PAT20647 S.L.C.

AMENDMENT NO._____ Calendar No._____

Purpose: To adjust mandated drawdowns from the Strategic Petroleum Reserve and require the Secretary of Energy to provide for a versatile, reactor-based fast neutron source and establish advanced nuclear reactor research and development goals, a nuclear energy strategic plan, an advanced nuclear fuel security program, and a university nuclear leadership program.

IN THE SENATE OF THE UNITED STATES—116th Cong., 2d Sess.

S. 4049

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AMENDMENT No. 2012

By Murkowski

To: S. 4049

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AMENDMENT intended to be proposed by Ms Murkowski, Mr. Booker, Mr. Tillis, Mr. Manchin, Mr. Jones, Ms. McSally, Ms. Blackburn, Ms. Hyde-Smith, Mr. Risch, Mr. Crapo, Mr. Whitehouse, Mr. Coons, Mr. Portman, Mr. Cramer,

Viz:

1 At the appropriate place, insert the following:

TITLE _____—NUCLEAR ENERGY LEADERSHIP

SEC. ___01. ADVANCED NUCLEAR REACTOR RESEARCH AND DEVELOPMENT GOALS.

(a) IN GENERAL.—Subtitle E of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16271 et seq.) is amended by adding at the end the following:

"SEC. 959A. ADVANCED NUCLEAR REACTOR RESEARCH AND DEVELOPMENT GOALS.

"(a) DEFINITIONS.—In this section:

"(1) ADVANCED NUCLEAR REACTOR.—The term 'advanced nuclear reactor' means—

"(A) a nuclear fission reactor, including a prototype plant (as defined in sections 50.2 and 52.1 of title 10, Code of Federal Regulations (or successor regulations)), with significant improvements compared to the most recent generation of fission reactors, including improvements such as—

"(i) additional inherent safety features;

"(ii) lower waste yields;

"(iii) improved fuel performance;

"(iv) increased tolerance to loss of fuel cooling;

"(v) enhanced reliability;

"(vi) increased proliferation resistance;

"(vii) increased thermal efficiency;

"(viii) reduced consumption of cooling water;

"(ix) the ability to integrate into electric applications and nonelectric applications;

"(x) modular sizes to allow for deployment that corresponds with the demand for electricity; or

"(xi) operational flexibility to respond to changes in demand for electricity and to complement integration with intermittent renewable energy; and

"(B) a fusion reactor.

"(2) DEMONSTRATION PROJECT.—The term 'demonstration project' means an advanced nuclear reactor operated in any manner, including as part of the power generation facilities of an electric utility system, for the purpose of demonstrating the suitability for commercial application of the advanced nuclear reactor.

"(b) PURPOSE.—The purpose of this section is to direct the Secretary, as soon as practicable after the date of enactment of this section, to advance the research and development of domestic advanced, affordable, and clean nuclear energy by—

"(1) demonstrating different advanced nuclear reactor technologies that could be used by the private sector to produce—

"(A) emission-free power at a levelized cost of electricity of $60 per megawatt-hour or less;

"(B) heat for community heating, industrial purposes, or synthetic fuel production;

"(C) remote or off-grid energy supply; or

"(D) backup or mission-critical power supplies;

"(2) developing subgoals for nuclear energy research programs that would accomplish the goals of the demonstration projects carried out under subsection (c);

"(3) identifying research areas that the private sector is unable or unwilling to undertake due to the cost of, or risks associated with, the research; and

"(4) facilitating the access of the private sector—

"(A) to Federal research facilities and personnel; and

"(B) to the results of research relating to civil nuclear technology funded by the Federal Government.

"(c) DEMONSTRATION PROJECTS.—

"(1) IN GENERAL.—The Secretary shall, to the maximum extent practicable—

"(A) enter into agreements to complete not fewer than 2 demonstration projects by not later than December 31, 2025; and

"(B) establish a program to enter into agreements to complete 1 additional operational demonstration project by not later than December 31, 2035.

