

## Radioisotopes as political instruments, 1946–1953

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**SUMMARY:** 1.—Introduction. 2.—The politics of foreign distribution of «American» isotopes. 3.—Destinations and complications. 4.—Conclusion: Lost market share.

**ABSTRACT:** The development of nuclear «piles», soon called reactors, in the Manhattan Project provided a new technology for manufacturing radioactive isotopes. Radioisotopes, unstable variants of chemical elements that give off detectable radiation upon decay, were available in small amounts for use in research and therapy before World War II. In 1946, the U.S. government began utilizing one of its first reactors, dubbed X-10 at Oak Ridge, as a production facility for radioisotopes available for purchase to civilian institutions. This program of the U.S. Atomic Energy Commission was meant to exemplify the peacetime dividends of atomic energy. The numerous requests from scientists outside the United States, however, sparked a political debate about whether the Commission should or even could export radioisotopes. This controversy manifested the tension in U.S. politics between scientific internationalism as a tool of diplomacy, associated with the aims of the Marshall Plan, and the desire to safeguard the country's atomic monopoly at all costs, linked to American anti-Communism. This essay examines the various ways in which radioisotopes were used as political instruments —both by the U.S. federal government in world affairs, and by critics of the civilian control of atomic energy— in the early Cold War.

**PALABRAS CLAVE:** Comisión de Energía Atómica de Estados Unidos, radioisótopos, Proyecto Manhattan, energía atómica, biología, medicina, David Lilienthal, Lewis Strauss.

**KEY WORDS:** United States Atomic Energy Commission (AEC), radioisotopes, Manhattan Project, atomic energy, biology, medicine, David Lilienthal, Lewis Strauss.

## 1. Introduction (\*)

In the initial years of the U.S. Atomic Energy Commission (AEC), radioisotopes —produced and distributed by the agency for civilian use— became political instruments in struggles over the control of the atom. Even as the atomic bomb became the currency of the Cold War, radioisotopes represented the U.S. government's efforts to harness the power of the atom for peace. The entry of the government into the supply of radioisotopes displaced informal exchange networks that cyclotron physicists had managed before the war. The Manhattan Project's nuclear reactors produced a bountiful supply of radioactive isotopes, but access to them became entangled in the politics of national security. National security concerns resulted in a yearlong embargo on AEC-produced isotopes to foreign institutions, and continued to reverberate in Congressional politics and the national press into the early 1950s. In short, the nationalization of radioisotopes resulted in their politicization<sup>1</sup>.

The Atomic Energy Act of 1946 was aimed at protecting or at least prolonging the American atomic monopoly; to this end it prohibited the export of «fissionable» materials. At the same time, the bill charged the new agency with promoting civilian uses of atomic energy, authorizing the distribution of reactor «byproduct materials» for peaceful uses<sup>2</sup>. The government announcement of the availability of reactor-produced radioisotopes referred to «national distribution», and there was also a general assumption that domestic needs were to be filled first<sup>3</sup>. But

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1. This essay expands on material first presented in Creager, Angela N. H. *Tracing the politics of changing postwar research practices: The export of «American» radioisotopes to European biologists*. *Studies in History and Philosophy of Biological and Biomedical Sciences*. 2002; 33C: 367-388.
2. The Atomic Energy Act of 1946. In: Hewlett, Richard G.; Anderson, Oscar E., Jr. *The new world: A history of the United States Atomic Energy Commission*, Vol. 1: 1939–1946. University Park: Pennsylvania State University Press; 1962 [repr. Berkeley: University of California Press; 1990, p. 714-722, quote on p. 717].
3. Availability of radioactive isotopes. Announcement from headquarters, Manhattan Project, Washington, D.C. *Science*. 1946; 103: 697-705; *Foreign Distribution of Radioisotopes*. Appendix A to Memorandum from J. B. Fisk to Carroll Wilson. 13 Aug 1947. AEC Records of the General Secretary, U.S. National Archives and Records Administration, College Park, Record Group

foreign purchasers were not simply at the back of the line; they could not purchase the AEC's isotopes at all. As one physicist reported at the end of 1946, «Although no one in this country knows of any regulations against sending isotopes to foreign users, the conviction is wide spread abroad that scientists in this country are unwilling to share their materials»<sup>4</sup>.

Restrictions against sending radioisotopes abroad did not come from the leadership of the Manhattan Project; the Army was inclined to share the fruits of government reactors, at least with British and Canadian wartime collaborators. The Truman administration, however, took a dim view of the prospect of continuing any nuclear exchanges after the war. In the summer of 1947, the issue of foreign distribution came to a head among the five AEC Commissioners, who voted —without achieving unanimity— to allow export. They justified their decision by appealing to the Marshall Plan, not Anglo-American military cooperation. In announcing the program, Truman spoke of the foreign shipments as securing «greater international cooperation in the field of medical and biological research»<sup>5</sup>. The first shipments of radioisotopes reached foreign hospitals and laboratories in the fall of 1947.

As the Cold War intensified, conservative watchdogs of the AEC monitored the agency's foreign radioisotope shipments with suspicion. In 1949, their concerns about shipments of isotopes to Norway and Finland resulted in allegations that the agency's distribution policy was undermining national security. The Commission never altered its policy —in fact, the agency expanded the purview of exports to include industrial shipments in the early 1950s— but these shipments featured in the 1949 Congressional Investigative Hearings of the agency, which took a toll on the agency's leadership. Just a few months later, the explosion of the first Soviet atomic bomb shattered any illusions that the U.S. could maintain its nuclear monopoly. In addition, the governments of Britain and Canada began selling radioisotopes to foreign purchasers, with fewer restrictions

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326, Entry 67A [hereafter AEC Secretary Records], box 46, folder 3, Foreign Distribution of Radioisotopes. Vol. 1, p. 8.

