



Detection of the First Soviet Nuclear Test, September 1949

Joe-1, 29 August 1949. Photo from Peter Curan's film "Trinity and Beyond: The Atomic Bomb Movie," as displayed on nuclearweaponsarchive.org, and used with permission of Peter Curan.

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Newly Declassified Documents Trace Beginnings of Superpower Nuclear Arms Race

Soviet Atomic Project Posed Major Challenge to U.S. Intelligence

Records Expand Knowledge of the Role of German Scientists in Advancing the Soviet Nuclear Program

Washington, D.C., September 9, 2019 – Seventy years ago, on 9 September 1949, Director of Central Intelligence Admiral Roscoe Hillenkoetter handed President Harry Truman a carefully worded report of “an abnormal radio-active contamination” in the Northern Pacific that greatly exceeded normal levels in the atmosphere. While uncertain as to the cause, the DCI’s first hypothesis was “An atomic explosion on the continent of Asia.” This proved to be accurate – it was the first Soviet test of a nuclear device.

Moscow's success in building a nuclear bomb was a monumental development made all the more alarming for U.S. strategists by the fact that it occurred one-to-four years sooner than analysts had expected. The White House chose to preempt possible Kremlin triumphalism by announcing the finding to the world on 23 September 1949, a move that evidently came as a shock to the Soviets who had no idea the U.S. had the capability to isolate and identify the signs of a nuclear blast.

Hillenkoetter's memo, never before published, is at the core of a new posting today by the National Security Archive offering previously classified information and context surrounding the U.S. discovery of the landmark Soviet test. The documents are an update to an earlier Archive compilation and focus on the state of U.S. intelligence about the Soviet nuclear program before and after the test. They help address lingering questions about the unexpected abilities of U.S. nuclear detection technology but also about the disturbing failure to predict the Soviet atomic breakthrough more accurately.

Seventy years ago, on 9 September 1949, Director of Central Intelligence Admiral Roscoe Hillenkoetter handed to President Harry Truman a report that "samples of air masses" collected in the Northern Pacific included evidence of "abnormal radioactive contamination." According to the report, published for the first time today by the National Security Archive, the intelligence community was not sure whether the contamination was evidence of a Soviet nuclear test or a nuclear accident or something else altogether, but by 21 September it advised Truman that the Soviet Union had staged a nuclear test. Two days later, on [23 September 1949](#), Truman made headlines with an announcement that the Soviet Union had tested a nuclear device several weeks earlier.

The White House did not explain how the United States had detected the test, which had occurred on 29 August 1949 at Semipalatinsk, in northeastern Kazakhstan. What made the detection possible was that an Air Weather Service plane controlled by the secret U.S. Air Force organization, Air Force Office of Atomic Energy/1 [AFOAT/1], had collected radiological debris produced by the test and that an Air Force contractor confirmed that the material was from an atomic test.

Today's publication on the detection of "Joe I", as U.S. intelligence analysts dubbed it, is an update of a National Security Archive posting published ten years ago.[\[1\]](#) That posting drew on previously unpublished declassified material, documenting how the U.S. Air Force and other organizations collaborated to detect a nuclear event that intelligence analysts had not expected for another year or longer. This update includes recently declassified information on the intelligence picture prior to and after Joe 1, including:

- *An intelligence report from 1948 on East German production of calcium metal of such high purity that intelligence analysts believed "beyond any shadow of a doubt" that it was "intended for an atomic energy project." Calcium metal helped produce the uranium reactor fuel that generated plutonium for Moscow's first bomb.*

- *A State Department memorandum from July 1949 reporting the existence of “evidence indicating that a chemical extraction plant [with] the earmarks of a plutonium extraction plant has been completed in the USSR,” but no evidence of a nuclear reactor.*
- *A CIA report from 1957 on the role of German scientists at a Soviet factory that produced uranium metal (used for reactor fuel) of sufficient purity that they “may have advanced the Soviet atomic energy program by about 6 months.”*

Detecting Joe 1

The White House announcement on 23 September may have stunned Stalin and the Soviet Politburo; they did not know that the U.S. had a surveillance system geared to detect the tell-tale signs of nuclear activities and they wanted to avoid giving Washington an incentive to accelerate its own nuclear weapons activities.^[2] The Soviet test was also a jolt to U.S. intelligence analysts who had estimated that Moscow was unlikely to have the bomb before mid-1953, although they had deemed mid-1950 as a possibility. A few weeks after the test, CIA Director Roscoe Hillenkoetter argued that "I don't think we were taken by surprise" because of an error of only a "few months," but not all of his Congressional overseers accepted that.

How did the Truman administration discover Moscow's secret? Why had U.S. intelligence been so mistaken?

A few days after the Soviet test, on 3 September 1949, a WB-29 ["W" for weather reconnaissance] operated by the Air Force's Weather Service undertook a routine flight from Misawa Air Force Base (Japan) to Eilson Air Force Base (Alaska) on behalf of the secretive Air Force Office of Atomic Energy-1 [AFOAT-1] [later renamed the [Air Force Technical Applications Center, or AFTAC](#)]. The plane carried special filters designed to pick up the radiological debris that an atmospheric atomic test would inevitably create. So far none of the flights in the Northern Pacific had picked up such debris, but after this flight returned to Eilson and a huge Geiger counter checked the filters, the technicians detected radioactive traces. This was the 112th alert of the Atomic Energy Detection System (the previous 111 had been caused by natural occurrences, such as earthquakes).