"(2) REQUIREMENTS.—In carrying out demonstration projects under paragraph (1), the Secretary shall—

"(A) include diversity in designs for the advanced nuclear reactors demonstrated under this section, including designs using various—

"(i) primary coolants;

"(ii) fuel types and compositions; and

"(iii) neutron spectra;

"(B) seek to ensure that—

"(i) the long-term cost of electricity or heat for each design to be demonstrated under this subsection is cost-competitive in the applicable market;

"(ii) the selected projects can meet the deadline established in paragraph (1) to demonstrate first-of-a-kind advanced nuclear reactor technologies, for which additional information shall be considered, including—

"(I) the technology readiness level of a proposed advanced nuclear reactor technology;

"(II) the technical abilities and qualifications of teams desiring to demonstrate a proposed advanced nuclear reactor technology; and

"(III) the capacity to meet cost-share requirements of the Department;

"(C) ensure that each evaluation of candidate technologies for the demonstration projects is completed through an external review of proposed designs, which review shall—

"(i) be conducted by a panel that includes not fewer than 1 representative of each of—

"(I) an electric utility; and

"(II) an entity that uses high-temperature process heat for manufacturing or industrial processing, such as a petrochemical company, a manufacturer of metals, or a manufacturer of concrete;

"(ii) include a review of cost-competitiveness and other value streams, together with the technology readiness level, of each design to be demonstrated under this subsection; and

"(iii) not be required for a demonstration project that receives no financial assistance from the Department for construction costs;

"(D) for federally funded demonstration projects, enter into cost-sharing agreements with private sector partners in accordance with section 988 for the conduct of activities relating to the research, development, and demonstra-

tion of private-sector advanced nuclear reactor designs under the program;

"(E) work with private sector partners to identify potential sites, including Department-owned sites, for demonstrations, as appropriate;

"(F) align specific activities carried out under demonstration projects carried out under this subsection with priorities identified through direct consultations between—

"(i) the Department;

"(ii) National Laboratories;

"(iii) institutions of higher education;

"(iv) traditional end-users (such as electric utilities);

"(v) potential end-users of new technologies (such as users of high-temperature process heat for manufacturing processing, including petrochemical companies, manufacturers of metals, or manufacturers of concrete); and

"(vi) developers of advanced nuclear reactor technology; and

"(G) seek to ensure that the demonstration projects carried out under paragraph (1) do not cause any delay in a deployment of an advanced

reactor by private industry and the Department that is underway as of the date of enactment of this section.

"(3) ADDITIONAL REQUIREMENTS.—In carrying out demonstration projects under paragraph (1), the Secretary shall—

"(A) identify candidate technologies that—

"(i) are not developed sufficiently for demonstration within the initial required timeframe described in paragraph (1)(A); but

"(ii) could be demonstrated within the timeframe described in paragraph (1)(B);

"(B) identify technical challenges to the candidate technologies identified in subparagraph (A);

"(C) support near-term research and development to address the highest-risk technical challenges to the successful demonstration of a selected advanced reactor technology, in accordance with—

"(i) subparagraph (B); and

"(ii) the research and development activities under sections 952 and 958;

"(D) establish such technology advisory working groups as the Secretary determines to be appropriate to advise the Secretary regarding the technical challenges identified under subparagraph (B) and the scope of research and development programs to address the challenges, in accordance with subparagraph (C), to be comprised of—

"(i) private-sector advanced nuclear reactor technology developers;

"(ii) technical experts with respect to the relevant technologies at institutions of higher education; and

"(iii) technical experts at the National Laboratories.

"(d) GOALS.—

"(1) IN GENERAL.—The Secretary shall establish goals for research relating to advanced nuclear reactors facilitated by the Department that support the objectives of the program for demonstration projects established under subsection (c).

"(2) COORDINATION.—In developing the goals under paragraph (1), the Secretary shall coordinate, on an ongoing basis, with members of private indus-

try to advance the demonstration of various designs of advanced nuclear reactors.

