Forgotten Creators of the German Atomic Bomb

Dr. Todd H. Rider **thor@riderinstitute.org**

riderinstitute.org/revolutionary-innovation

Der Welt Erbe gewänne
zu eigen,
wer aus dem Rheingold
schüfe den Ring,
der maß lose Macht
ihm verlieh'.

The whole world can be
possessed by one
who from the Rhinegold
forges the Ring,
which can bestow
immeasurable power.

Richard Wagner, *Das Rheingold*, Scene I, Wellgunde (1854)

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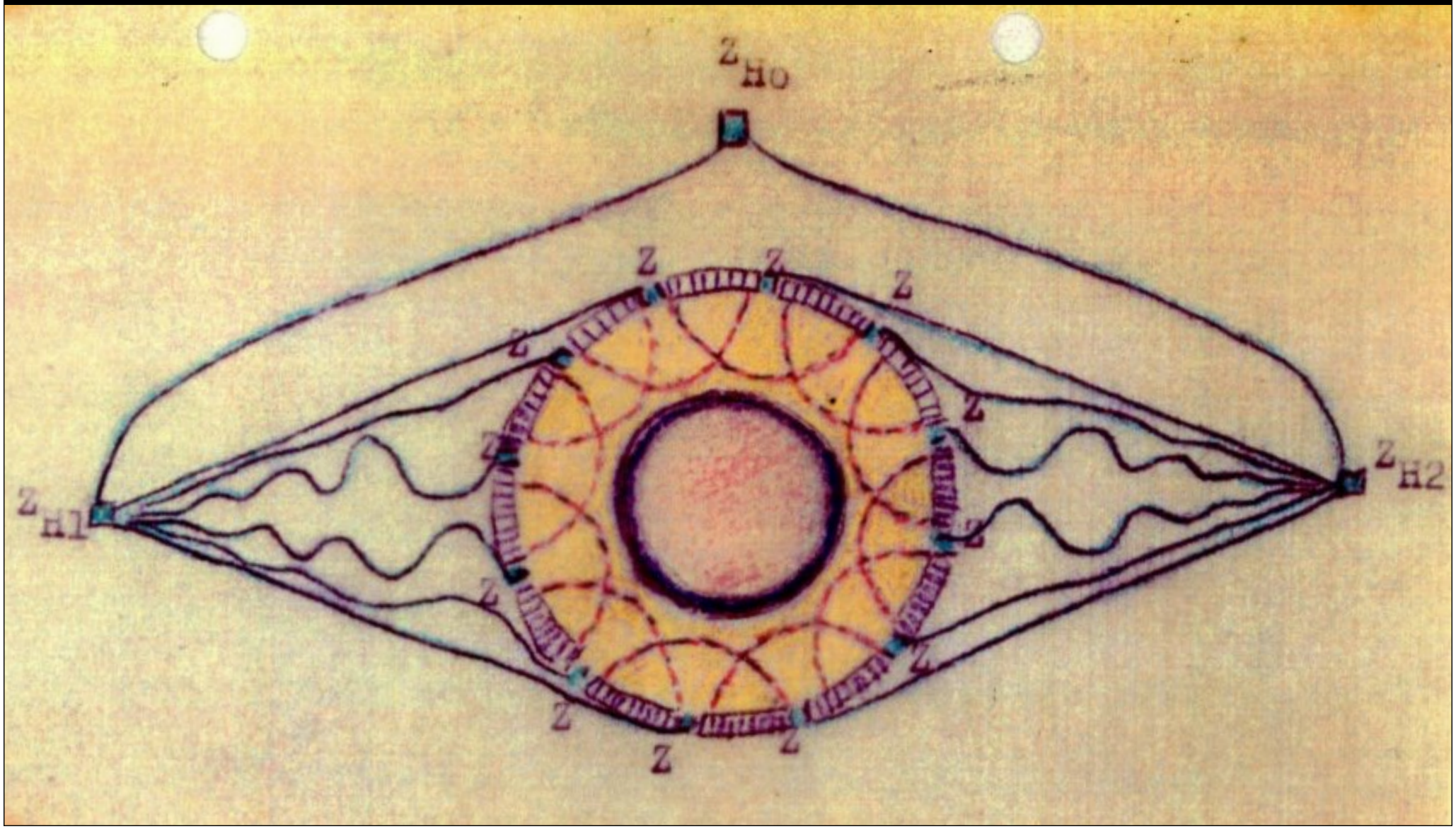