After a complex chain of events, involving additional flights to collect more air samples, consultations among U.S. government scientists, consultants, and contractors, including radiological analysis by the AFOAT/1 contractor, Tracerlab, and consultations with the British government, the U.S. intelligence community concluded that Moscow had indeed conducted a nuclear test. The test data was codenamed "Vermont." On 23 September 1949, the White House announced that "We have evidence that within recent weeks an atomic explosion occurred in the U.S.S.R."^[3]

That the U.S. government had a system for spotting overseas nuclear activities was a deep secret. During and after World War II, the possibility of detecting radioactive particles and emissions (as well as seismic and acoustic signals) became the subject of protracted research and development work, including the collection of radioactive

samples from U.S. atomic tests. In September 1947, Army Chief of Staff Dwight D. Eisenhower assigned the Army Air Force, not yet an independent service, with responsibility for establishing an Atomic Energy Detection System (AEDS). Later that year, the Air Force created what would later become known as AFOAT-1, with responsibility for the surveillance program. AFOAT/1 began to operate an "Interim Surveillance Research Net" that was functional by the spring of 1949. A more comprehensive surveillance system integrating radiochemical, seismic, acoustic, and other methods was not yet in place.[\[4\]](#)

Atomic Energy Commissioner Lewis Strauss sought detection capabilities to avoid an "atomic Pearl Harbor," but U.S. intelligence analysts did not see a Soviet test as a near-term likelihood. Thus, estimates during the years before Joe-1 projected mid-1953 as "the most probable date," although conceding that mid-1950 was also possible. No one in U.S. intelligence realized how quickly the Soviets were moving ahead, or that intelligence gathered by Soviet spies in the U.S. and the United Kingdom would save Moscow a year or two in building its own bomb.[\[5\]](#)

Tight security measures in the Soviet Union made it difficult to produce accurate estimates, but British and U.S. intelligence had collected information that had implications not fully considered by analysts. Especially relevant was intelligence on the production in an East German factory of metallic calcium, integral for the production of the uranium metal used to fuel Soviet reactors. Apparently, no one in the intelligence establishment asked why so much metallic calcium was being produced, although it was at levels that suggested that the Soviets could be producing significant quantities of reactor fuel.[\[6\]](#) One of the major analytic units, CIA's Office of Research and Estimates (ORE), was so disengaged from scientific intelligence that several weeks after the detection of the Soviet test and three days before the White House announcement it produced a paper repeating the estimate of mid-1953 "as the most probable date."[\[7\]](#)

The US Announcement

Once senior scientific advisers confirmed AFOAT/1's findings, a U.S. announcement was by no means automatic. President Truman was not entirely convinced that a test had taken place and top officials debated whether to announce, with some (AEC Chairman David Lilienthal) arguing that the public had a right to know, while others (Secretary of State Acheson) were more reluctant. Moreover, another important announcement was pending – devaluation of the British pound, and Truman thought two shocks were too many. Yet, he feared that the information would leak (hundreds of U.S. government officials were already in the know), and concluded that an official U.S. announcement was better than a Soviet one.[\[8\]](#)

After Truman's press secretary handed out the mimeographed announcement, no further information about the discovery was made available, even the estimated date of the test. The U.S. government kept the details secret, although that did not stop informed speculation by journalists and academics about how the test was detected, with some

correctly deducing that the U.S. had used radiological analysis. Senator Edwin Johnson (D-CO) inadvertently released an important clue when, during a television interview, he said that the Soviet bomb contained "plutonium," indicating that the United States had acquired traces of the device that it could analyze.[\[9\]](#)

It took years before the fuller story became publicly available. Doyle Northrup, one of the leading officials at AFOAT-1/AFTAC, wrote several narratives that were eventually declassified (with excisions). It was not until the 1990s, however, that two anthropologists at Brandeis University, Charles A. Ziegler and David Jacobson, pieced together the declassified archival record to produce an authoritative and accomplished account of the early history of AFOAT-1 and the detection of Joe-1: *Spying Without Spies: Origin of America's Secret Nuclear Intelligence Surveillance System* (Praeger, 1995).[\[10\]](#)

Implications

The discovery that the United States had lost its nuclear monopoly created alarm about falling behind Moscow and a resolve to stay ahead. Among the measures that reinforced a spiraling nuclear competition were Truman's decision to approve a Joint Chiefs of Staff proposal to expand fissile material production and his 31 January decision to authorize a thermonuclear weapons program. Moreover, the Soviet test gave impetus to a major policy report, NSC 68 (14 April 1950) calling for massive military spending to offset the political and military impact of Stalin's bomb. [\[11\]](#)

Stalin may have hoped that secrecy could prevent such U.S. reactions or even a war. Indeed, when the Soviets made a counter-statement on 25 September, they did not acknowledge a weapons test, claiming (preposterously) that the U.S. must have detected "blasting" caused by construction work. Moscow also tried to put a damper on U.S. preventive action by suggesting that it had possessed the bomb since 1947. In any event, the Soviet Union's entrance into the nuclear club may have had a direct impact of an entirely unexpected kind – emboldening Stalin to support Kim Il-sung's plan for a North Korean invasion of the South. As Evgueni Bajanov put it, when Stalin approved Kim's proposal, he was "more confident of the Communist bloc's strength."[\[12\]](#)

Notwithstanding all of the significant declassifications, a complete picture of the role of U.S. intelligence in the events of September 1949 is not yet possible. The part played by AFOAT/1 in detecting the test is well documented, but more needs to be learned about the role of the CIA, which played a central part in coordinating intelligence about the test. Moreover, reports that were of the nature of post-mortems on the intelligence failure remain largely unavailable, such as [one](#) by the Office of Scientific Intelligence for which only the conclusions have been declassified. Moreover, in response to a National Security Archive request, the CIA recently denied an unspecified number of documents concerning the detection of Joe I.

Read the Document

Part I: Overview of the Discover



[Document 01](#)

[Doyle Northrup, Air Force Technical Applications Center, "Detection of the First Soviet Nuclear Test on August 29, 1949," February 1962, Secret, excised copy](#)

1962-02-00

Source: American Institute of Physics, Neils Bohr Library, R.C. Williams Papers, box 3, Letters/Interviews (copy courtesy of Michael Goodman)

Thirteen years after the event, Doyle Northrup, who was a key player at AFOAT/1, wrote what may have been the first detailed account of the detection of Joe I, providing a narrative of the creation of the Atomic Energy Detection System and the analytic effort that followed Alert No. 112. He also showed how U.S. intelligence was able to develop a more accurate estimate of the date and location of the test. While acoustic records were analyzed, they did not immediately provide useful information. "On subsequent review these records revealed weak signals at two stations. These acoustic signals were very useful because they helped after the fact to establish the location, time, and size of Joe-1 with greater precision than was possible otherwise." (See page 17). Although this report provides no further information, apparently U.S. intelligence was able to determine the site of Joe-1 to "within 100 miles and the time to within 10 minutes."[\[13\]](#)



[Document 02](#)

[Doyle Northrup and Donald Rock, "The Detection of Joe 1,"Central Intelligence Agency, Studies in Intelligence, Fall 1966, Secret, excised copy](#)

1966-09-00

Source: [CIA FOIA Web Page](#)

This version of the Northrup-Rock study, written for an audience in the intelligence establishment, included additional details. The authors recalled that what precipitated the White House announcement was news that the Associated Press had picked up rumors of the test. The actual decision was more complex, but fear of leaks did influence the announcement. The authors also provided details of the contribution of acoustic intelligence to determining the time, date, and location of the test: 0100 GMT, Semipalatinsk, 29 August 1949, Moreover, the yield of the device was 20 kilotons.