4. Evans, Robley D. to: Robert F. Bacher. 31 Dec 1946. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.
5. Telegram from President Truman to: Cowdry, E. V. 3 Sep 1947. Printed with Press Release. 4 Sep 1947. United States Atomic Energy Commission announces first shipment of radioisotopes to a foreign country. AEC Secretary Records. Box 47. Folder 6. Foreign Distribution of Radioisotopes. Vol. 2.

than the AEC. U.S. policy based on denying radioactive materials and nuclear technology to other nations had become pointless. In the early 1950s, President Eisenhower took a new approach to American nuclear supremacy in his Atoms for Peace program, shifting the emphasis from guarding secrets to sharing technology. His depiction of radioisotopes as tools of international diplomacy, in conjunction with 1954 revisions to the Atomic Energy Act permitting greater (though controlled) access to nuclear materials and technology, finally quelled suspicions about foreign shipments<sup>6</sup>.

Two features of the politicization of radioisotopes in the immediate postwar years stand out. First is a recurrent symbolism that divided civilian uses from military uses along disciplinary lines, with biomedicine perceived as inherently civilian and physics and engineering as military. The popular perception that nuclear physics research was unavoidably related to atomic weapons development led the AEC to prioritize medical therapy and biological research in the export program, which the agency represented as a humanitarian endeavor<sup>7</sup>. Nonetheless, a few shipments to foreign physical scientists, especially those to countries in Russia's sphere of influence, drew the alarm of the agency's Congressional critics. They alleged that these radioisotopes could end up in the hands of Soviet government to further military developments, undermining American national security.

Second (and relatedly), critics of these shipments, including dissenting Commissioner Lewis Strauss, insinuated that the sharing of nuclear materials in the form of isotopes was equivalent to the dissemination of nuclear information, which was strictly forbidden under the 1946 Atomic Energy Act. To the degree that nuclear information and nuclear materials appeared inseparable, this weakened the perceived legitimacy of isotope exports. While the dream of a lasting U.S. atomic monopoly persisted, conservatives used anxieties about the loss of the country's nuclear secrets to denounce the international circulation of the AEC's radioisotopes.

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6. See Krige, John. Atoms for peace, scientific internationalism, and scientific intelligence. *Osiris*. 2006; 21: 161-181.

7. See Creager, Angela N. H.; Santesmases, María Jesús. Radiobiology in the atomic age: Changing research practices and policies in comparative perspective. *Journal of the History of Biology*. 2006; 39: 637-647; Santesmases, María Jesús. Peace propaganda and biomedical experimentation: Influential uses of radioisotopes in endocrinology and molecular genetics in Spain (1947-1971). *Journal of the History of Biology*. 2006; 39: 765-794.

## 2. The politics of foreign distribution of «American» isotopes

From the fall of 1945 to the spring of 1946, legislation over atomic energy stalled in Congress. One of the sticking points concerned the level of scientific and technical exchange that the U.S. would have with its former allies<sup>8</sup>. Roosevelt and Churchill had negotiated the so-called Quebec Agreement in 1943, permitting exchanges of technical information between the Americans, British, and Canadian participants in the bomb project<sup>9</sup>. The British government hoped to continue Anglo-American cooperation in the postwar period. However, Truman's administration viewed the sharing of technical information as antithetical to the American aim of maintaining a nuclear monopoly. The U.S. Congress overwhelmingly agreed: the McMahon Bill that President Truman signed into law on August 1, 1946 forbade the government «to share information about nuclear technology with any other power»<sup>10</sup>.

The bill also authorized distribution of «byproduct material», enabling the Manhattan Engineering District (MED) to commence their radioisotope distribution program. On August 2, 1946, the first radioisotope «shipment» was made in front of the MED's graphite reactor in Oak Ridge, Tennessee, with dozens of newspapermen crowded around the stage taking notes and snapping pictures<sup>11</sup>. Shipments that had been pending all summer began being sent out, even as the confirmation hearings for the Commission's first chair, David E. Lilienthal (former head of the Tennessee Valley Authority, or TVA) resurfaced the contentious political debates over atomic energy.

On September 9, 1946, physicist J. D. Cockcroft wrote to General Leslie Groves about the status of outstanding requests for isotopes from

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8. See Mallard, Grégoire. *Quand l'expertise se heurte au pouvoir souverain: La nation américaine face à la prolifération nucléaire, 1945–1953*. Sociologie du Travail. 2006; 48: 367-389; Mallard, Grégoire. *The atomic confederacy: Europe's quest for nuclear weapons and the making of the new world order* [Ph.D. dissertation]. Princeton University; 2008.
  9. Hewlett, Richard G.; Duncan, Francis. *Atomic shield: A history of the United States Atomic Energy Commission, Vol. 2: 1947-1952*. University Park: Pennsylvania University Press; 1969 [repr. Berkeley: University of California Press; 1990. Chapter 9].
  10. Ball, S. J. Military nuclear relations between the United States and Great Britain under the terms of the McMahon Act, 1946–1958. *The Historical Journal*. 1995; 38: 439-454 (440).
  11. This reactor was the main site for the AEC's radioisotope production and distribution. See Creager, Angela N. H. Nuclear energy in the service of biomedicine: The U.S. Atomic Energy Commission's radioisotope program, 1946–1950. *Journal of the History of Biology*. 2006; 39: 649-684.

the British atomic energy installation, Harwell. One such request, for 10 millicuries of phosphorus-32 for biological research, had been transmitted over five months earlier. Groves viewed these requests favorably, writing Cockroft that «it is possible to approve the supply of radioactive isotopes to the United Kingdom and Canada without awaiting appointment of the United States Atomic Energy Commission»<sup>12</sup>. He sent an identical letter to W. B. Lewis at Chalk River, Canada, in response to radioisotope requests from scientists there<sup>13</sup>. These requests from former collaborators in the American atomic bomb project drew upon the wartime precedent of technical cooperation. As it developed, the purchase orders were not received in time to permit shipment before the New Year, so the Army deferred action to the new AEC<sup>14</sup>.