Acknowledgments

American Institute of Physics Bohr Library & Archives (Maryland)
Archiv der Max-Planck-Gesellschaft (Berlin-Dahlem)
Archiv der Österreichischen Akademie der Wissenschaften (Vienna)
Atomkeller Museum (Haigerloch)
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Historisch-Technisches Museum Peenemünde
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U.S. Combined Arms Research Library (Kansas)
U.S. Holocaust Memorial Museum (Washington, DC)
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Family of Heinz Stoelzel
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Andreas Sulzer
Matthias Uhl
Mark Wade
Mark Walker
Stephen Walton
Alex Wellerstein
Ed West
Kevin, Cathy,
and Peter Wilson
Clive R. Woodley
Benjamin Zusman
My family for their
patience and support

This Work Only Uses Information from Unclassified Sources, Such As:

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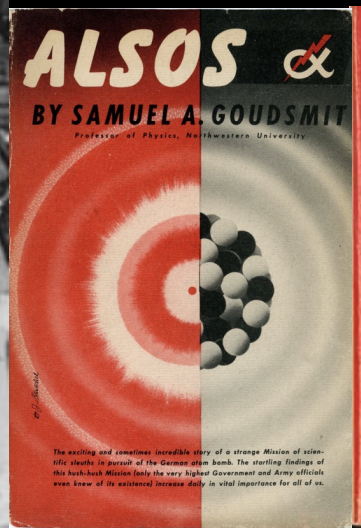
Complete set of slides and more available at riderinstitute.org/revolutionary-innovation

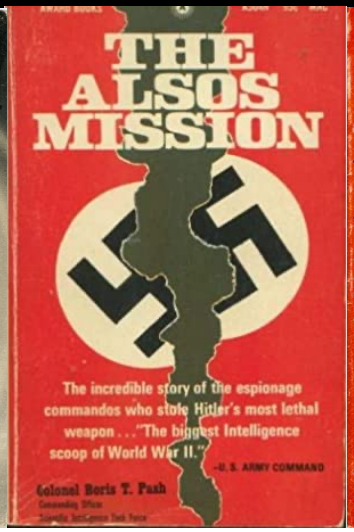
1. Conventional view of the wartime German nuclear program
2. Origins and organization of the German nuclear program
3. Sources of uranium and thorium
4. Enrichment of uranium-235 (^{235}U)
5. Breeding plutonium-239 (^{239}Pu) or uranium-233 (^{233}U) in fission reactors
6. Breeding ^{239}Pu or ^{233}U in electronuclear systems
7. Production of heavy water (D_2O) and other nuclear-related materials
8. German fission bomb design (explosive yield ~ tens of kilotons)
9. German hydrogen bomb design (explosive yield ~ megatons)
10. October 1944 test explosion on the Baltic coast
11. ~November 1944 test explosion in Poland
12. March 1945 test explosions in Thuringia
13. Wartime/postwar Axis belief in the reality of German nuclear weapons
14. Wartime/postwar Allied belief in the reality of German nuclear weapons
15. Conclusions and further work

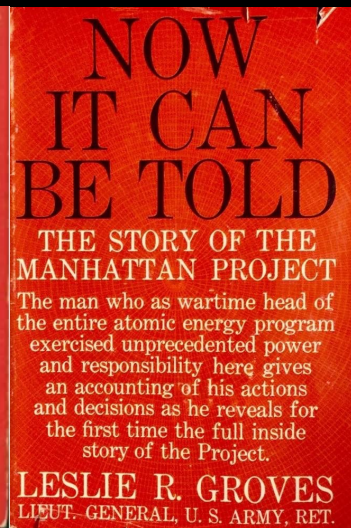
1. Conventional View of German Program: Alsos

At the end of the war, the U.S.-led Alsos Mission searching for nuclear work found an incomplete fission reactor at Haigerloch, some papers on basic nuclear physics, and apparently not much else, according to the public accounts.