Part II: Estimates, Analysis, and Information on the Soviet Nuclear Program



[Document 03](#)

[Henry S. Lowenhaupt, "On the Soviet Nuclear Scint," Central Intelligence Agency, *Studies in Intelligence* 11 \(Fall 1967\), Secret](#)

1967-00-00

Lowenhaupt, who was involved in the Manhattan Project and was present at the creation of the CIA's nuclear intelligence work, elucidates the painstaking and complex effort to learn about Soviet progress in the nuclear field during the 1940s. Through such methods as opening mail and acquiring bills of lading, CIA scientific intelligence acquired insight into the Soviet nuclear program even if most of it was beyond the Agency's ken.



[Document 04](#)

["Calcium Production at Bitterfeld," undated \["received \(?\) June 30, 1948"\], Top Secret](#)

1948-06-30

Source: National Archives, Record Group 59 (hereinafter RG 59), Records of the Special Assistant to the Secretary of State for Atomic Energy, General Records Relating to Atomic Energy Matters, 1948-1962, box 83, 21.91 Country File USSR c. Estimates of the Russian Bomb 1947-1952

The archival file that includes this scientific intelligence report provides no clues on its provenance. So far it is only available primary source in U.S. archives concerning the results of a secret U.S.-British intelligence operation: to glean information on an industrial plant in the Soviet Zone of Germany that produced large quantities of distilled calcium, an important input into the Soviet nuclear program. Apparently, MI-6 sources at the plant provided most of the intelligence and this report may be derived from British information.[\[14\]](#)

Early in the Soviet Union's occupation of East Germany at the close of World War II, the Soviets took over a huge I.G. Farben complex at Bitterfeld (southeast of Berlin) that produced calcium products, including calcium metal. One of the plant's products, metallic calcium, can be used for processing uranium ore into uranium metal, the fuel for a nuclear reactor. U.S. and British intelligence learned that the plant's Soviet director had demanded high levels of purity for distilled calcium. That demand informed the report's principal conclusion: "on the basis of the analytical specifications presented by the Russians to the German Directorate of the plant ... the calcium is intended for an atomic energy project beyond any shadow of a doubt."

During 1946-1947, Bitterfeld produced 112 tons of distilled calcium, about half of which

had the desired purity. The product went directly to the Soviet Union, either by air or by rail. One of the forwarding addresses was "Elektrostalwork Moskau, Bisonbahn Bozirk.Kursk:Postfach 3" The reference to Elektrostal was a good clue for the possible location of the Soviet uranium metal plant. Elektrostal, an industrial town near Moscow, was the site of factory 12, the plant designed by the German scientist Nikolaus Riehl [See document 27]

Besides supplying distilled calcium, the report indicates that the Germans provided the Soviets with designs for a similar plant to be built at Dzherzhinsk. The plant at Bitterfeld and the Soviet plant produced enough calcium metal to help the Soviets produce up to 60 tons of metallic uranium per month, far more than CIA intelligence analysts were estimating. The Soviets had enough uranium metal to start their nuclear reactor operations and to produce enough plutonium to fuel a nuclear device.



[Document 05](#)

[Director of Central Intelligence R.H. Hillenkoetter, memorandum to the President, "Estimate of the Status of the Russian Atomic Energy Project," 6 July 1948, Top Secret](#)

1948-07-06

Source: Harry S. Truman Library, Presidents Secretary's File, box 249, Central Intelligence-Memoranda 1945-1948 (copy courtesy of Jeffrey Richelson)

CIA director Hillenkoetter reaffirmed a 1947 estimate: while it was "remotely possible" that the Soviets would test a weapon by mid-1950, the "most probable date" was mid-1953.



[Document 06](#)

[Untitled memorandum on uranium production, 18 August 1948, Top Secret](#)

1948-08-11

Source: RG 59, Records of the Special Assistant to the Secretary of State for Atomic Energy, General Records Relating to Atomic Energy Matters, 1948-1962, box 83, 21.91 Country File USSR c. Estimates of the Russian Bomb 1947-1952

Probably written as an input for a yet to be identified report, this memo included estimates of output of U_3O_8 (triuranium octoxide), a form of yellowcake, and low-grade uranium.



[Document 07](#)

[Memorandum from R. Gordon Arneson to Mose L. Harvey, Chief, East European Branch, DRE, 9 November 1948, Secret](#)

1948-11-09

Source: RG 59, Records of the Special Assistant to the Secretary of State for Atomic Energy, General Records Relating to Atomic Energy Matters, 1948-1962, box 54, 21.91 USSR General 1947-1952

In this memorandum to State Department intelligence, Gordon Arneson, special assistant to the secretary of state for atomic energy matters, asked for information on possible graphite production facilities in the Soviet Union. By making this request, he demonstrated his understanding of a basic issue: that the Soviets could possibly develop an atomic reactor moderated by graphite, along the same lines as the U.S.'s Hanford, Washington plant. While suggesting some possible locations for graphite production, Arneson did not know about the prime source, the Moscow Electrode Factory. [\[15\]](#)



[Document 08](#)

[Untitled estimate, 3 December 1948, Top Secret](#)

1948-12-03

Source: RG 59, Records of the Special Assistant to the Secretary of State for Atomic Energy, General Records Relating to Atomic Energy Matters, 1948-1962, box 83, 21.91 Country File USSR c. Estimates of the Russian Bomb 1947-1952