At midnight on December 31, 1946, most of the infrastructure of the MED was legally transferred to the civilian AEC. The new agency was headed by a board, or Commission, of five Presidentially-nominated individuals. The five Commissioners —Lilienthal (its chair), Robert Bacher, Lewis Strauss, Sumner T. Pike, and William W. Waymack— met for the first time on January 2, 1947<sup>15</sup>. They were soon updated on the program launched by the MED to supply radioisotopes for civilian use. Colonel Kenneth D. Nichols, the Army liaison to the AEC selected by General Groves, explained that domestic requests were already being filled, but action on foreign requests had been postponed. He emphasized the special status of requests from wartime allies, recommending that the AEC fill the requests

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12. Groves, L. G. to: Cockroft, J. D. at Harwell, England; Groves, L. G. to: Lewis, W. B. at Chalk River, Canada. 24 Oct 1946. National Archives and Record Administration Southeast Region. Record Group 326 (AEC). Acc. No. 68A1096. Oak Ridge Operations Office Laboratory and University Division Official Files, 1944–1966. Box 13. Folder Isotopes-3. The request for phosphorus-32 had been transmitted by Cockroft on behalf of the UK's Medical Research Council.
  13. Nichols, K. D. to: Wilson, Carroll L. 15 Jan 1947. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.
  14. Huddleson, E. E. Jr., to: Wilson, Carroll L. Memorandum Distribution of radioisotopes abroad. 5 March 1947. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes, Vol. 1.
  15. Robert F. Bacher was nuclear physicist from Cornell who had been a division director at Los Alamos; Lewis L. Strauss was an admiral and financier with a strong background and interest in nuclear physics; Sumner T. Pike was a businessman and former member of the Securities and Exchange Commission and Office of Price Administration. William W. Waymack was a newspaper editor and deputy chairman of the board of the Federal Reserve Bank of Chicago. See Hewlett and Duncan, n. 9, p. 1-6.

from Chalk River and Harwell<sup>16</sup>. There were many other foreign requests; by March of 1947, individuals from institutions at twenty foreign countries had asked to purchase isotopes from the U.S. government<sup>17</sup>.

As the Commission saw it, their position in the forefront of the radioisotope field had been «forced upon it more or less by accident», as a non-military application of their nuclear reactors<sup>18</sup>. Paul Aebersold, who directed the agency's Oak Ridge-based isotope distribution program, advocated opening it to foreign purchasers. But the Commission hesitated to authorize international distribution, even though a memorandum prepared on «the case against sale of radioisotopes abroad» rebutted the most obvious objections<sup>19</sup>. Their lack of decisiveness on the question of isotope distribution was partly attributable to political battles on other fronts. The contentious confirmation hearings for Commissioners lasted into March, and focused on national security issues. Senator Robert A. Taft of Ohio described Lilienthal as «too 'soft' on issues connected with communism and Soviet Russia»<sup>20</sup>. That spring, reports surfaced in the press that «secret files» had been lost or stolen from the AEC's laboratories. Critics of the AEC called for a military takeover of the agency on account of its ineptitude in managing security —despite the fact that the some of the alleged thefts had taken place while the labs were under control of the Army<sup>21</sup>.

At the beginning of June, the General Advisory Committee (GAC) of the AEC discussed whether the agency should make isotopes available to researchers abroad. The GAC, headed by J. Robert Oppenheimer, was composed entirely of physical scientists; the group wielded substantial influence on the Commission in its early years. They strongly supported foreign distribution of the AEC's radioisotopes, arguing it would «prove that this democratic county will do all it can, consistent with its own defense

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16. Nichols, K. D. to: Wilson, Carroll L. 15 Jan 1947 and 21 Jan 1947. Memoranda. AEC Secretary Records Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.
  17. Haywood, C. G. to: Bennett Boskey. 31 Jan 1947. Memorandum. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.
  18. Foreign distribution of radioisotopes, 13 Aug 1947, Appendix A to: Wilson, Carroll L. Memorandum to J. B. Fisk. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.
  19. Shurcliff, W. A. to: Boskey, Bennett. 14 May 1947. Memorandum. Bourke B. Hickenlooper papers, Herbert Hoover Presidential Library. Series 3G. Joint Atomic Energy Committee [hereafter Hickenlooper Papers]. Box 24. Folder Isotopes Jan-Aug 1947.
  20. As quoted in Hewlett; Duncan, n. 9, p. 11.
  21. Hewlett; Duncan, n. 9, p. 88-95.

and security, to improve the public welfare and raise the standard of living throughout the world»<sup>22</sup>.

On June 5, 1947, the Commission considered the GAC's recommendation that it release radioisotopes to foreign scientists but failed to reach consensus. Cited in their minutes are a variety of «pro» and «con» factors. The main perceived risk was that sharing isotopes might compromise the U.S.'s military supremacy. As the minutes put it, the advances in basic research enabled by radioisotopes could give «possible advantages, military and otherwise,» to foreign nations<sup>23</sup>. None of the radioisotopes under the proposed export program could directly assist in the development of atomic weapons. However, obtaining experience with isotopes would help scientists in other nations develop atomic energy, and might contribute to the pursuit of radiological warfare. There was also the problem of controlling secondary distribution. Strauss had already observed that if the agency was unwilling to ship radioisotopes to Russia, it should not let them outside American borders at all, since it could not control their ultimate destination<sup>24</sup>.

On the other side of the ledger, there were many advantages to a policy of controlled sharing. First, publications from foreign scientists using radioisotopes would benefit American researchers. Second, making radioisotopes available outside the U.S., as a step away from American isolationism, would generate political goodwill among foreign nations. It would reinforce the country's commitment to scientific internationalism and show that the AEC was not dominated by the military. As Lilienthal saw it, restoring a sense of the «international fraternity of knowledge» was crucial to shoring up alliances with European «friends», in the spirit of the

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22. Draft of proposed public statement on release of isotopes abroad. Prepared from discussions of the General Advisory Committee, 1 June 1947. J. Robert Oppenheimer Papers, Manuscript Division. Library of Congress [hereafter Oppenheimer Papers]. Box 176. Folder GAC-Radioisotopes, Foreign Distribution.
  23. Minutes from 62<sup>nd</sup> AEC Meeting, 5 June 1947, AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.
  24. Strauss, Lewis L. to Bacher, Robert F. 23 May 1947. Memorandum. Lewis L. Strauss papers. Herbert Hoover Presidential Library. Series 5: Atomic Energy Commission [hereafter Strauss Papers]. Box 46. Folder Isotopes Jan-Aug 1947. Interestingly, there is also a copy in the Hickenlooper Papers. Box 24. Folder Isotopes Jan-Aug 1947. This is one of several pieces of evidence suggesting that Strauss was passing information to Hickenlooper to generate Congressional concern about the radioisotope exports.