"(3) REQUIREMENTS.—In developing the goals under paragraph (1), the Secretary shall ensure that—

"(A) research activities facilitated by the Department to meet the goals developed under this subsection are focused on key areas of nuclear research and deployment ranging from basic science to full-design development, safety evaluation, and licensing;

"(B) research programs designed to meet the goals emphasize—

"(i) resolving materials challenges relating to extreme environments, including extremely high levels of—

"(I) radiation fluence;

"(II) temperature;

"(III) pressure; and

"(IV) corrosion; and

"(ii) qualification of advanced fuels;

"(C) activities are carried out that address near-term challenges in modeling and simulation to enable accelerated design and licensing;

"(D) related technologies, such as technologies to manage, reduce, or reuse nuclear waste, are developed;

"(E) nuclear research infrastructure is maintained or constructed, such as—

"(i) currently operational research reactors at the National Laboratories and institutions of higher education;

"(ii) hot cell research facilities;

"(iii) a versatile fast neutron source; and

"(iv) a molten salt testing facility;

"(F) basic knowledge of non-light water coolant physics and chemistry is improved;

"(G) advanced sensors and control systems are developed; and

"(H) advanced manufacturing and advanced construction techniques and materials are investigated to reduce the cost of advanced nuclear reactors.".

(b) TABLE OF CONTENTS.—The table of contents of the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 594; 132 Stat. 3160) is amended—

(1) in the item relating to section 917, by striking "Efficiency";

(2) in the items relating to each of sections 957, 958, and 959 by inserting "Sec." before the item number; and

(3) by inserting after the item relating to section 959 the following:

"Sec. 959A. Advanced nuclear reactor research and development goals.".

SEC. ___02. NUCLEAR ENERGY STRATEGIC PLAN.

(a) IN GENERAL.—Subtitle E of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16271 et seq.) (as amended by [section ____01(a)]) is amended by adding at the end the following:

"SEC. 959B. NUCLEAR ENERGY STRATEGIC PLAN.

"(a) IN GENERAL.—Not later than 180 days after the date of enactment of this section, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate and the Committees on Energy and Commerce and Science, Space, and Technology of the House of Representatives a 10-year strategic plan for the Office of Nuclear Energy of the Department, in accordance with this section.

"(b) REQUIREMENTS.—

"(1) COMPONENTS.—The strategic plan under this section shall designate—

"(A) programs that support the planned accomplishment of—

"(i) the goals established under section 959A; and

"(ii) the demonstration programs identified under subsection (c) of that section; and

"(B) programs that—

"(i) do not support the planned accomplishment of demonstration programs, or the goals, referred to in subparagraph (A); but

"(ii) are important to the mission of the Office of Nuclear Energy, as determined by the Secretary.

"(2) PROGRAM PLANNING.—In developing the strategic plan under this section, the Secretary shall specify expected timelines for, as applicable—

"(A) the accomplishment of relevant objectives under current programs of the Department; or

"(B) the commencement of new programs to accomplish those objectives.

"(c) UPDATES.—Not less frequently than once every 2 years, the Secretary shall submit to the Committee on Energy and Natural Resources of the Senate and the Committees on Energy and Commerce and Science, Space,

and Technology of the House of Representatives an updated 10-year strategic plan in accordance with subsection (b), which shall identify, and provide a justification for, any major deviation from a previous strategic plan submitted under this section.".

(b) TABLE OF CONTENTS.—The table of contents of the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 594; 132 Stat. 3160) (as amended by [section ____01(b)(3)]) is amended by inserting after the item relating to section 959A the following:

"Sec. 959B. Nuclear energy strategic plan.".

SEC. ___03. VERSATILE, REACTOR-BASED FAST NEUTRON SOURCE.

Section 955(c)(1) of the Energy Policy Act of 2005 (42 U.S.C. 16275(c)(1)) is amended—

(1) in the paragraph heading, by striking "MISSION NEED" and inserting "AUTHORIZATION"; and

(2) in subparagraph (A), by striking "determine the mission need" and inserting "provide".

SEC. ___04. ADVANCED NUCLEAR FUEL SECURITY PROGRAM.