Apparently, a draft for a 1 January 1949 estimate of the USSR atomic energy program, this memorandum restated the findings of the July 1948 estimate about mid-1950 and mid-1953 (see document 4). It made a special point that new intelligence on Soviet uranium mining from "well-placed sources" surpassed early appraisals based on "geological theory and low-grade intelligence reports on uranium mining." Nevertheless, the reliability of the sources had to be tested



[Document 09](#)

[Untitled estimate, 10 December 1948, Top Secret](#)

1948-12-10

Source: RG 59, Records of the Special Assistant to the Secretary of State for Atomic Energy, General Records Relating to Atomic Energy Matters, 1948-1962, box 83, 21.91 Country File USSR c. Estimates of the Russian Bomb 1947-1952

Another draft for the 1 January 1949 estimate (not yet declassified), this memorandum cited unspecified “fragmentary” evidence on a plutonium bomb and other information furnishing a “picture of the organization of the Soviet atomic energy program and certain localities involved.” Whether such sites as Elektrostal had been identified as one of the relevant “localities” remains to be learned. According to this estimate, the Soviets had enough uranium to operate one reactor (“production pile”). Moreover, the quantity of uranium could be “considerably higher than that previously estimated.”



[Document 10](#)

[Joint Nuclear Energy Intelligence Committee, “Status of the U.S.S.R. Atomic Energy Project – 1 July 1949,” Top Secret, attached to U.S. Air Force, Executive Directorate of Intelligence, “Estimate of Soviet Capabilities in the Field of Atomic Energy,” 13 July 1949, Top Secret](#)

1949-07-13

Source: National Archives, Record Group 341, Records of Headquarters, United States Air Force (Air Staff), Deputy Chief of Staff for Operations, Directorate of Intelligence Top Secret Control & Cables Section, July 1945-Dec 1954, box 45, folder "2-8100 to 2-8199."

A highly compressed report by the recently created Joint Nuclear Energy Intelligence Committee [JNEIC], produced only weeks before the Soviet test, reached the same basic conclusion as the earlier reports. Thus, it generally upheld the mid-1950 and mid-1953 dates, except for one modification: if the Soviets were using only "one method" for fissile material production, then mid-1951 was the earliest possible date for an atomic bomb. "One method" was probably a reference to a heavy water reactor.



[Document 11](#)

[Memorandum for the Secretary \[of State\] from R. Gordon Arneson, “Attached Statement on Status of USSR Atomic Energy Project,” 7 July 1949, Top Secret](#)

1949-07-05

Source: RG 59, Records of the Special Assistant to the Secretary of State for Atomic Energy, General Records Relating to Atomic Energy Matters, 1948-1962, box 83, 21.91 Country File USSR c. Estimates of the Russian Bomb 1947-1952

Gordon Arneson provided Secretary of State Dean Acheson with an explanation of the intelligence information (or lack of information) that shaped the JNEIC’s recent

assessment. U.S. intelligence concluded that before mid-1951 Moscow would not have enough heavy water at hand to operate a reactor for producing plutonium. As for a graphite pile reactor Arneson's earlier efforts to collection information on Soviet graphite production had failed: "There are not even low grade rumors of Soviet manufacture within, or acquisition outside the USSR, of pile grade graphite." Nevertheless, Arneson could not dismiss the possibility of a "uranium-graphite pile," which is what the Soviets already had, a copy of the U.S. reactor at Hanford.

U.S. intelligence had assigned a mid-1950 date as the "earliest possible date" for a Soviet bomb because it had "evidence indicating that a chemical extraction plant [with] the earmarks of a plutonium extraction plant has been completed in the USSR." Arneson acknowledged that the evidence might be incorrectly interpreted and noted that the "Soviets, as we did during the war, have built a 'flexible' extraction plant before they had anything to extract."

Arneson cited estimates for Soviet stocks of U_3O_8 that were significantly lower than the August 1948 estimate: in the range of 1324 to 2150 tons, "the lower figure being the most probable." The estimate for Soviet bloc production of U_3O_8 in tons was 570-850, as 1 July 1949, with "470-700 coming from outside the USSR--Saxony (250-400), Czechoslovakia (200-250), and small quantities from Poland and Bulgaria."

Arneson made a technical point about the rate of plutonium production by noting that intelligence analysts had assumed that by the 1950s, the Soviets would compensate for a postulated shortage of uranium by extracting "twice the amount or plutonium that we have been extracting to date." The United States was seeking to achieve a "higher rate by keeping the slugs longer in the pile, after a recalculation of the risks involved in such a procedure." The "risk" may have been a reference to the greater probability that the plutonium could have a higher fraction of spontaneously fissioning Pu-240; that could cause the weapon to fail by detonating prematurely before reaching maximum criticality.

Part III: The Discovery



[Document 12](#)

[Memorandum from Director of Central Intelligence Rear Admiral R. H. Hillenkoetter, 9 September 1949, Top Secret, Excised copy \(currently under request for review at CIA\)](#)

1949-09-09

Source: Harry S. Truman Library, President's Secretary's Files, Intelligence File, Central Intelligence, Memoranda-1949 folder

In this closely held memorandum, DCI Hillenkoetter notified the White House of the detection of radioactive materials in the Northern Pacific but cautioned that the intelligence community was still trying to determine whether it had found evidence of "an atomic explosion" or of some other phenomenon (volcanic activities, effluents from the Hanford production reactor, or an atomic accident in Russia). According to George Elsey's interview with NSC Executive Secretary Sidney Souers [See document 16B], the latter showed this document to President Truman.



[Document 13](#)

[Air Force Chief of Staff to Secretary of Defense, "Long Range Detection of Atomic Explosions," undated \[circa 21 September 1949\], with enclosures: 1\) Vannevar Bush et al. to General Vandenberg, 20 September 1949, and 2\) Doyle L. Northrup, Technical Director, AFOAT-1 to Major General Nelson, Technical Memo. No. 37, "Atomic Detection System Alert No. 112," 19 September 1949, Top Secret, Excised copy, best copy available](#)

1949-09-21

Source: *Declassified Documents Reference System*

President Truman had been doubtful that the Soviets had tested the bomb, but on 21 September 1949, he, his aide Steven Early, and Secretary of Defense Louis Johnson saw this memorandum and the supporting documents. Air Force Chief of Staff Vandenberg had written that that "I believe an atomic bomb has been detonated over the Asiatic land mass during the period 26 August 1949 to 29 August 1949. Drawing on the findings of Tracerlab, the AFOAT-1 report concluded that an atomic bomb had been detonated, that the "fission products resulted ... from the fission of plutonium" and that the "observed phenomena are all consistent with the view that the origin of the fission products was the explosion of an atomic bomb whose nuclear composition was similar to the Alamogordo bomb.," with the test occurring between 27 and 30 August.

