy, in consultation with the Secretary of Homeland Security, shall develop a plan to test and evaluate available devices that mitigate the effects of geomagnetic disturbances on the electrical power grid through the development of a pilot program that deploys such devices, *in situ*, in the electrical power grid. After the development of the plan, the Secretary shall implement the plan in collaboration with industry. In taking action pursuant to this subsection, the Secretaries of Energy and Homeland Security shall consult with the Chairman of the Federal Energy Regulatory Commission.

(b) Within 120 days of the date of this order, the heads of the sector-specific agencies that oversee the lifeline critical infrastructure functions as defined by the National Infrastructure Protection Plan of 2013—including communications, energy, transportation, and water and wastewater systems—as well as the Nuclear Reactors, Materials, and Waste Sector, shall assess their executive and statutory authority, and limits of that authority, to direct, suspend, or control critical infrastructure operations, functions, and services before, during, and after a space weather event. The heads of each sector-specific agency shall provide a summary of these assessments to the Subcommittee.

(c) Within 90 days of receipt of the assessments ordered in section 5(b) of this order, the Subcommittee shall provide a report on the findings of these assessments with recommendations to the Director of OSTP, the Assistant to the President for Homeland Security and Counterterrorism, and the Director of OMB. The assessments may be used to inform the development and implementation of policy establishing authorities and responsibilities for agencies in response to a space weather event.

(d) Within 60 days of the date of this order, the Secretaries of Defense and Commerce, the Administrator of NASA, and the Director of NSF, in collaboration with other agencies as appropriate, shall identify mechanisms for advancing space weather observations, models, and predictions, and for sustaining and transitioning appropriate capabilities from research to operations and operations to research, collaborating with industry and academia to the extent possible.

(e) Within 120 days of the date of this order, the Secretaries of Defense and Commerce shall make historical data from the GPS constellation and other U.S. Government satellites publicly available, in accordance with Executive Order 13642 of May 9, 2013 (Making Open and Machine Readable the New Default for Government Information), to enhance model validation and improvements in space weather forecasting and situational awareness.

(f) Within 120 days of the date of this order, the Secretary of Homeland Security, through the Administrator of the Federal Emergency Management Agency and in coordination with relevant agencies, shall lead the development of a coordinated Federal operating concept and associated checklist to coordinate Federal assets and activities to respond to notification of, and protect against, impending space weather events. Within 180 days of the publication of the operating concept and checklist, agencies shall develop operational plans documenting their procedures and responsibilities to prepare for, protect against, and mitigate the effects of impending space weather events, in support of the Federal operating concept and compatible with the National Preparedness System described in PPD-8.

SEC. 6. *Stakeholder Engagement.* The agencies identified in this order shall seek public-private and international collaborations to enhance observation networks, conduct research, develop prediction models and mitigation approaches, enhance community resilience and preparedness, and supply the services necessary to

protect life and property and promote economic prosperity, as consistent with law.

SEC. 7. *Definitions.* As used in this order:

(a) "Prepare" and "preparedness" have the same meaning they have in PPD-8. They refer to the actions taken to plan, organize, equip, train, and exercise to build and sustain the capabilities necessary to prevent, protect against, mitigate the effects of, respond to, and recover from those threats that pose the greatest risk to the security of the Nation. This includes the prediction and notification of space weather events.

(b) "Space weather" means variations in the space environment between the Sun and Earth (and throughout the solar system) that can affect technologies in space and on Earth. The primary types of space weather events are solar flares, solar energetic particles, and geomagnetic disturbances.

(c) "Solar flare" means a brief eruption of intense energy on or near the Sun's surface that is typically associated with sunspots.

(d) "Solar energetic particles" means ions and electrons ejected from the Sun that are typically associated with solar eruptions.

(e) "Geomagnetic disturbance" means a temporary disturbance of Earth's magnetic field resulting from solar activity.

(f) "Critical infrastructure" has the meaning provided in section 1016(e) of the USA Patriot Act of 2001 (42 U.S.C. 5195c(e)), namely systems and assets, whether physical or virtual, so vital to the United States that the incapacity or destruction of such systems and assets would have a debilitating impact on security, national economic security, national public health or safety, or any combination of those matters.

(g) "Sector-Specific Agency" means the agencies designated under PPD-21 of February 12, 2013 (Critical Infrastructure Security and Resilience), or any successor directive, to be responsible for providing institutional knowledge and specialized expertise as well as leading, facilitating, or supporting the security and resilience programs and associated activities of its designated critical infrastructure sector in the all-hazards environment.

SEC. 8. *General Provisions.* (a) Nothing in this order shall be construed to impair or otherwise affect:

(i) the authority granted by law to an agency, or the head thereof; or

(ii) the functions of the Director of OMB relating to budgetary, administrative, or legislative proposals.

(b) This order shall be implemented consistent with applicable law and subject to the availability of appropriations.

(c) This order is not intended to, and does not, create any right or benefit, substantive or procedural, enforceable at law or in equity by any party against the United States, its departments, agencies, or entities, its officers, employees, or agents, or any other person.

BARACK OBAMA.

SUBCHAPTER VIII—AERONAUTICS AND SPACE TECHNOLOGY

§ 18401. Aeronautics research goals

The Administrator should ensure that NASA maintains a strong aeronautics research portfolio ranging from fundamental research through systems research with specific research goals, including the following:

(1) **Airspace capacity**

NASA's Aeronautics Research Mission Directorate shall address research needs of the Next Generation Air Transportation System, including the ability of the National Airspace System to handle up to 3 times the current travel demand by 2025.

(2) **Environmental sustainability**

The Directorate shall consider and pursue concepts to reduce noise, emissions, and fuel