

111TH CONGRESS  
1ST SESSION

# H. R. 3276

To promote the production of molybdenum-99 in the United States for medical isotope production, and to condition and phase out the export of highly enriched uranium for the production of medical isotopes.

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## IN THE HOUSE OF REPRESENTATIVES

JULY 21, 2009

Mr. MARKEY of Massachusetts (for himself and Mr. UPTON) introduced the following bill; which was referred to the Committee on Energy and Commerce

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## A BILL

To promote the production of molybdenum-99 in the United States for medical isotope production, and to condition and phase out the export of highly enriched uranium for the production of medical isotopes.

1       *Be it enacted by the Senate and House of Representa-*  
2       *tives of the United States of America in Congress assembled,*

3       **SECTION 1. SHORT TITLE.**

4       This Act may be cited as the “American Medical Iso-  
5       topes Production Act of 2009”.

6       **SEC. 2. FINDINGS.**

7       Congress finds the following:

1           (1) Molybdenum-99 is a critical medical isotope  
2           whose decay product technecium-99m is used in ap-  
3           proximately two-thirds of all diagnostic medical iso-  
4           tope procedures in the United States, or 16 million  
5           medical procedures annually, including for the detec-  
6           tion of cancer, heart disease, and thyroid disease, in-  
7           vestigating the operation of the brain and kidney,  
8           imaging stress fractures, and tracking cancer stages.

9           (2) Molybdenum-99 has a half-life of 66 hours,  
10          and decays at a rate of approximately one percent  
11          per hour after production. As such, molybdenum-99  
12          cannot be stockpiled. Instead, molybdenum-99 pro-  
13          duction must be scheduled to meet the projected de-  
14          mand and any interruption of the supply chain from  
15          production, to processing, packaging, distribution,  
16          and use can disrupt patient care.

17          (3) There are no facilities within the United  
18          States that are dedicated to the production of mo-  
19          lybdenum-99 for medical uses. The United States  
20          must import molybdenum-99 from foreign produc-  
21          tion facilities, and is dependent upon the continued  
22          operation of these foreign facilities for millions of  
23          critical medical procedures annually.

24          (4) Most reactors in the world which produce  
25          molybdenum-99 utilize highly enriched uranium,

1       which can also be used in the construction of nuclear  
2       weapons. In January 2009, the National Academy of  
3       Sciences encouraged molybdenum-99 producers to  
4       convert from highly enriched uranium to low en-  
5       riched uranium, and found that there are “no tech-  
6       nical reasons that adequate quantities cannot be  
7       produced from LEU targets in the future” and that  
8       “a 7-10 year phase-out period would likely allow  
9       enough time for all current HEU-based producers to  
10      convert”.

11           (5) The 51-year-old National Research Uni-  
12      versal reactor in Canada, which is responsible for  
13      producing approximately sixty percent of United  
14      States demand for molybdenum-99 under normal  
15      conditions, was shut down unexpectedly May 14,  
16      2009, after the discovery of a leak of radioactive  
17      water. It is unclear whether the National Research  
18      Universal reactor will be able to resume production  
19      of molybdenum-99.

20           (6) The United States currently faces an acute  
21      shortage of molybdenum-99 and its decay product  
22      technetium-99m due to technical problems which  
23      have seriously interrupted operations of foreign nu-  
24      clear reactors producing molybdenum-99.

1           (7) As a result of the critical shortage of molyb-  
2           denum-99, patient care in the United States is suf-  
3           fering. Medical procedures requiring technetium-99  
4           are being rationed or delayed, and alternative treat-  
5           ments which are less effective, more costly, and may  
6           result in increased radiation doses to patients are  
7           being substituted in lieu of technetium-99.

8           (8) The radioactive isotope molybdenum-99 and  
9           its decay product technetium-99m are critical to the  
10          health care of Americans, and the continued avail-  
11          ability of these isotopes, in a reliable and affordable  
12          manner, is in the interest of the United States.

13          (9) The United States should move expedi-  
14          tiously to ensure that an adequate and reliable sup-  
15          ply of molybdenum-99 can be produced in the  
16          United States, without the use of highly enriched  
17          uranium.

18          (10) The United States should accelerate its ef-  
19          forts to convert nuclear reactors worldwide away  
20          from the use of highly enriched uranium, which can  
21          be used in nuclear weapons, to low enriched ura-  
22          nium. Converting nuclear reactors away from the  
23          use of highly enriched uranium is a critically impor-  
24          tant element of United States efforts to prevent nu-  
25          clear terrorism, and supports the goal announced in

1 Prague by President Barack Obama on April 5,  
2 2009, to create “a new international effort to secure  
3 all vulnerable nuclear material around the world  
4 within four years”.