Vandenberg noted that "[c]onclusions by our scientists based on physical and radiochemical analyses of collected data have been confirmed by scientists of the AEC, United Kingdom and Office of Naval Research" [See documents that follow], In one of the attached memoranda, top scientific and military experts on nuclear weapons, including J. Robert Oppenheimer and Vannevar Bush, endorsed AFOAT/1's findings.^[16] Presumably, this dispelled Truman's doubts.

The excisions on PDF pages 3 and 5 may be references to the role of the Air Weather Service in providing the aircraft used for the collection of fallout samples.



Document 14

U.S. Atomic Energy Commission, "An Interim Report of British Work on Joe," 22 September 1949, Top Secret

1949-09-22

Source: Harry S. Truman Library, President's Secretary's Files, box 199, NSC-Atomic

When Washington alerted the British government that an air mass containing radioactive particles was going to pass north of Scotland, London ordered special air sampling flights to collect more traces of the Soviet test. While the British had their own routine air sampling flight program, the next one was not scheduled until 14 September so important evidence could have been missed had it not been for the U.S. alert.



Document 15

U.S. Naval Research Laboratory, "Collection and Identification of Fission Products of Foreign Origin," date illegible [Circa 21 September 1949], Top Secret

1949-09-21

Source: Harry S. Truman Library, President's Secretary's Files, box 200, NSC-Atomic

Some months before the Soviet test, in April 1949, the U.S. Navy began "Project Rain Barrel" to analyze debris from nuclear weapons tests that might show up in rain water collected secretly at stations in Kodiak, Alaska, and Washington, D.C. "Rain Barrel" information described in this report was critically important to forming the scientific consensus about the nature of the Joe-1 test. [\[17\]](#)



Document 16

Document 8: [U.S. Air Force Deputy Chief of Staff for Operations, Atomic Energy Office, Section 1], "U.S. Weather Bureau Report on Alert Number 112 of the Atomic Detection System," 29 September 1949, Top Secret

1949-09-22

Source: Harry S. Truman Library, President's Secretary's Files, box 199, NSC-Atomic

This detailed report shows how U.S. analysts back-tracked the radioactive samples collected in early September to a nuclear detonation that occurred sometime between 27 and 29 August 1949.

Part IV: Whether to Announce the Discovery



Document 17

Statement by the President, 23 September 1949, with notes attached of George Eley interview with President Truman [transcription attached], n.d. [Circa 23 September 1949]

1949-09-23

Source: Harry S. Truman Library, George Eley Papers, box 88, National Defense- Atomic Energy – Announcement of Russian Atomic Bomb – September 23, 1949

White House staffer George Eley had been involved in foreign policy issues, but as he wrote on the first page of this document, the intelligence on the Soviet test was so secret that he knew nothing of it until the time of the announcement. A trained historian, he wanted to know about the decision-making process and interviewed Truman and NSC executive secretary Sidney Souers to find out who knew what when, how it was decided that a statement would be made, and what problems had to be resolved before President Truman was willing to approve one.

According to Eley's notes, Truman wanted to hold up the announcement because of the impending devaluation of the British pound (two shocks were "too much") and he wanted to be "sure" that the Soviets had tested a device.



Document 18

Eley notes of interview with National Security Council Executive Secretary Sydney Souers, n.d. [Circa 23 September 1949]

1949-09-23

Source: Harry S. Truman Library, George Eley Papers, box 88, National Defense- Atomic Energy – Announcement of Russian Atomic Bomb – September 23, 1949

Souers was as close as anyone to the discussions and decisions concerning the intelligence on the Soviet test and he provided Eley with detailed information on the considerations behind the decision to make a public announcement, including the timing of the statement. While some, such as the Joint Chiefs of Staff and top civilian defense officials, wanted an early announcement to prevent a leak, as Truman had told Eley, concern about the devaluation of the pound sterling led to some delay of the announcement. Indeed, these notes demonstrate that Secretary of State Dean Acheson, in New York for the UN General Assembly meetings, closely coordinated the timing and the language of the announcement with British Foreign Secretary Ernest Bevin. Just as important was concern about a leak to the press. That concern increased when the White House became aware that the news had already reached Senator Brian McMahon, chairman of the Joint Committee on Atomic Energy. Moreover, by the morning of 23

September, White House officials and others had learned that Soviet Foreign Minister Andrei Vyshinsky would be giving a speech at the United Nations that afternoon. Perhaps they hoped that an announcement would force Vyshinsky to respond to the U.S. statement.



[Document 19](#)

[George W. Elsey's First Draft, based on interview with the President, n.d. \[Circa 23 October 1949\]](#)

1949-09-23

Source: Harry S. Truman Library, George Elsey Papers, box 88, National Defense- Atomic Energy – Announcement of Russian Atomic Bomb – September 23, 1949

The chronology in this draft is off (the Soviet test had not been detected on 28 August) but it includes an interesting account of how Deputy Secretary of Defense Steven Early tried to find out whether Truman knew about the early intelligence on the Soviet test. He asked if Truman knew about the “dust storm.”

Part V. Some Implications



[Document 20](#)

[Memorandum by Carleton Savage \[Policy Planning Staff\], 29 September 1949, Restricted](#)

1949-09-29

Source: RG 59, Policy Planning Council Subject Files, 1947-1962, box 2, Atomic Energy-Armaments 1949

Once senior State Department officials, including Policy Planning Staff director George F. Kennan, were read into “Vermont” intelligence, Kennan tasked several staff members to prepare a questions-and-answers document [See following item] that could be used to brief officials “in the field” after a White House announcement had been made. Here, Savage recounts how the document was prepared and what he learned about the White House decision-making on the announcement.