(a) IN GENERAL.—Subtitle E of title IX of the Energy Policy Act of 2005 (42 U.S.C. 16271 et seq.) (as amended by [section ____02(a)]) is amended by adding at the end the following:

"SEC. 960. ADVANCED NUCLEAR FUEL SECURITY PROGRAM.

"(a) DEFINITIONS.—In this section:

"(1) HALEU TRANSPORTATION PACKAGE.—The term 'HALEU transportation package' means a transportation package that is suitable for transporting high-assay, low-enriched uranium.

"(2) HIGH-ASSAY, LOW-ENRICHED URANIUM.—The term 'high-assay, low-enriched uranium' means uranium with an assay greater than 5 weight percent, but less than 20 weight percent, of the uranium-235 isotope.

"(3) HIGH-ENRICHED URANIUM.—The term 'high-enriched uranium' means uranium with an assay of 20 weight percent or more of the uranium-235 isotope.

"(b) HIGH-ASSAY, LOW-ENRICHED URANIUM PROGRAM FOR ADVANCED REACTORS.—

"(1) ESTABLISHMENT.—Not later than 1 year after the date of enactment of this section, the Secretary shall establish a program to make available high-assay, low-enriched uranium, through contracts for sale, resale, transfer, or lease, for use in commercial or noncommercial advanced nuclear reactors.

"(2) NUCLEAR FUEL OWNERSHIP.—Each lease under this subsection shall include a provision estab-

lishing that the high-assay, low-enriched uranium that is the subject of the lease shall remain the property of the Department, including with respect to responsibility for the storage, use, or final disposition of all radioactive waste created by the irradiation, processing, or purification of any leased high-assay, low-enriched uranium.

"(3) QUANTITY.—In carrying out the program under this subsection, the Secretary shall make available—

"(A) by December 31, 2022, high-assay, low-enriched uranium containing not less than 2 metric tons of the uranium-235 isotope; and

"(B) by December 31, 2025, high-assay, low-enriched uranium containing not less than 10 metric tons of the uranium-235 isotope (as determined including the quantities of the uranium-235 isotope made available before December 31, 2022).

"(4) FACTORS FOR CONSIDERATION.—In carrying out the program under this subsection, the Secretary shall take into consideration—

"(A) options for providing the high-assay, low-enriched uranium under this subsection from a stockpile of uranium owned by the De-

partment (including the National Nuclear Security Administration), including—

"(i) fuel that—

"(I) directly meets the needs of an end-user; but

"(II) has been previously used or fabricated for another purpose;

"(ii) fuel that can meet the needs of an end-user after removing radioactive or other contaminants that resulted from a previous use or fabrication of the fuel for research, development, demonstration, or deployment activities of the Department (including activities of the National Nuclear Security Administration); and

"(iii) fuel from a high-enriched uranium stockpile, which can be blended with lower-assay uranium to become high-assay, low-enriched uranium to meet the needs of an end-user; and

"(B) requirements to support molybdenum-99 production under the American Medical Isotopes Production Act of 2012 (Public Law 112–239; 126 Stat. 2211).

"(5) LIMITATIONS.—

"(A) FINAL DISPOSITION OF RADIOACTIVE WASTE.—The Secretary shall not barter or otherwise sell or transfer uranium in any form in exchange for services relating to the final disposition of radioactive waste from uranium that is the subject of a lease under this subsection.

"(B) NATIONAL SECURITY NEEDS.—The Secretary shall only make available from Department stockpiles under this subsection high-assay, low-enriched uranium that is not needed for national security.

"(6) SUNSET.—The program under this subsection shall terminate on the earlier of—

"(A) January 1, 2035; and

"(B) the date on which uranium enriched up to, but not equal to, 20 weight percent can be obtained in the commercial market from domestic suppliers.

"(c) REPORT.—

"(1) IN GENERAL.—Not later than 180 days after the date of enactment of this section, the Secretary shall submit to the appropriate committees of Congress a report that describes actions proposed to be carried out by the Secretary—

"(A) under the program under subsection (b); or

"(B) otherwise to enable the commercial use of high-assay, low-enriched uranium.