Marshall Plan<sup>25</sup>. Third, sharing of radioisotopes might help the U.S. negotiate access to uranium ores, needed for continued nuclear weapons production, that were located in other countries or their colonial possessions<sup>26</sup>. Fourth, the radioisotope program could be used to gain information about the nuclear programs in other countries, bolstering national security through intelligence. As one memorandum put it:

«It will presumably be useful to the United States to know that certain foreigners are busy with no more mischievous work than radioisotope research; conversely, the absence of certain expected names from the list of applicants might suggest inquiry into the possibility that these men are employed against the interests of the United States»<sup>27</sup>.

There was an element of urgency: the political benefits would be greatest if the U.S. acted before other nations developed production-scale nuclear reactors with which to supply radioisotopes.

During the summer of 1947, while the Commissioners equivocated about radioisotope export, scientists became increasingly frustrated with the AEC's restrictive policy. One American scientist who was working in the Institute for Theoretical Physics in Copenhagen conveyed the damage being done to reputation of the U.S. overseas:

«I have just returned from two international scientific congresses, one in Stockholm and one in Oxford and was really amazed to find European biologists regarding America as somewhat the same as Soviet Russia insofar as scientific matters were being handled. It is certainly not a flattering comparison but one cannot deny many of the facts brought out. At neither congress was a paper of any importance regarding the biological uses of radioisotopes read, this in spite of the fact that this new tool has been called one of the most significant advances in biology»<sup>28</sup>.

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25. Lilienthal, David E. *The atomic energy years: The journals of David E. Lilienthal*. Vol. 2, New York: Harper & Row; 1964, p. 190-191 [journal entry for 7 June 1947]. On the significance of science in American-European relations, see Krige, John. *American hegemony and the postwar reconstruction of science in Europe*. Cambridge: MIT Press; 2006.

26. Haywood, n. 17.

27. *Foreign Distribution of Radioisotopes*, n. 18.

28. Mullins, Lorin J. to: Aebersold, Paul C. 1 Aug 1947. Letter. AEC Secretary Records. Box 46. Folder 3. *Foreign Distribution of Radioisotopes*. Vol. 1.

Another referred to British biologists, who were relying on the Cavendish cyclotron for minute supplies of phosphorus-32 and sodium-24, as «materially handicapped by the almost complete lack of isotopes»<sup>29</sup>. The discontent of scientists spilled into the press on July 21, 1947 through an editorial entitled «Scientific Monopoly» in the *New York Herald Tribune* (whose internationalist orientation reflected its liberal Republican ownership). The piece criticized the AEC for changing national policy from openness in sharing radioisotopes to withholding them. «Before the war, when isotopes were made in minute quantities by cyclotrons, America was magnanimous enough to ship tiny amounts to foreign scientists; today, when the supply is comparatively huge, the nation holds on to it grimly»<sup>30</sup>. Even the supply from cyclotrons was restricted: E. O. Lawrence, who had sent isotopes to European scientists such as George Hevesy in the late 1930s, could not resume after the war because his laboratory was supported by the Army and then the AEC.

By mid-1947, Oak Ridge had ninety-six unfilled foreign requests for radioisotopes, of which seventy-three were for medical research and therapy. Nearly half were from England and continental Europe, including requests from Belgium, Denmark, France, Holland, Italy, Portugal, Spain, and Sweden<sup>31</sup>. The agency had drawn up a provisional policy that would allow sales of twenty-eight different radioisotopes of nineteen elements to foreign scientists. The list featured those isotopes that were of greatest interest to biomedical researchers: carbon-14, calcium-45, iodine-131, phosphorus-32, sodium-24, and sulfur-35<sup>32</sup>. Foreign distribution of naturally radioactive elements — those with atomic number higher than 83— would not be authorized, and the only fission product that could be exported was iodine-131, on account of its importance in medical therapy.

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29. Evans, Robley D. to Bacher, Robert F. 15 July 1947. Letter. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.

30. Anonymous. Scientific monopoly. *New York Herald Tribune*. 21 July 1947. Copy in AEC Secretary Records, box 46, Folder Foreign Distribution of Radioisotopes. Vol. 1. On the *New York Herald Tribune*, see Kluger, Richard. *The paper: The life and death of the New York Herald Tribune*. New York: Alfred A. Knopf; 1986.

31. Appendix. List of Foreign Countries from which Requests for Isotopes Have Been Received. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.

32. Manley, J. H. to: Carroll L. Wilson. 24 June 1947. Memorandum. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 1.

On August 19, 1947, when the Commission finally voted on the pending proposal, the tally was four-to-one in favor of radioisotope export. Strauss, the holdout, did not believe that the safeguards proposed by the AEC would prevent radioisotopes from being used to military advantage by other nations. This risk trumped all other benefits in his view<sup>33</sup>. In the eyes of the other four Commissioners, the damage to the credibility of the United States if it failed to export radioisotopes outweighed any risk:

«The United States should take the leadership in this matter rather than reluctantly follow the actions of Canada or Britain. By denying the foreign distribution of radioisotopes at this time the United States will be giving unfriendly countries a propaganda weapon that might be more hurtful to national security than would be any possible harm in the release of radioisotopes under appropriately safeguarded conditions»<sup>34</sup>.

The issue of competition from other national atomic energy facilities was acute; as the minutes noted, since the Commissioner's last discussion of the issue, the first Canadian reactor at Chalk River had become operational. The Department of State approved the AEC's policy at the end of August<sup>35</sup>.

At the opening of the Fourth Annual International Cancer Research Congress in St. Louis on September 3, 1947, President Truman announced that the American-produced radioisotopes would be made available to foreign scientists «principally for medical and biological research». The decision was framed as enabling the «open, impartial, and truly international character of medical research [to] carry over into the realm of other problems of world concern»<sup>36</sup>. The emphasis was on internationalism and humanitarianism as manifested in medicine and biology, though the AEC did not prohibit shipments to foreign scientists working outside of these fields.