[Document 21](#)

[Policy Planning Staff, "Questions and Answers Versions, 9/21/49-9/22," n.d., Top Secret](#)

1949-09-21

Source: RG 59, Policy Planning Council Chronological Files, 1947-1962, box 1, Chronological 1949

This is the questions-answers document mentioned above. . Much of the text was incorporated into a confidential [telegram](#) sent to all U.S. embassies and consulates on 23 September 1949 as background information. The document conveyed great optimism that the Soviet Union had not benefitted from purloined intelligence information. But it also posited that the Soviet bomb did not make war more likely and U.S. policy was directed at policies designed to avoid war. The documents raised the possibility that "consciousness of possessing this terrible and destructive weapon will bring to [Soviet] leaders something of that same sense of responsibility to [the] peoples of world" that President Truman had previously acknowledged.



[Document 22](#)

[Joint Nuclear Energy Intelligence Committee, "Status of the U.S.S. R. Atomic Energy Project: An Extended Estimate for the Joint Staff Plans Group of the Joint Chiefs of Staff," 1 October 1949, attached to less detailed version of the report, same date, Top Secret](#)

1949-10-01

Source: [CIA FOIA Website](#)

Taking into account the "Vermont" findings, the latest assessment by the JNEIC tried to put the best face on things by noting that the test confirmed previous estimates that the Soviets were working on a plutonium bomb (but not mentioning the mistaken estimates of mid-1950 and mid-1953). Nevertheless, the claim that the test occurred in Siberia suggested that acoustic and seismic data, which later indicated that the test had occurred at Semipalatinsk, had not yet been analyzed. Taking into account the plutonium findings, the report estimated that the Soviets had one or possibly two "graphite-moderated production piles in operation since October 1948" [only one pile, operating since July 1948]. On that basis, the committee estimated that the Soviets would have a stockpile of ten weapons by the end of 1949 and 25 by mid-1950, an overestimate because Moscow had only a handful of deliverable weapons in 1951 and did not produce them in quantity until 1953.[\[18\]](#)



[Document 23](#)

[R. W. Spence et al., Los Alamos Scientific Laboratory, "Identification of Radioactivity in Special Samples," 4 October 1949, Top Secret](#)

1949-10-04

Source: Harry S. Truman Library, President's Secretary's Files, box 199, NSC-Atomic Roderick Spence, who had worked at the Manhattan Project's Metallurgical Laboratory during World War II, directed Los Alamos Laboratory's Radiochemistry Group. AFOAT-1 sent Spence a sample of the radioactive material for independent analysis. Spence's report, written up several weeks after the analytical work had occurred, concluded that the "samples supplied to us contained radioactive isotopes and that the bulk of the activity was due to fission products of fairly recent origin, their age probably being one month or less." [\[19\]](#)



[Document 24](#)

[General S. E. Anderson, Director, Plans and Operations, memo to Director of Intelligence, "Implications of Soviet Atomic Explosion," 5 October 1949, attached to memorandum from General C. P. Cabell, U.S. Air Force Director of Intelligence to Director Plans and Operations, "Implication of Soviet Atomic Explosion," 6 October 1949, Top Secret](#)

1949-10-06

Source: Record Group 341. Records of Headquarters, United States Air Force (Air Staff), Deputy Chief of Staff for Operations, Directorate of Intelligence, Top Secret Control & Cables Section Jul 1945-Dec 1954, box 46, 9300 to 2-9399

With the U.S. nuclear monopoly, if not superiority, ending, U.S. intelligence began to look at the military implications. Air Force intelligence prepared what turned out to be an exaggerated estimate of Soviet capabilities to produce atomic weapons and deliver them to targets in the United States and the United Kingdom. The Air Force projected that the Soviets already had the capability to deliver atomic weapons to targets in the Northwest United States, using TU-4 bombers on two-way missions. Striking significant industrial, political, and military installations further east would require one-way missions until the Soviets had an aerial refueling capability.



[Document 25](#)

[Document 12](#): Joint Committee on Atomic Energy, "Report of the Central Intelligence Agency," 17 October 1949, Top Secret, excised copy

1949-10-17

Source: National Archives, Record Group 128, Records of Joint Committee on Atomic Energy, box 3, JCAE Transcripts

During this hearing of the Joint Committee of Atomic Energy (JCAE), a defensive Director of Central Intelligence Roscoe Hillenkoetter argued that "our estimate was not too far off

in the first place" because it was an "error of a few months" (p. 5) and that "I don't think we were taken by surprise." (p. 46). Nevertheless, a fuller picture emerged when Chairman Sen. Brian McMahon (D-Conn) read from the Joint Nuclear Energy Intelligence Committee's 1949 report (see document 3 above) estimating mid-1953 as the "most probable" date. One of the Republicans, Senator Eugene D. Milliken (CO), observed that it was a "very bad mis-estimate" and that "we have not had an organization adequate to what is going on in the past and [Hillenkoetter] gives me no assurance that we are going to have one in the future." The DCI had his defenders. For example, Rep. Chester Holifield (D-CA) observed that "you can't order a piece of intelligence out of Russia like you order groceries in the morning." Senator Edwin C. Johnson (D-CO) questioned why the Soviets would "stumble on to the very best way to do this job without a little assistance from some place or the other." Hillenkoetter cited the high proficiency of Soviet science, but a full answer depended on intelligence sources, such as the Venona intercepts, that the DCI was unlikely to discuss in this setting.



[Document 26](#)

[Central Intelligence Agency, "Review of the World Situation," 19 October 1949, CIA 10-49, Secret](#)

1949-10-19

Source: [CIA FOIA Website](#)

A brief analysis of the Soviet test in this CIA publication found that the Soviets had gained a political advantage. Despite the test, it did not fundamentally change the U.S.'s military-security position; the "superior US stockpile" remained a "significant" advantage. To identify a prospective military threat, it would be necessary to "determine the time at which the rising curve of a Soviet stockpile will reach a point at which it can be considered operationally effective." The fact that the Soviets had an "ability to stockpile" was another matter because it raised "psychological and political imponderables." Moscow's access to atomic technology "permits [it] to exert psychological and political pressures in Western Europe." While the Soviets had not yet exerted such pressure, and there was no way to gauge European reactions to pressure, "it is certain that the USSR has an enhanced 'cold war' capability."