Haigerloch







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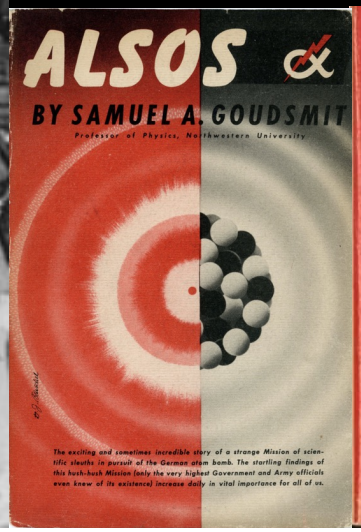
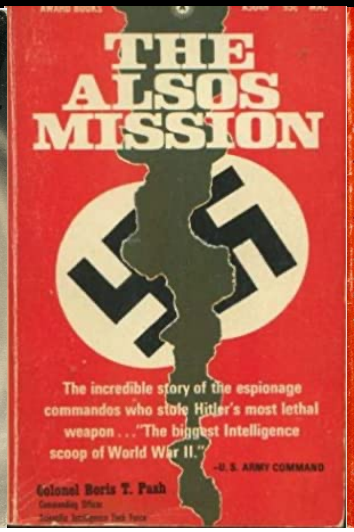
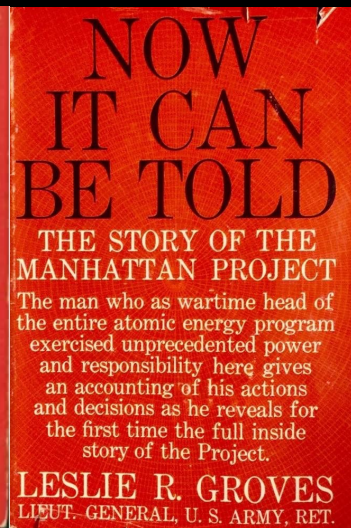
Alsos failed to properly investigate numerous specific organizations, scientists, and locations that could have revealed a more advanced nuclear program.

If any more advanced nuclear work had in fact been discovered, that information would have been automatically classified at the time, and could remain classified or buried in archives and unreleased to this day.

Haigerloch







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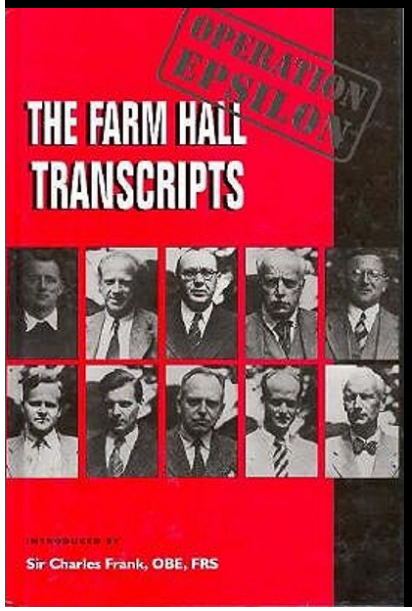
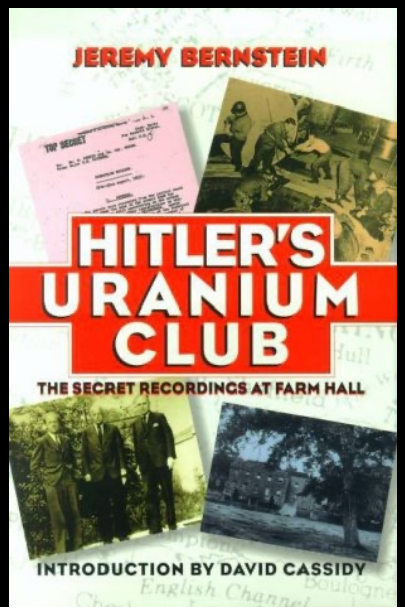
10 scientists (Erich Bagge, Kurt Diebner, Walther Gerlach, Otto Hahn, Paul Harteck, Werner Heisenberg, Horst Korsching, Max von Laue, Carl Friedrich von Weizsäcker, and Karl Wirtz) were kept under house arrest July 1945–January 1946 at Farm Hall, U.K., where their conversations were secretly recorded.

The transcripts record the scientists' surprise at news of the 6 August 1945 Hiroshima bombing and do not reveal significant apparent knowledge of nuclear weapons design and development.





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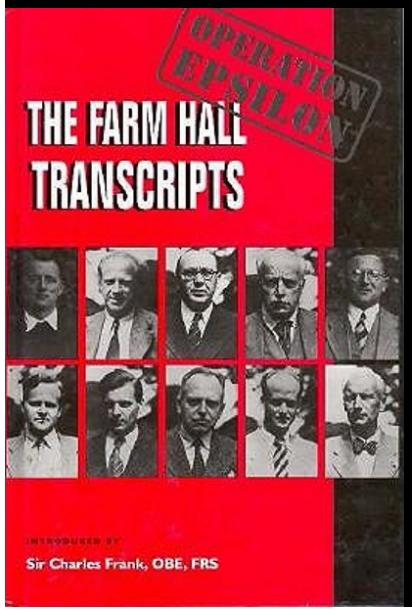
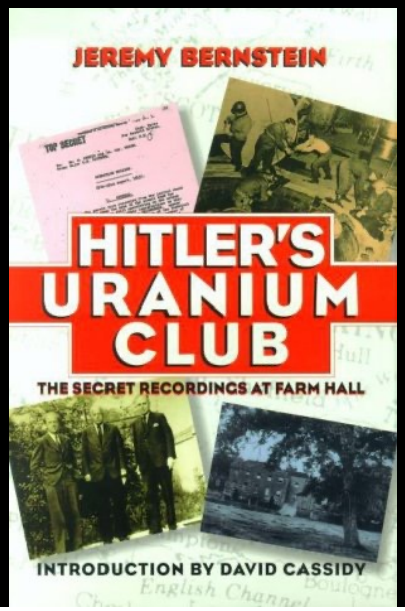