Just a few weeks later, negotiations at the United Nations on the Baruch plan for the international control of atomic weapons reached a stalemate, as the Soviet Union would not agree to the terms set by the U.S. Strauss

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33. Hewlett; Duncan, n. 9, p. 109-110.

34. Minutes of the Atomic Energy Commission on Foreign Distribution of Radioisotopes. 19 Aug 1947. p. 3, copy in Oppenheimer Papers. Box 186. Folder Isotopes–Miscellaneous Information.

35. Summary of actions at Commissioners' meetings re: foreign distribution of radioisotopes. AEC Secretary Records. Box 47. Folder 6, Foreign Distribution of Radioisotopes. Vol. 2.

36. Telegram from President Truman, n. 5.

drafted a memorandum to his fellow Commissioners asking them to consider suspending all foreign shipments until the issue of international control had been resolved<sup>37</sup>. His plea was ineffective. Determined to monitor the program himself, Strauss asked the AEC's manager to begin sending him a «record at the end of each month which will show the isotopes that we export, with a description of the isotope, the amount in units of radioactivity or weight, or both, the country of destination, the consignee, and the purpose for which requested»<sup>38</sup>.

The AEC's protocol for foreign shipment requests differed markedly from that for domestic purchasers. Foreign countries had to be approved for the program by the Department of State. This involved going through the usual diplomatic channels to make the request to the Secretary of State, and designating a U.S.-based representative to act on the country's behalf in handling requests. This agent, which could be a diplomatic official, company, or an individual, was expected to take care of a wide variety of tasks: «arrangements for shipments, payment, forwarding of technical circulars to interested scientists in his country and [submitting] progress reports»<sup>39</sup>. Other, less bureaucratic issues came into play for certain foreign applicants. Before «final affirmative action» could be taken on «requests from Russia or Russian dominated countries», they had to be referred to the AEC's General Manager for approval<sup>40</sup>.

The AEC required foreign recipients to report semiannually on the results obtained with the radioisotopes, to use the reagents only for the purposes specified in the application, to abide by the same laboratory safety guidelines as domestic users, and to «permit qualified scientists of all nations to visit their institutions and freely obtain information about

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37. Strauss, Lewis L. to: Bacher, Robert. 23 Sep 1947. Draft memorandum. Re: Has a mistake been made in deciding to export isotopes to foreign countries? Includes a note indicating that the draft was shown to the three other Commissioners on 24 and 25 Sep 1947. Strauss Papers. Box 46. Folder Isotopes Sep-Dec 1947. Quote from p. 9.

38. Strauss, Lewis L. to Wilson, Carroll L. 18 Sep 1947. Memorandum. Strauss Papers. Box 46. Folder Isotopes 1947 Sep-Dec.

39. Press release: 27 nations qualify to receive radioisotopes from Atomic Energy Commission. AEC Secretary Records. Box 47. Folder 6. Foreign Distribution of Radioisotopes. Vol. 2.

40. Franklin, John C. to: Wilson, Carroll L. 26 Sep 1947. Memorandum: Procedure for handling foreign requests for radioisotopes. AEC Secretary Records. Box 47. Folder 6. Foreign Distribution of Radioisotopes. Vol. 2.

the work, in accordance with the best scientific tradition»<sup>41</sup>. For countries interested in building up their own atomic energy capabilities, the policy had a coercive edge —receiving AEC isotopes meant opening up laboratories to American visitors, including the scientific attachés the U.S. government was appointing in various European countries<sup>42</sup>. In other words, it meant acquiescing to U.S. intelligence-gathering.

### 3. Destinations and complications

From the fall of 1947 to the end of 1948, the AEC sent out 356 shipments of radioisotopes to various laboratories and treatment centers around the world, beginning with eleven shipments to Australia. (See Figure 1) Nearly seventy percent went to Europe and the United Kingdom. Sweden was the largest consumer, having received sixty-two shipments, followed by England with fifty-eight. Beyond Australia and New Zealand, the other non-European countries whose institutions received shipments were Argentina, Chile, Peru, and South Africa<sup>43</sup>. Approximately 90% of the uses of isotopes by foreign recipients were in the fields of medical therapy or physiological research. The other ten percent of research uses was accounted for by «fundamental research problems in physics, chemistry, and plant physiology»<sup>44</sup>.

The AEC's official list of exported isotopes is incomplete in one important way. On October 1, 1948, the AEC authorized shipments of stable and radioactive isotopes to the Canadian and British atomic energy installations at Chalk River and Harwell. These shipments were part of the Technical Cooperation Program, as specified by the 1947 *modus vivendi* agreements between the U.S., the U.K., and Canada<sup>45</sup>. Negotiations for reinstating some level of Anglo-American nuclear cooperation became

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41. U.S. Atomic Energy Commission. Third semiannual report. Washington, D.C.: U.S. Government Printing Office; 1948, p. 8.

42. Excerpted minutes, attached to memorandum from T. O. Jones to Edwin E. Huddleson, Jr. 16 Dec 1948. AEC Secretary Records. Box 47. Folder 6. Foreign Distribution of Radioisotopes. Vol. 2.

43. Monthly reports of foreign shipments—radioisotopes. Report No. 16. Dec 1948. AEC Secretary Records. Box 46. Folder 2. Monthly Reports of Foreign Shipments of Radioisotopes.

44. U.S. Atomic Energy Commission. Isotopes: A three-year summary of distribution with extensive bibliography. Washington, D.C.: U.S. Government Printing Office; 1949, p. 24.

45. Hewlett and Duncan, n. 9, chapters 9 and 10.

urgent once the U.S. government realized that half of the uranium ore from the Belgian Congo was going to the British, and this would soon hamper the American nuclear weapons program. The Technical Cooperation Program, like radioisotope exports, remained a sore point with Lewis Strauss and other national security watchdogs. The radioisotope shipments to Chalk River and Harwell were not numerous —there were three to the U.K. and fifteen to Canada between October 1, 1948 and August 1, 1949. Even counting these covert shipments, the slant towards applications in biology and medicine was stronger in the foreign distribution program than in the domestic program<sup>46</sup>.