[Document 27](#)

["Estimate of the Effects of Soviet Possession of the Atomic Bomb upon the Security of the United States and Upon the Probabilities of Direct Soviet Military Action," ORE 91-41, 6 April 1950. Top Secret](#)

1950-04-06

Source: [CIA FOIA Web page](#)

To deal with the strategic issues raised by the Soviet bomb, the CIA produced a long analysis, focusing not only on Soviet nuclear capabilities but also on Moscow's intentions and the extent to which a nuclear weapons capability increased the risk of U.S.-Soviet conflict. The analysts reached the general conclusion that they saw “no firm basis for an assumption that the USSR presently *intends* deliberately to use military force to attain a Communist world or further to expand Soviet territory *if this involves war with a potentially stronger US.*” Even with atomic weapons, Soviet intentions were unlikely to change although “a Soviet capability for effective direct attack upon the continental US must be considered to increase the danger that the USSR might resort to military action to attain its objectives.” Dissents by the intelligence organizations of the State Department, the Navy, the Army, and the Air Force indicated profound misgivings about the ORE estimate of Soviet intentions. For example, the State Department dissented from the conclusion that “except under extreme and apparently unlikely circumstances, the USSR will not deliberately employ military force in its struggle against the US.”

Part VI: The German Factor: Future Findings



[Document 28](#)

[Central Intelligence Agency, Office of Scientific Intelligence, “Contributions of German Scientists to the Atomic Energy Program – Agudzeri,” Research Supplement to Scientific Intelligence Report CIA/SI 2-57, CIA/SI 2-SE III-57, 15 April 1957, Secret, Excised Copy](#)

1957-04-15

Source: Mandatory declassification review request to CIA

While U.S. and British intelligence were well aware that captured German scientists were playing multiple roles in the Soviet nuclear program, they did not have the details until they could interview the scientists when they began to return during the 1950s (Operation DRAGON). Some of the interview-based reports have already been declassified and published in a National Security Archive [posting](#). This report, along with the next two documents, add to the knowledge base of the work on the German scientists, although they have to be checked against other sources.[\[20\]](#)

According to the report, German scientists at the Agudzeri Institute successfully developed a mass spectrometer which is essential to measure the results of uranium isotope separation activities. Another success was Heinz Barwich's contribution to the gaseous diffusion program, including theoretical work on cascade theory, for which he was awarded a Stalin Prize. By contrast, Nobel Prize winner Gustav Hertz's effort to

develop an industrial-scale method to separate uranium isotopes was a failure.

At the end of this document, like the two that follow, are excised pages that probably list the German scientists and technicians who had been interviewed.



[Document 29](#)

[Central Intelligence Agency, Office of Scientific Intelligence, "Contributions of German Scientists to the Atomic Energy Program – Sinop," Research Supplement to Scientific Intelligence Report CIA/SI 2-57, CIA/SI 2-SE I-57, 15 April 1957, Secret, Excised Copy](#)

1957-04-15

Source: Mandatory declassification review request to CIA

The Sinop Institute, like Agudzeri, focused on isotope separation, but with greater success, according to the CIA. The leading figure was Baron Manfred Von Ardenne, whom some of the Germans saw as a "charlatan," although with very good organizational skills. Research on electromagnetic separation of uranium isotopes began at Sinop but was eventually given low priority because the gaseous diffusion method proved more successful. In that respect, "The contributions of [Peter Adolph] Thiessen and of his group ... at Sinop must be ranked high among the German contributions to the Soviet atomic energy program," largely because of their development of the barriers used in gaseous diffusion plants. [\[21\]](#)

Another major project at Sinop was the ultracentrifuge research directed by Max Steenbeck. The Germans may have convinced the Soviets that the gas centrifuge was an "ideal" method for isotope separation compared to gaseous diffusion, but technical problems were difficult to solve: the high speeds required (100,000 RPM) caused the rotors and bearings to fail.

In 1953, key personnel in the Steenbeck group were sent to Leningrad for further R&D work. Gernot Zippe, identified as the head of Ultracentrifuge Team I, later became an important source on the progress of the Soviet gas centrifuge program. The drafters of this report did not have access to Zippe and the Steenbeck group, who did not return to the West until late 1956. Consequently, the report's findings were rather downbeat: the "Steenbeck group probably made no substantial contribution to the overall success of the Soviet atomic energy program other than to vigorously investigate one possible means of isotope separation."



[Document 30](#)

Central Intelligence Agency, Office of Scientific Intelligence, "Contributions of German Scientists to the Atomic Energy Program – Elektrostal," Research Supplement to Scientific Intelligence Report CIA/SI 2-57, CIA/SI 2-SE IV-57, 15 July 1957, Secret, Excised Copy

1945-07-15

Source: Mandatory declassification review request to CIA

The German scientists at Elektrostal led by Nikolaus Riehl made a contribution to the Soviet atomic project that CIA analysts believed had saved the Soviets about "six months" of work. Born in Russia, Riehl directed research at the Auer Company, which manufactured uranium metal for the Nazi atomic weapons project. According to this report, two key Soviets, Iulii Khariton and General A.P. Zaveniagin who were in Berlin after the Nazi collapse made Riehl an offer to produce uranium in a Soviet laboratory. [22] The Soviets gave top priority to the production of "pure uranium metal in sufficient quantity for the operation of reactors producing plutonium."

At Elektrostal, Riehl's group tried to reduce uranium oxide to metallic form but the results were not sufficiently pure. They then successfully processed uranium tetrafluoride (UF₄) into pure uranium metal. In both instances, the reducing element was the pure calcium produced by the plant at Bitterfeld, East Germany (see document ...). Much of the work was accomplished during 1946-1947, although the scientists "retained much value" for the Soviets. By 1952 all of the German scientists at Elektrostal had been sent to Sukhumi, Georgia, for a period of "forgetfulness" or "quarantine" before returning to Germany in 1955.

A note on page 9 indicates that the CIA's sources of information on Elektrostal included Nikolaus Riehl, Gunther Wirths, and Karl Heinrich Riewe.