A huge number of relevant nuclear scientists were not at Farm Hall.

Those who were there suspected surveillance and presumably conducted their conversations accordingly.

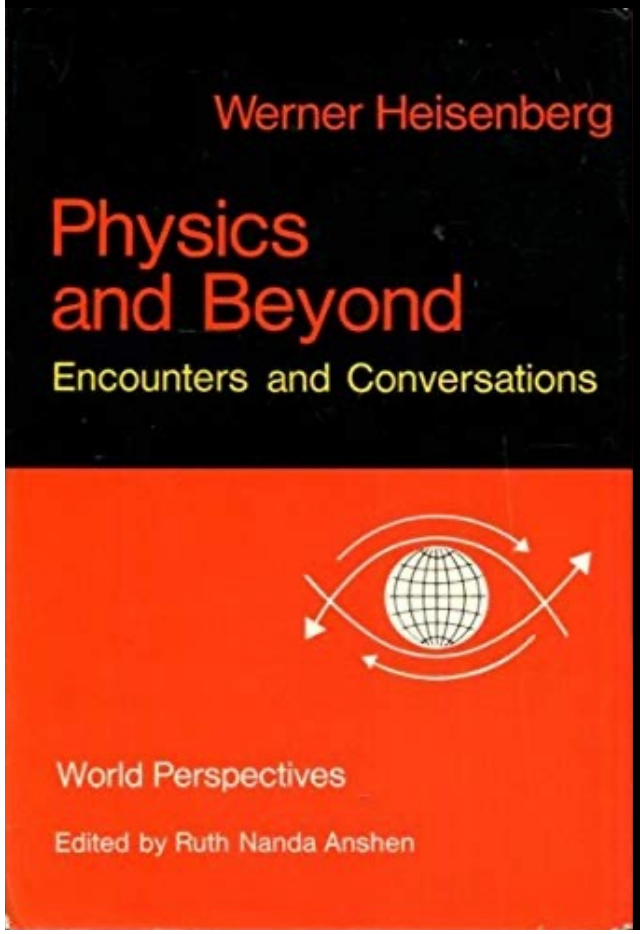
The preserved transcripts document only a small fraction of the discussions that would have occurred among ten people and their British attendants during those six months.

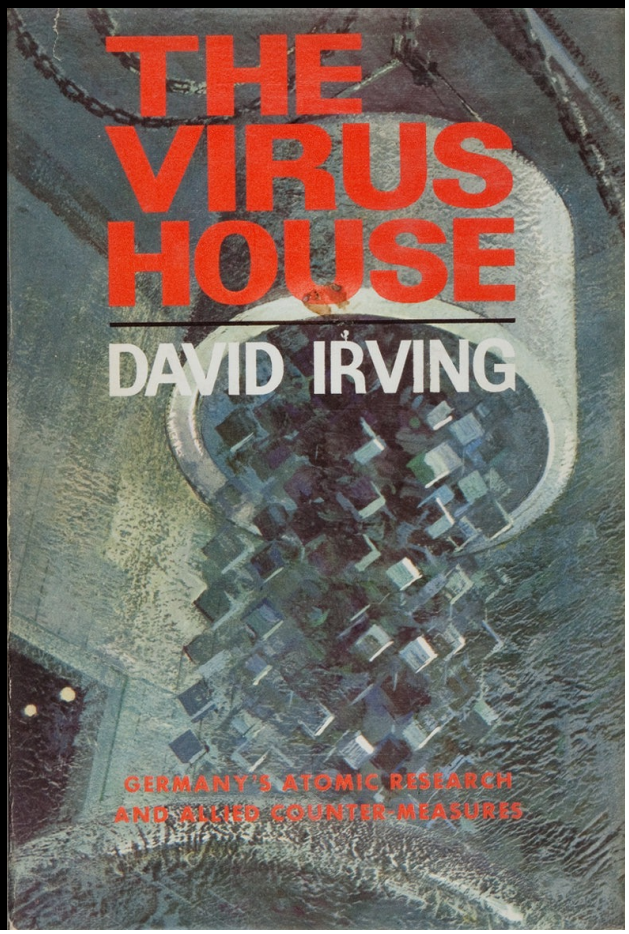
The transcripts are English translations, which may not accurately reflect the original German conversations.