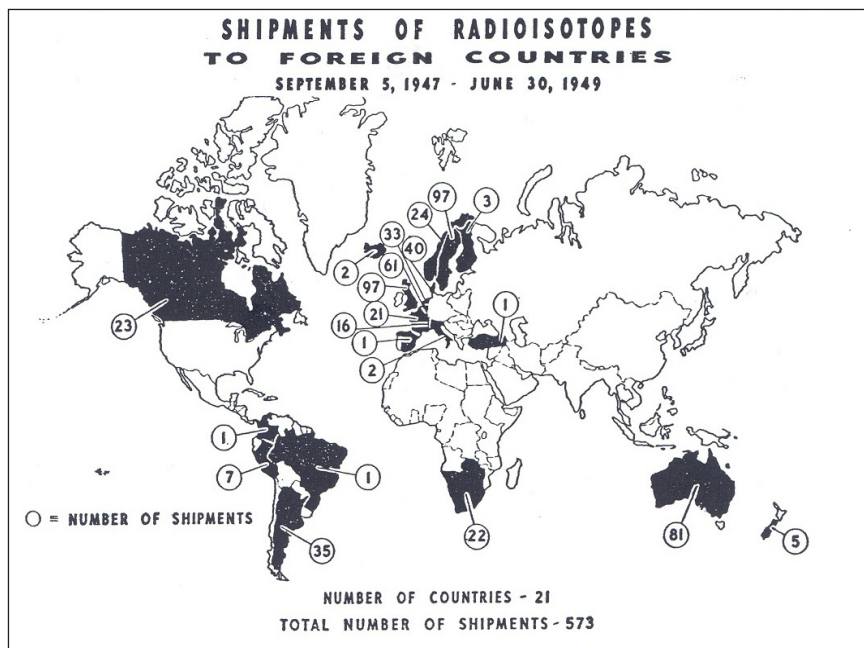


Figure 1. A world map indicating the destination of all foreign shipments of radioisotopes from the U.S. Atomic Energy Commission during the first twenty-two months of the program. Reproduced from the U.S. Atomic Energy Commission. *Isotopes: A three-year summary of distribution with extensive bibliography*. Washington, D.C.: U.S. Government Printing Office; 1949, p. 59.

46. Two years into the program, the AEC estimated that 90% of the foreign shipments were being used in «the fields of medical therapy or physiological research». Press release: AEC sends radioisotopes to 22 nations for research and therapy. AEC Secretary Records. Box 47. Folder 6. Foreign Distribution of Radioisotopes. Vol. 2.

In December 1948, the Commission approved an application to ship radiophosphorus to Finland, despite the fact that Finland had negotiated a mutual assistance pact with the U.S.S.R. a few months earlier. The State Department, which emphasized that «Finland is not behind the iron curtain», sought to encourage the country's independence from Soviet influence<sup>47</sup>. Including Finland in the radioisotope program would signal its place among the European democracies whose economies the U.S. sought to assist. Again Lewis Strauss dissented<sup>48</sup>.

This action added to several other controversial decisions and allegations causing problems in Congress for the AEC. First, the Commission decided in 1948 that its postdoctoral fellowships in the biomedical and physical sciences would be open to applicants irrespective of their political affiliations. The subsequent award of an AEC fellowship to a scientist with a record of membership in the Communist Party became a lightning rod for criticism<sup>49</sup>. Second, the JCAE raised concerns about the publication of the Commission's fifth semiannual report to Congress, which contained detailed information about their facilities and programs —too much for politicians eager to see the country protect its atomic knowledge<sup>50</sup>. Third, another security breach was reported on May 17, this time concerning some fissionable uranium missing from Argonne National Laboratory. This allegation spurred the JCAE to launch an investigation of the AEC, to «make a complete inquiry into the grave charges which have been made»<sup>51</sup>. Making his position clear-cut, Hickenlooper called for Lilienthal's resignation on May 22<sup>52</sup>.

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47. Finland. Policy Statement, U.S. Department of State. 2 Sep 1948. AEC Secretary Records. Box 47. Folder 6. Foreign Distribution of Radioisotopes. Vol. 2, p. 5.

48. Summary of actions at Commissioners' meetings re: foreign distribution of radioisotopes. AEC Secretary Records, box 47, folder 6, Foreign Distribution of Radioisotopes. Vol. 2. See also Krige, John. The politics of phosphorus-32: A cold war fable based on fact. *Historical Studies in the Physical and Biological Sciences*. 2005; 36 (1): 71-91.

49. Kaiser, David. Cold war requisitions, scientific manpower, and the production of American physicists after World War II. *Historical Studies in the Physical and Biological Sciences*. 2002; 33 (1): 131-159, especially p. 140-141. The Commission lost this battle; the appropriations bill Congress passed that summer and President Roosevelt signed on 25 Aug 1949 required FBI clearance for all AEC fellowship applicants. Hewlett and Duncan, n. 9, p. 451.

50. This despite the fact that much of this information, including locations of facilities, had previously been published in the Smyth Report. Lilienthal, n. 25, p. 488-489 (journal entry for March 20, 1949); Hewlett and Duncan, n. 9, p. 352.

51. Joint Committee on Atomic Energy. Investigation into the United States Atomic Energy Project: Hearings Before the Joint Committee on Atomic Energy. 81<sup>st</sup> Congress. 1<sup>st</sup> session. Washington, D.C.: U.S. Government Printing Office; 1949. Part 1. 26 May 1949, p. 1.



Even before the hearings began on May 26, 1949, critics within and without the agency positioned themselves. Strauss's surveillance of the foreign shipment records turned up exactly the sort of suspicious export he had hoped to find—a shipment of radioactive iron to the Norwegian Defense Research Establishment<sup>53</sup>. He wrote the other Commissioners that he thought this shipment violated provisions of the Atomic Energy Act<sup>54</sup>. Given Strauss's close connections to Hickenlooper, this was a warning signal of trouble ahead. A few days later, on May 24, 1949 the AEC sent out a press release defending their foreign distribution program<sup>55</sup>. Hickenlooper marked up his own copy, underlining the emphases on exports for «medical and biological research,» a slant that he knew sat uneasily with the shipment to Norway.