5 **SEC. 3. IMPROVING THE RELIABILITY OF DOMESTIC MED-**  
6 **ICAL ISOTOPE SUPPLY.**

7 (a) **MEDICAL ISOTOPE DEVELOPMENT PROJECTS.—**

8 (1) **IN GENERAL.**—The Secretary of Energy  
9 shall establish a program to evaluate and support  
10 projects for the production in the United States,  
11 without the use of highly enriched uranium, of sig-  
12 nificant quantities of molybdenum-99 for medical  
13 uses.

14 (2) **CRITERIA.**—Projects shall be judged against  
15 the following primary criteria:

16 (A) The length of time necessary for the  
17 proposed project to begin production of molyb-  
18 denum-99 for medical uses within the United  
19 States.

20 (B) The capability of the proposed project  
21 to produce a significant percentage of United  
22 States demand for molybdenum-99 for medical  
23 uses.

24 (C) The cost of the proposed project.

1           (3) EXEMPTION.—An existing reactor fueled  
2 with highly enriched uranium shall not be disquali-  
3 fied from the program if the Secretary of Energy de-  
4 termines that—

5           (A) there is no alternative nuclear reactor  
6 fuel, enriched in the isotope U-235 to less than  
7 20 percent, that can be used in that reactor;  
8 and

9           (B) the reactor operator has provided as-  
10 surances that, whenever an alternative nuclear  
11 reactor fuel, enriched in the isotope U-235 to  
12 less than 20 percent, can be used in that reac-  
13 tor, it will use that alternative in lieu of highly  
14 enriched uranium.

15           (4) AUTHORIZATION OF APPROPRIATIONS.—  
16 There are authorized to be appropriated to the Sec-  
17 retary of Energy for carrying out the program under  
18 paragraph (1) \$163,000,000 for fiscal years 2010  
19 through 2014.

20           (b) DEVELOPMENT ASSISTANCE.—The Secretary of  
21 Energy shall establish a program to provide assistance  
22 for—

23           (1) the development of fuels, targets, and proc-  
24 esses for domestic molybdenum-99 production that  
25 do not use highly enriched uranium; and

1           (2) commercial operations using the fuels, tar-  
2           gets, and processes described in paragraph (1).

3           (c) URANIUM LEASE AND TAKE BACK.—The Sec-  
4           retary of Energy shall establish a program to make low  
5           enriched uranium available, through lease contracts, for  
6           irradiation for the production of molybdenum-99 for med-  
7           ical uses. The lease contracts shall provide for the Sec-  
8           retary to retain responsibility for the final disposition of  
9           radioactive waste created by the irradiation, processing,  
10          or purification of leased uranium.

11   **SEC. 4. EXPORTS.**

12          Section 134 of the Atomic Energy Act of 1954 (42  
13   U.S.C. 2160d(b)) is amended by striking subsections b.  
14   and c. and inserting in lieu thereof the following:

15          “b. Effective 7 years after the date of enactment of  
16   the American Medical Isotopes Production Act of 2009,  
17   the Commission may not issue a license for the export of  
18   highly enriched uranium from the United States.

19          “c. The period referred to in subsection (b) may be  
20   extended for no more than three years if, no earlier than  
21   6 years after the date of enactment of the Act, the Sec-  
22   retary of Energy certifies to the appropriate Congressional  
23   committees that—

24                  “(1) there is insufficient global supply of molyb-  
25          denum-99 produced without the use of highly en-

1 enriched uranium available to satisfy the domestic  
2 United States market, and

3 “(2) the export of United States-origin highly  
4 enriched uranium for the purposes of medical iso-  
5 tope production is the most effective temporary  
6 means to increase the supply of molybdenum-99 to  
7 the domestic United States market.”.

8 **SEC. 5. REPORT ON DISPOSITION OF EXPORTS.**

9 Not later than 1 year after the date of the enactment  
10 of this Act, the Chairman of the Nuclear Regulatory Com-  
11 mission, after consulting with other relevant agencies,  
12 shall submit to the Congress a report detailing the current  
13 disposition of previous United States exports of highly en-  
14 riched uranium, including—

15 (1) their location;

16 (2) whether they are irradiated;

17 (3) whether they have been used for the pur-  
18 pose stated in their export license;

19 (4) whether they have been used for an alter-  
20 native purpose and, if so, whether such alternative  
21 purpose has been explicitly approved by the Commis-  
22 sion;

23 (5) the year of export, and reimportation, if ap-  
24 plicable;

1           (6) their current physical and chemical forms;  
2           and

3           (7) whether they are being stored in a manner  
4           which adequately protects against theft and unau-  
5           thorized access.