Oddly, both the original recordings and the original German transcripts just happen to have been completely lost.

1. Conventional View of German Program: Public Remarks

In their public interviews and writings in the years after the war, German nuclear scientists professed a lack of desire, plans, materials and/or political support to produce nuclear weapons for the Third Reich.





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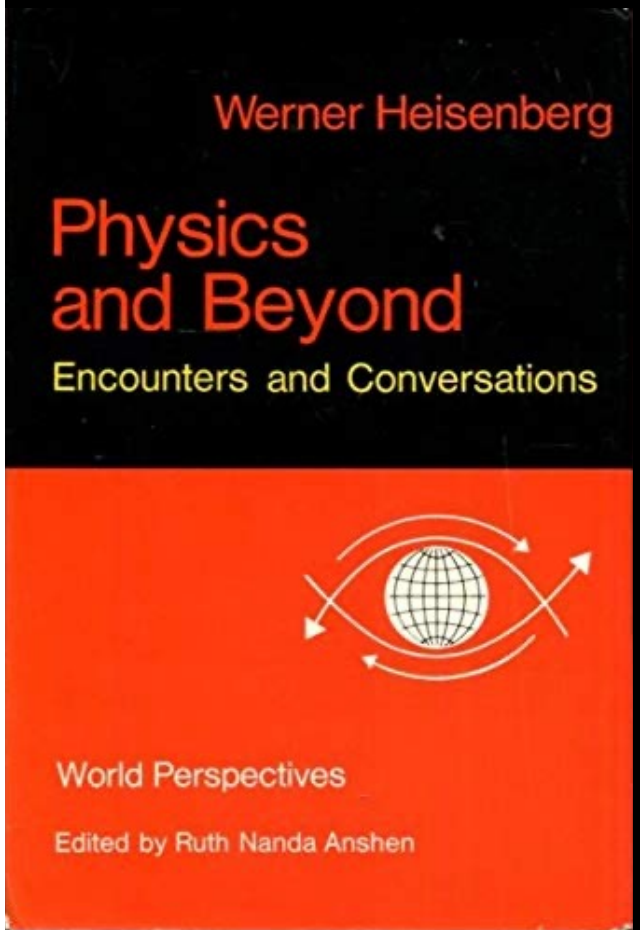
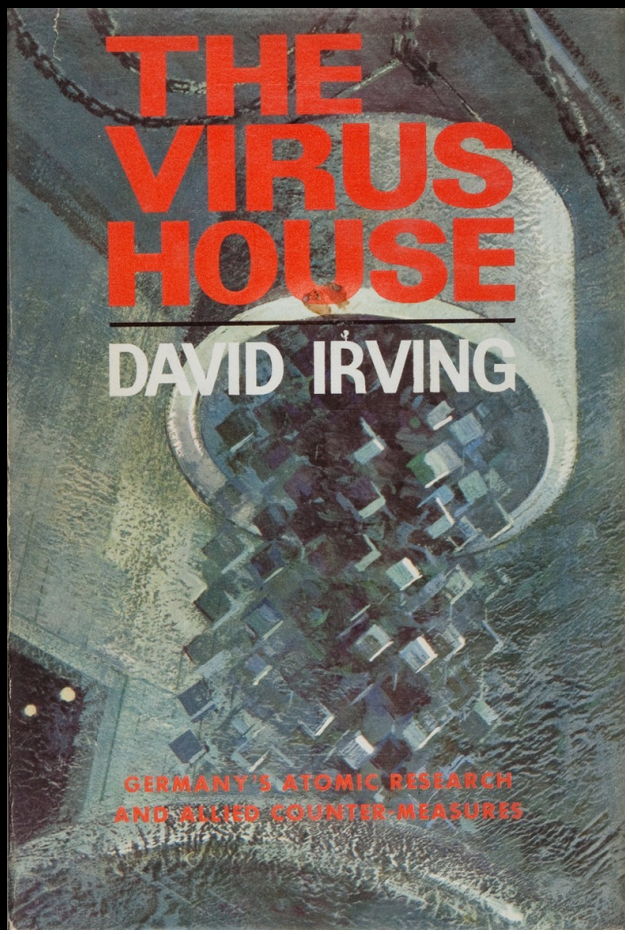
Only a small number of nuclear scientists went on the public record.