The Investigative Hearings focused alarm on the issue of isotope exports. On June 8, Hickenlooper charged that the AEC's authorization certain shipments «clearly violates the scope and limitations of the isotope distribution program as announced by the President on September 3, 1947»<sup>56</sup>. More specifically, the initial policy was that «isotopes would be made for biological and medical research almost exclusively» whereas a shipment of radioactive iron had been sent on April 28, 1949 to the Norwegian Defense Research Establishment at Kjeller for metallurgical research on high-temperature steel, which might be used in jet engines<sup>57</sup>. Adding to the sense of urgency, the *New York Times* reported shortly before the hearings that Norway was pressing to build a nuclear reactor at Kjeller<sup>58</sup>. Hickenlooper raised concerns about other shipments as well, three to Finland for research in the physical sciences, plus other shipments that had been sent to the Joliot-Curie laboratory in France:

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52. Hewlett; Duncan, n. 9, p. 358.

53. See Strauss's marked-up shipment records in Strauss Papers. Box 46. Folder Isotopes 1949.

54. Strauss, Lewis L. to: the Commissioners. 18 May 1949. Memorandum. Strauss Papers. Box 46. Folder Isotopes 1949.

55. AEC press release: Foreign distribution of radioisotopes. 24 May 1949. Hickenlooper Papers. Box 24. Folder Isotopes 1949.

56. Joint Committee on Atomic Energy, n. 51, Part 5. 8 June 1949, p. 204.

57. This was shipment n. 508, one millicurie of high specific activity iron-59. Monthly Reports of Foreign Shipments—Radioisotopes. Report No. 20. Apr 1949. AEC Secretary Records. Box 46. Folder 2. Monthly Reports of Foreign Shipments of Radioisotopes.

58. Norwegian Defense Board pressing an atomic pile. The *New York Times*. 29 May 1949. Hickenlooper Papers. Box 24. Folder Isotopes 1949. The Norwegian reactor at Kjeller went critical in 1951.



«I call attention to the fact that the social and political views of Madame Curie and her husband have been widely publicized not only in Europe but in the United States. I call attention to the fact that once these isotopes leave our possession we lose control of the actual use to which they may be put and we lose control over the destination of either the isotopes or the information gained therefrom. I also call attention to the fact that many of these isotopes can, in fact, be used for the development of information that will not be used for the benefit of mankind nor for humanitarian purposes»<sup>59</sup>.

According to Hickenlooper, these shipments directly violated the Atomic Energy Act which banned exchange of «information with other nations with respect to the use of atomic energy for industrial purposes» until international safeguards had been established by Congress<sup>60</sup>.

Strauss aligned himself publicly with Hickenlooper. As he stated while testifying that same day, «The question of whether indiscriminate dissemination of knowledge on atomic energy ought to be made during the period of a cold war is the real point at issue»<sup>61</sup>. By referring to the dissemination of «knowledge», rather than isotopic materials, Strauss insinuated that exporting radioisotopes abrogated the Atomic Energy Act's prohibition against sharing nuclear information. Strauss also failed to acknowledge distinctions among the alleged violations: Finland was suspicious on account of its pact with the Soviet Union, France owing to Joliot being an outspoken communist, and Norway because of its military research —this despite the fact that Norway was a U.S. ally and a founding member of the North American Treaty Organization (NATO)<sup>62</sup>. In their loathing of Lilienthal, he and Hickenlooper simply saw red.

Hickenlooper's accusation was reported in newspapers the next day under by-lines such as «U.S. Isotope Export Held Dangerous»<sup>63</sup>. The *New York Times* reported that the accusation «threw the Joint Congressional Committee into severe dispute at the resumption of hearings in Mr. Hickenlooper's

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59. Joint Committee on Atomic Energy, n. 51. Part 5. 8 June 1949, p. 207. On research with radioisotopes in France, see Gaudillière, Jean-Paul. Normal pathways: Controlling isotopes and building biomedical research in postwar France. *Journal of the History of Biology*. 2006; 39: 737–764.

60. Joint Committee on Atomic Energy, n. 51, Part 5. 8 June 1949, p. 206–207.

61. Joint Committee on Atomic Energy, n. 51, Part 6. 9 June 1949, p. 236.

62. On Norway and NATO, see Krige, n. 25.

63. Los Angeles Times. 9 June 1949: 14.

'incredible mismanagement' case against David E. Lilienthal»<sup>64</sup>. Oppenheimer testified on June 13 in defense of the radioisotope export decisions of the AEC, but Congressmen and Senators asked him repeatedly whether the radioisotopes being sent to Europeans might find their way into the hands of the Russians and speed the development of atomic weapons behind the iron curtain. Oppenheimer responded dismissively, suggesting that isotopes were no more useful to the military development of atomic energy than a shovel<sup>65</sup>. Yet, just three months later, the announcement that the Russians had detonated their first atomic bomb reinforced suspicions that disloyal Americans scientists had given away the country's nuclear «secrets»<sup>66</sup>.

#### 4. Conclusion: Lost market share

Richard Hewlett and Francis Duncan argue that the summer 1949 Investigative Hearings, in conjunction with the first Soviet atomic test, marked the end of the period of postwar hope that peaceful applications of atomic energy would predominate over military uses. This changed the symbolism of radioisotopes in two ways. First, to the degree that the radioisotope program exemplified the new era of peaceful uses of atomic energy, it began to appear a mirage in light of the intensifying Cold War. As the successor to the Manhattan Project, the AEC had never ceased being the supplier of nuclear weapons, but the vision that it might develop into an atomic TVA faded as the reality of an arms race with the Soviet Union sunk in. Second, the new reality that the U.S. no longer held an atomic monopoly made it harder for conservatives to portray the export of radioisotopes as jeopardizing the country's supremacy. The establishment of foreign radioisotope distribution programs by Britain and Canada eased the political acceptability of this expanded program in the U.S. by competing with it.