"(2) COORDINATION AND STAKEHOLDER INPUT.—In developing the report under this subsection, the Secretary shall seek input from—

"(A) the Nuclear Regulatory Commission;

"(B) the National Laboratories;

"(C) institutions of higher education;

"(D) producers of medical isotopes;

"(E) a diverse group of entities operating in the nuclear energy industry; and

"(F) a diverse group of technology developers.

"(3) COST AND SCHEDULE ESTIMATES.—The report under this subsection shall include estimated costs, budgets, and timeframes for enabling the use of high-assay, low-enriched uranium.

"(4) REQUIRED EVALUATIONS.—The report under this subsection shall evaluate—

"(A) the costs and actions required to establish and carry out the program under subsection (b), including with respect to—

"(i) proposed preliminary terms for the sale, resale, transfer, and leasing of high-assay, low-enriched uranium (including guidelines defining the roles and responsibilities between the Department and the purchaser, transfer recipient, or lessee); and

"(ii) the potential to coordinate with purchasers, transfer recipients, and lessees regarding—

"(I) fuel fabrication; and

"(II) fuel transport;

"(B) the potential sources and fuel forms available to provide uranium for the program under subsection (b);

"(C) options to coordinate the program under subsection (b) with the operation of the versatile reactor-based fast neutron source under section 955(c)(1);

"(D) the ability of the domestic uranium market to provide materials for advanced nuclear reactor fuel; and

"(E) any associated legal, regulatory, and policy issues that should be addressed to enable—

"(i) the program under subsection (b); and

"(ii) the establishment of a domestic industry capable of providing high-assay, low-enriched uranium for commercial and noncommercial purposes, including with respect to the needs of—

"(I) the Department;

"(II) the Department of Defense; and

"(III) the National Nuclear Security Administration.

"(d) HALEU TRANSPORTATION PACKAGE RESEARCH PROGRAM.—

"(1) IN GENERAL.—As soon as practicable after the date of enactment of this section, the Secretary shall establish a research, development, and demonstration program under which the Secretary shall provide financial assistance, on a competitive basis, to establish the capability to transport high-assay, low-enriched uranium.

"(2) REQUIREMENT.—The focus of the program under this subsection shall be to establish 1 or more HALEU transportation packages that can be certified by the Nuclear Regulatory Commission to

transport high-assay, low-enriched uranium to the various facilities involved in producing or using nuclear fuel containing high-assay, low-enriched uranium, such as—

"(A) enrichment facilities;

"(B) fuel processing facilities;

"(C) fuel fabrication facilities; and

"(D) nuclear reactors.".

(b) CLERICAL AMENDMENT.—The table of contents of the Energy Policy Act of 2005 (Public Law 109–58; 119 Stat. 594; 132 Stat. 3160) (as amended by [section ____02(b)]) is amended by inserting after the item relating to section 959B the following:

"Sec. 960. Advanced nuclear fuel security program.".

SEC. ___05. UNIVERSITY NUCLEAR LEADERSHIP PROGRAM.

Section 313 of the Energy and Water Development and Related Agencies Appropriations Act, 2009 (42 U.S.C. 16274a) is amended to read as follows:

"SEC. 313. UNIVERSITY NUCLEAR LEADERSHIP PROGRAM.

"(a) DEFINITIONS.—In this section:

"(1) ADVANCED NUCLEAR REACTOR.—The term 'advanced nuclear reactor' means—

"(A) a nuclear fission reactor, including a prototype plant (as defined in sections 50.2 and 52.1 of title 10, Code of Federal Regulations (or successor regulations)), with significant im-

provements compared to the most recent generation of fission reactors, including improvements such as—

"(i) additional inherent safety features;

"(ii) lower waste yields;

"(iii) improved fuel performance;

"(iv) increased tolerance to loss of fuel cooling;

"(v) enhanced reliability;

"(vi) increased proliferation resistance;

"(vii) increased thermal efficiency;

"(viii) reduced consumption of cooling water;

"(ix) the ability to integrate into electric applications and nonelectric applications;

"(x) modular sizes to allow for deployment that corresponds with the demand for electricity; or

"(xi) operational flexibility to respond to changes in demand for electricity and to complement integration with intermittent renewable energy; and

"(B) a fusion reactor.