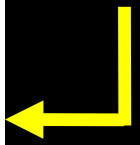
It was in their best personal interests to downplay the wartime German nuclear program, their knowledge of it, and their support for it.





2. Origins of the German Nuclear Program

1928: Fritz Houtermans and Georg Stetter began work on fusion in Germany and Austria



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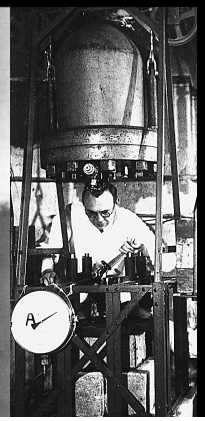

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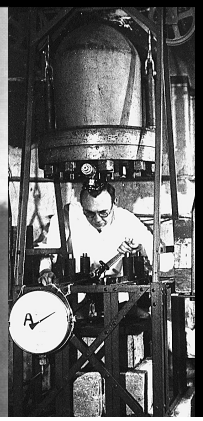
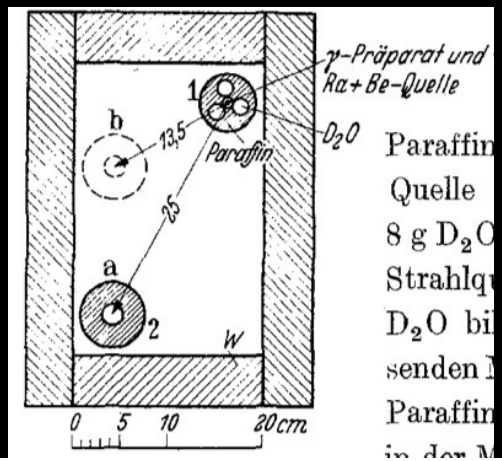


Rausch von Traubenberg began using surrounding neutron reflectors



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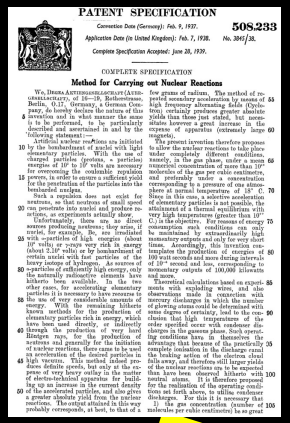


PATENT SPECIFICATION

Convention Date (Germany): Feb. 9, 1937.

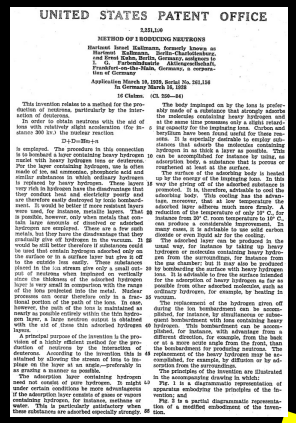
508,233

Application Date (in United Kingdom): Feb. 7, 1938. No. 3845/38.

Complete Specification Accepted: June 20, 1939.

COMPLETE SPECIFICATION

Method for Carrying out Nuclear Reactions



UNITED STATES PATENT OFFICE

2,251,156

METHOD OF PRODUCING NEUTRONS

Hartmut Josef Kallmann, formerly known as Hartmut Josef Kallmann-Bijl, Berlin-Charlottenburg, and Ernst Kuhn, Berlin, Germany, assignors to Telefunken Gesellschaft für Drahtlose Telegraphie m.b.H., Berlin, Germany, a corporation of Germany

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16 Claims. (Cl. 250—84)

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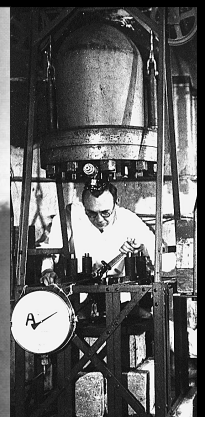

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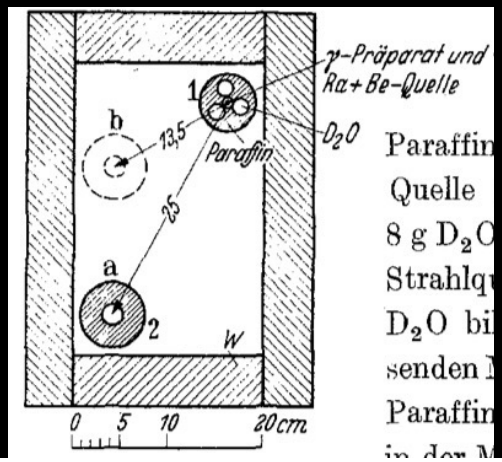