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64. Morris, John D. Isotopes shipment to Norse stirs row. *The New York Times*. 9 June 1949: 1.

65. Joint Committee on Atomic Energy, n. 51. Part 7. 13 June 1949. p. 282. John Krige (n. 48) notes that it was at this time that Strauss's hatred of Oppenheimer hardened, contributing to the humiliating withdrawal of Oppenheimer's security clearance when Strauss headed the Commission in 1954.

66. Kaiser, David I. The atomic secret in red hands? American suspicions of theoretical physicists during the early cold war. *Representations*. 2005; 90: 28-60; Gordin, Michael D. *Red cloud at dawn: Truman, Stalin, and the end of hanatomic monopoly*. New York: Farrar, Straus & Giroux [forthcoming].

The U.S. atomic monopoly was short-lived, and the window of opportunity for the American government to show itself generous with its radioactive resources was closing.

Early in 1951, the Commission voted to expand the foreign radioisotope program. Foreigners would be permitted to purchase isotopes for industrial applications, as the British and Canadian programs allowed. In announcing the change, the AEC sought to assure the head of the JCAE, Senator Brien McMahon, that the newly broadened program «is wholly consistent with the paramount objective of assuring the common defense and security»<sup>67</sup>. The press release for the policy was also carefully worded to allay public worries about the exports:

«There is nothing secret or evil about radioisotopes in the forms in which they are sold in this country and abroad. While their utilization cannot significantly advance the atomic energy programs of nations, they can contribute, and are contributing, significantly to advancements in basic science, medicine, agriculture and industry. As of today, isotopes constitute the single most important contribution of atomic energy to peacetime welfare.

Enlargement of our isotope export program is, we feel, in keeping with the foreign policy of the United States, which calls for aid to foreign nations in peacetime development, and, even in the absence of international control of atomic energy, constitutes a field in which international cooperation can be increased»<sup>68</sup>.

The press release also emphasizes the role of training programs for foreign scientists in growing the demand for isotopes abroad. The Isotope School of the Oak Ridge Institute of Nuclear Studies at Oak Ridge, Tennessee, had accepted a limited number of foreign nationals in the late 1940s through 1951<sup>69</sup>.

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67. Pike, Sumner T. to: McMahon, Brien. 7 May 1951. Letter. Appendix B to AEC 231/16. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 3.

68. Proposed press release: AEC enlarges radioisotope export program. Appendix E to AEC 231/16. AEC Secretary Records. Box 46. Folder 3. Foreign Distribution of Radioisotopes. Vol. 3, p. 16.

69. Proposed press release, n. 68. John Krige has analyzed the importance of such training programs in association with Eisenhower's Atoms for Peace initiative; see Krige, John. Techno-utopian dreams, techno-political realities. The education of desire for the peaceful atom. In: Gordin, Michael D.; Prakash, Gyan; Tilley, Helen, eds. *Utopia-dystopia: Conditions of historical possibility*. Princeton: Princeton University Press [forthcoming].

The upshot of the restrictions that the AEC placed on radioisotope exports was that the Americans lost substantial market share —and thus political influence— as foreign purchasers turned instead to the British and Canadian governments. As Néstor Herran has shown, within a year of the commencement of the British export program, radioactive shipments abroad from Harwell exceeded those from Oak Ridge<sup>70</sup>. An AEC memo from June 1951 conceded that the three governments had become regional, not global, isotope suppliers: «the British can, and for the most part do, furnish short-lived radioisotopes to Western European countries; we distribute these materials to Latin American countries»<sup>71</sup>. If the U.S. had an edge, it was in the production of radiolabeled compounds, although the gap was being narrowed by the British national company, Amersham, which began offering radiolabeled compounds in 1949<sup>72</sup>.

Because all three governments were subsidizing isotope sales, the U.S. could not actually compete on a cost basis —from the outset, the Canadian and British governments set their prices to match those of Oak Ridge. As the agency admitted, «Such differences in prices as do exist would not in themselves be the determining factor in choosing one country over another as a supplier. Differences in shipping costs are a most important economic consideration»<sup>73</sup>. For non-economic considerations, the U.S. AEC was at a disadvantage on account of the complex diplomatic controls it exercised in the name of national security.

The association that conservatives crafted between foreign distribution of isotopes and lax national security was finally severed by Dwight Eisenhower. President Eisenhower's «Atoms for Peace» speech at the end of 1953, with its core proposal that the U.S. and the U.S.S.R. both contribute fissionable materials to a program aimed at peaceful atomic energy, highlighted the longstanding emphasis on civilian benefits which had been emblemized by the radioisotope distribution program. The subsequent 1954 revision of the Atomic Energy Act relaxed the tight security restrictions of the original

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70. Herran, Néstor. Spreading nucleonics: The Isotope School at the Atomic Energy Research Establishment, 1951–67. *British Journal for the History of Science*. 2006; 39: 569-586.

71. AEC 231/17. 19 June 1951. AEC Secretary Records. Box 47. Folder 1. Foreign Distribution of Radioisotopes. Vol. 3.

72. Kraft, Alison. Between medicine and industry: Medical physics and the rise of the radioisotope 1945–65. *Contemporary British History*. 2006; 20: 1-35.

73. Pike, Sumner T. to: McMahon, Brien. 21 June 1951. Letter. AEC Secretary Records. Box 47. Folder 1. Foreign Distribution of Radioisotopes. Vol. 3.

legislation, and permitted companies to patent atomic technologies and license fissionable materials. This also served Eisenhower's foreign policy agenda. Having failed to become the main supplier of radioisotopes in the global marketplace, the U.S. began negotiating agreements with other nations to provide them with the technologies and materials they needed to construct their own radioisotope-producing reactors. In this new phase of the Cold War, nuclear information and fissionable materials joined radioisotopes as instruments of political influence<sup>74</sup>.

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74. See Krige, n. 6 and n. 69. I am indebted to Krige for discussions on the Atoms for Peace program.