6 **SEC. 6. DOMESTIC MEDICAL ISOTOPE PRODUCTION.**

7           (a) IN GENERAL.—Chapter 10 of the Atomic Energy  
8 Act of 1954 (42 U.S.C. 2131 et seq.) is amended by add-  
9 ing at the end the following new section:

10           “SEC. 112. DOMESTIC MEDICAL ISOTOPE PRODUC-  
11 TION. a. The Commission may issue a license, or grant  
12 an amendment to an existing license, for the use in the  
13 United States of highly enriched uranium as a target for  
14 medical isotope production in a nuclear reactor, only if,  
15 in addition to any other requirement of this Act—

16           “(1) the Commission determines that—

17                   “(A) there is no alternative medical isotope  
18                   production target, enriched in the isotope U-  
19                   235 to less than 20 percent, that can be used  
20                   in that reactor; and

21                   “(B) the proposed recipient of the medical  
22                   isotope production target has provided assur-  
23                   ances that, whenever an alternative medical iso-  
24                   tope production target can be used in that reac-

1           tor, it will use that alternative in lieu of highly  
2           enriched uranium; and

3           “(2) the Secretary of Energy has certified that  
4           the United States Government is actively supporting  
5           the development of an alternative medical isotope  
6           production target that can be used in that reactor.

7           “b. As used in this section—

8           “(1) the term ‘alternative medical isotope pro-  
9           duction target’ means a nuclear reactor target which  
10          is enriched to less than 20 percent of the isotope U-  
11          235; and

12          “(2) a target ‘can be used’ in a nuclear re-  
13          search or test reactor if—

14                 “(A) the target has been qualified by the  
15                 Reduced Enrichment Research and Test Reac-  
16                 tor Program of the Department of Energy; and

17                 “(B) use of the target will permit the large  
18                 majority of ongoing and planned experiments  
19                 and isotope production to be conducted in the  
20                 reactor without a large percentage increase in  
21                 the total cost of operating the reactor.”.

22          (b) TABLE OF CONTENTS.—The table of contents for  
23          the Atomic Energy Act of 1954 is amended by inserting  
24          the following new item after the item relating to section  
25          111:

“Sec. 112. Domestic medical isotope production.”.

1 **SEC. 7. ANNUAL DEPARTMENT OF ENERGY REPORTS.**

2 The Secretary of Energy shall report to Congress no  
3 later than one year after the date of enactment of this  
4 Act, and annually thereafter for 5 years, on Department  
5 of Energy actions to support the production in the United  
6 States, without the use of highly enriched uranium, of mo-  
7 lybdenum-99 for medical uses. These reports shall include  
8 the following:

9 (1) For medical isotope development projects—

10 (A) the names of any recipients of Depart-  
11 ment of Energy support under section 3 of this  
12 Act;

13 (B) the amount of Department of Energy  
14 funding committed to each project;

15 (C) the milestones expected to be reached  
16 for each project during the year for which sup-  
17 port is provided;

18 (D) how each project is expected to sup-  
19 port the increased production of molybdenum-  
20 99 for medical uses;

21 (E) the findings of the evaluation of  
22 projects under section 3(a)(2) of this Act; and

23 (F) the ultimate use of any Department of  
24 Energy funds used to support projects under  
25 section 3 of this Act.

1           (2) A description of actions taken in the pre-  
2           vious year by the Secretary of Energy to ensure the  
3           safe disposition of radioactive waste from used mo-  
4           lybdenum-99 targets.

5 **SEC. 8. NATIONAL ACADEMY OF SCIENCES REPORT.**

6           The Secretary of Energy shall enter into an arrange-  
7           ment with the National Academy of Sciences to conduct  
8           a study of the state of molybdenum-99 production and uti-  
9           lization, to be provided to the Congress not later than 5  
10          years after the date of enactment of this Act. This report  
11          shall include the following:

12           (1) For molybdenum-99 production—

13                   (A) a list of all facilities in the world pro-  
14                   ducing molybdenum-99 for medical uses, includ-  
15                   ing an indication of whether these facilities use  
16                   highly enriched uranium in any way;

17                   (B) a review of international production of  
18                   molybdenum-99 over the previous 5 years, in-  
19                   cluding—

20                           (i) whether any new production was  
21                           brought online;

22                           (ii) whether any facilities halted pro-  
23                           duction unexpectedly; and

24                           (iii) whether any facilities used for  
25                           production were decommissioned or other-

1           wise permanently removed from service;  
2           and

3           (C) an assessment of progress made in the  
4           previous 5 years toward establishing domestic  
5           production of molybdenum-99 for medical uses.

6           (2) An assessment of the progress made by the  
7           Department of Energy and others to eliminate all  
8           worldwide use of highly enriched uranium in reactor  
9           fuel, reactor targets, and medical isotope production  
10          facilities.

11 **SEC. 9. DEFINITIONS.**

12          In this Act the following definitions apply:

13           (1) **HIGHLY ENRICHED URANIUM.**—The term  
14           “highly enriched uranium” means uranium enriched  
15           to 20 percent or greater in the isotope U-235.

16           (2) **LOW ENRICHED URANIUM.**—The term “low  
17           enriched uranium” means uranium enriched to less  
18           than 20 percent in the isotope U-235.

19           (3) **APPROPRIATE CONGRESSIONAL COMMIT-**  
20           **TEES.**—The term “appropriate Congressional com-  
21           mittees” means the House Committee on Energy  
22           and Commerce and the Senate Committee on En-  
23           ergy and Natural Resources.

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