"(2) INSTITUTION OF HIGHER EDUCATION.—The term 'institution of higher education' has the meaning given the term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).

"(3) PROGRAM.—The term 'Program' means the University Nuclear Leadership Program established under subsection (b).

"(b) ESTABLISHMENT.—The Secretary of Energy, the Administrator of the National Nuclear Security Administration, and the Chairman of the Nuclear Regulatory Commission shall jointly establish a program, to be known as the 'University Nuclear Leadership Program'.

"(c) USE OF FUNDS.—

"(1) IN GENERAL.—Except as provided in paragraph (2), amounts made available to carry out the Program shall be used to provide financial assistance for scholarships, fellowships, and research and development projects at institutions of higher education in areas relevant to the programmatic mission of the applicable Federal agency, with an emphasis on providing the financial assistance with respect to research, development, demonstration, and deployment activities for technologies relevant to advanced nu-

clear reactors, including relevant fuel cycle technologies.

"(2) EXCEPTION.—Notwithstanding paragraph (1), amounts made available to carry out the Program may be used to provide financial assistance for a scholarship, fellowship, or multiyear research and development project that does not align directly with a programmatic mission of the applicable Federal agency providing the financial assistance, if the activity for which assistance is provided would facilitate the maintenance of the discipline of nuclear science or engineering.

"(d) AUTHORIZATION OF APPROPRIATIONS.—There are authorized to be appropriated to carry out the Program for fiscal year 2021 and each fiscal year thereafter—

"(1) $30,000,000 to the Secretary of Energy; and

"(2) $15,000,000 to the Nuclear Regulatory Commission.".

SEC. ___06. ADJUSTING STRATEGIC PETROLEUM RESERVE MANDATED DRAWDOWNS.

(a) BIPARTISAN BUDGET ACT OF 2015.—Section 403(a) of the Bipartisan Budget Act of 2015 (42 U.S.C. 6241 note; Public Law 114–74) is amended—

(1) by striking paragraph (6);

(2) by redesignating paragraphs (7) and (8) as paragraphs (6) and (7), respectively; and

(3) in paragraph (7) (as so redesignated), by striking "10,000,000" and inserting "20,000,000".

(b) FIXING AMERICA'S SURFACE TRANSPORTATION ACT.—Section 32204(a)(1) of the FAST Act (42 U.S.C. 6241 note; Public Law 114–94) is amended—

(1) in subparagraph (B)—

(A) by striking "16,000,000" and inserting "11,000,000"; and

(B) by striking "2023" and inserting "2022"; and

(2) in subparagraph (C), by striking "25,000,000" and inserting "30,000,000".

(c) AMERICA'S WATER INFRASTRUCTURE ACT OF 2018.—Section 3009(a)(1) of America's Water Infrastructure Act of 2018 (42 U.S.C. 6241 note; Public Law 115–270) is amended by striking "2028" and inserting "2030."

(d) BIPARTISAN BUDGET ACT OF 2018.—Section 30204(a)(1) of the Bipartisan Budget Act of 2018 (42 U.S.C. 6241 note; Public Law 115–123) is amended by striking subparagraphs (A) through (C) and inserting the following:

"(A) 7,500,000 barrels of crude oil during fiscal year 2022;

"(B) 7,500,000 barrels of crude oil during fiscal year 2024;

"(C) 15,000,000 barrels of crude oil during fiscal year 2025;

"(D) 30,000,000 barrels of crude oil during fiscal year 2029; and

"(E) 40,000,000 barrels of crude oil during fiscal year 2030.".

(e) RECONCILIATION ON THE BUDGET FOR 2018.—Section 20003(a)(1) of Public Law 115–97 (42 U.S.C. 6241 note) is amended by striking "the period of fiscal years 2026 through 2027" and inserting "fiscal year 2030".