President Harry S. Truman (left) presents the Distinguished Service Medal to Rear Admiral Sidney Souers, U.S. Naval Reserve (right), 1 December 1952, who had served as the first Director of Central Intelligence (1946) and the first Executive Secretary of the National Security Council (1947-50). In his NSC role, Souers coordinated the White House's response to the intelligence on the Soviet test. ([Image](#) from Harry S. Truman Presidential Library and Museum)



Air Force personnel decontaminate a B-29 sampler aircraft with Gunk degreaser. Photo, probably taken in early 1950s, provided by National Nuclear Security Administration / Nevada Site Office and reproduced in Mark Wolverton, "Into the Mushroom Cloud," Air and Space Magazine July 2009.



When the Truman White House announced the discovery of the Soviet test, aide [George Elsey](#) spoke with the President and other key officials to find out the backstory. Elsey, shown on the lawn of the Little White House in Key West, Florida, ca. December 1949. From the album, "The President's Visit to Key West, Florida." ([Image](#) from Harry S. Truman Presidential Library and Museum)

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Eley's handwritten notes, and to Frank von Hippel (Princeton University) for his wise counsel.

Notes

[1]. For the naming of "Joe 1," see Michael D. Gordin, [*Red Cloud at Dawn : Truman, Stalin, and the End of the Atomic Monopoly*](#) (New York: Farrar, Strauss, and Giroux, 2009). 357, note 3.

[2] . David Holloway, *Stalin and the Bomb: The Soviet Union and Atomic Energy, 1939-1956* (New Haven: Yale University Press, 1994), 266-267.

[3]. For the detection the Soviet test, see Jeffrey Richelson, *Spying on the Bomb: American Nuclear Intelligence from Nazi Germany to Iran and North Korea* (New York: W.W. Norton, 2007), 88-92.

[4] . For details, see Charles A. Ziegler and David Jacobson, *Spying Without Spies: Origin of America's Secret Nuclear Intelligence Surveillance System* (Praeger, 1995)

[5] . David Holloway, "Barbarossa and the Bomb: Two Cases of Soviet Intelligence in World War II," Jonathan Haslam and Karina Urbach, eds., *Secret Intelligence in the European State System, 1918-1989* (Palo Alto: Stanford University Press, 2013), 62.

[6] . Donald P. Steury, "[How the CIA Missed Stalin's Bomb,](#)" *Studies in Intelligence* 49 No. 1 (2005), 19-26, and Richelson, *Spying on the Bomb*, 92l; Henry Lowenhaupt "[Chasing Bitterfeld Calcium,](#)" *Studies in Intelligence* ([pdf](#)) *Studies in Intelligence* 17 (Spring 1973): 21-30.

[7] . Intelligence Memorandum No. 225, "Estimate of Status of Atomic Warfare in the USSR," 20 September 1949, in Michael Warner, editor, *The CIA under Harry Truman* (Washington, D.C.: History Staff, Center for the Study of Intelligence, 1994), 319.

[8] . For a detailed account, see Gordin, *Red Cloud at Dawn*, 216-238. For Lilienthal's role, see *Journals of David Lilienthal Volume 2: The Atomic Energy Years* (New York: Harper & Row, 1964), 569-572.

[9] . Truman later reprimanded Senator Johnson for the disclosure. "[Science: So It Was Plutonium,](#)" *Time*, 5 December 1949

[10] . See also Richelson, *Spying on the Bomb*, especially 62-104, and Michael S. Goodman, *Spying on the Nuclear Bear: Anglo-American Intelligence and the Soviet Bomb* (Stanford: Stanford University Press, 2007)

[11] . Melvyn P. Leffler, *A Preponderance of Power: National Security, the Truman Administration, and the Cold War* (Stanford: Stanford University Press, 1992), 325-333, and Gordin, [*Red Cloud at Dawn*](#), 247-275.

[12] Holloway, *Stalin and the Bomb*, 266-267; Evgueni Bajanov, "Assessing the Politics of the Korean War, 1949-51," *Bulletin of the Cold War International History Project* 6/7 (1995): 87; Vladislav Zubok, *A Failed Empire: The Soviet Union in the Cold War from Stalin to Khrushchev* (Chapel Hill: University of North Carolina Press, 2007), 86 (citing Bajanov). For the Soviet announcement and further discussion, see Gordin, [Red Cloud at Dawn](#), 240-244.

[13] . Ziegler and Jacobson, *Spying Without Spies*, 210.

[14]. For Bitterfeld in context, see Henry Lowenhaupt, "[Chasing Bitterfeld Calcium.](#)"

[15] . For Soviet production of highly pure graphite and the construction of a production reactor near Kyshtym, see Holloway, *Stalin and the Bomb*, 100-101 and 183-187.

[16] . See also, Ziegler and Jacobson, *Spying Without Spies*, 210-211; Richelson, *Spying on the Bomb*, 90

[17]. For the Navy project, see Herbert Friedman, Luther B. Lockhart, and Irving H. Blifford, "Detecting the Soviet Bomb: Joe-1 in a Rain Barrel," *Physics Today* 49 (November 1996): 38-41.

[18]. Steven Zaloga, *The Kremlin's Nuclear Sword: The Rise and Fall of Russia's Strategic Nuclear Force, 1945-2000* (Washington, D.C.: Smithsonian Institution Press, 2002), 10-12

[19] . The Los Alamos findings corresponded to the findings of the AFOAT-1 contractor, Tracerlab. See Ziegler and Jacobson, *Spying Without Spies*, 187-189, 207.

[20] . Pavel V. Oleynikov's "German Scientists in the Soviet Atomic Project," [The Nonproliferation Review](#), 7 (2000), 1-30, provides a valuable account of these developments.

[21]. For more on gaseous diffusion, see Holloway, *Stalin and the Bomb*, 191-192.

[22] . *Ibid.*, 109-112. See also Oleynikov, "German Scientists," at 7. During this trip, the Soviets also acquired 300 hundred tons of uranium oxide that the Germans had hidden.

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[tags RESEARCH DOCUMENT, Detection, First, Soviet, Nuclear Test, September 1949]