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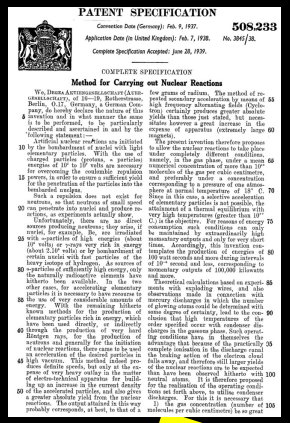

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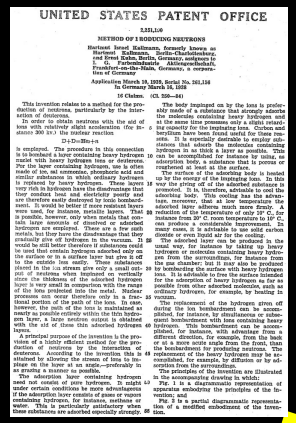

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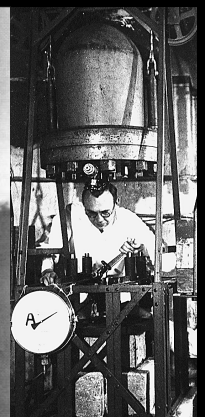

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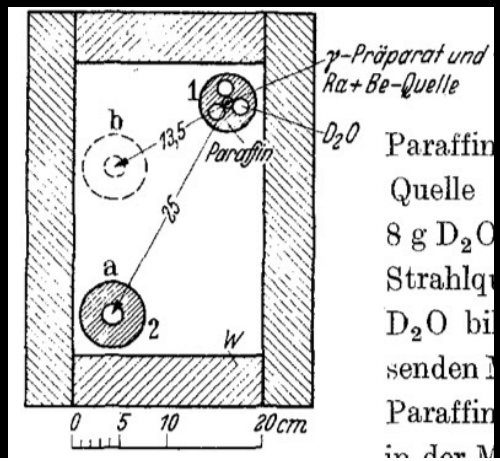
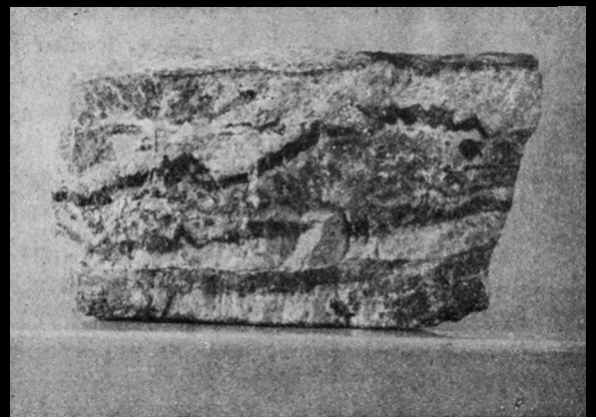


Germany began mining uranium in Bulgaria for secret Organisation Todt project



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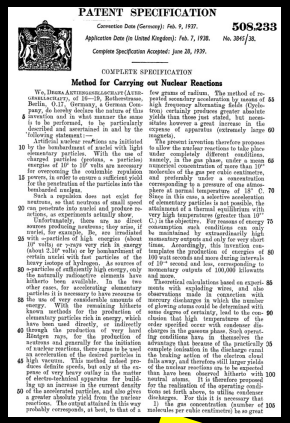

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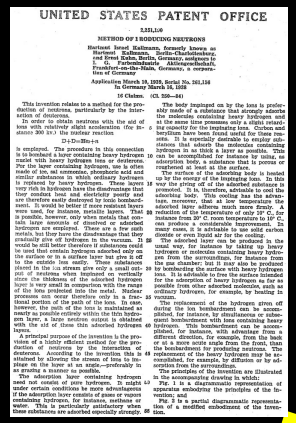
COMPLETE SPECIFICATION

Method for Carrying out Nuclear Reactions



UNITED STATES PATENT OFFICE

2,237,156

METHOD OF PRODUCING NEUTRONS

Hartmut Josef Kallmann, formerly known as Hartmut Josef Kallmann-Kallmann, and Ernst Kuhn, Berlin, Germany, assignors to Farbenindustrie Aktiengesellschaft, Frankfort-on-Main, Germany, a corporation of Germany

Application March 18, 1938, Serial No. 261,156
In Germany March 24, 1938

16 Claims. (Cl. 250—84)

1934

1935

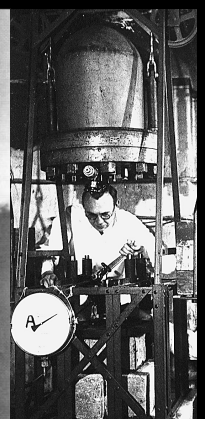
1936

1937

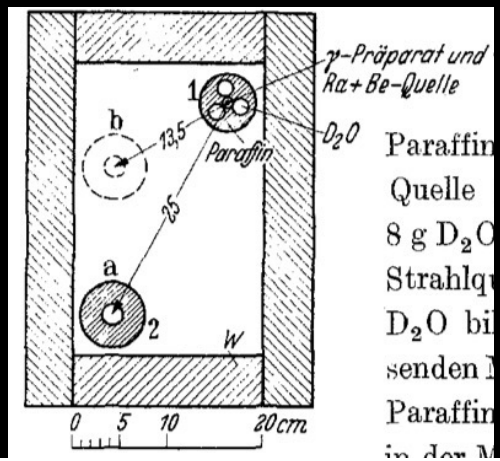
1938

Erich Schumann (implosion expert) hired

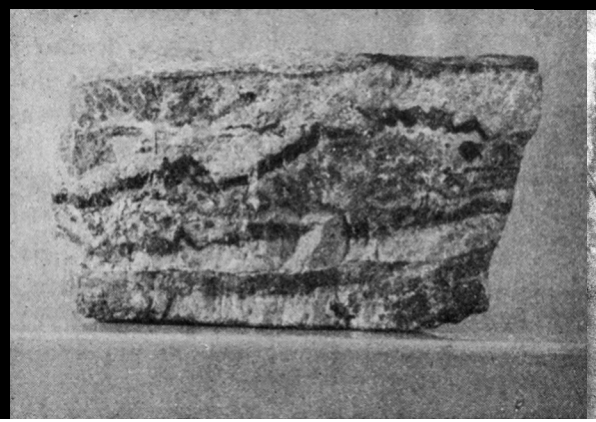
Kurt Diebner (nuclear expert) for secret army weapons project



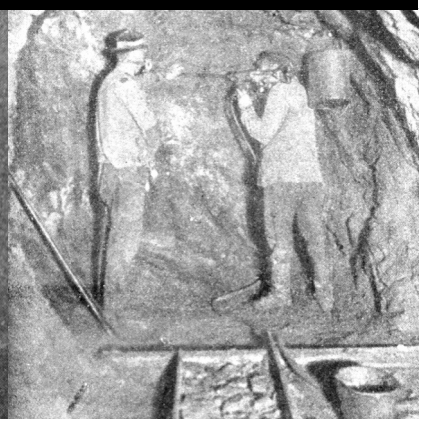
Rausch von Traubenberg began using surrounding neutron reflectors



Germany began mining uranium in Bulgaria for secret Organisation Todt project



Germany took over Czech uranium mines, transported ore on planes

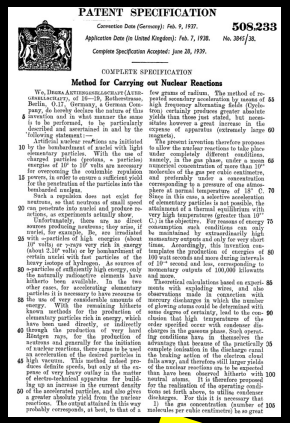


2. Origins of the German Nuclear Program

1928: Fritz Houtermans and Georg Stetter began work on fusion in Germany and Austria

Ida Tacke Noddack published theoretical predictions of uranium fission and plutonium production

Auergesellschaft and I.G. Farben patented high-voltage fusion neutron generators and tritium breeders



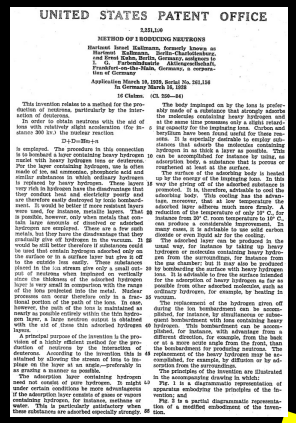
PATENT SPECIFICATION

Convention Date (Germany): Feb. 9, 1937.
Application Date (in United Kingdom): Feb. 7, 1938.
Complete Specification Accepted: June 20, 1939.

508,233
No. 3065/38.

COMPLETE SPECIFICATION

Method for Carrying out Nuclear Reactions



UNITED STATES PATENT OFFICE

2,251,156

METHOD OF PRODUCING NEUTRONS

Application March 18, 1939, Serial No. 262,156
In Germany March 24, 1938

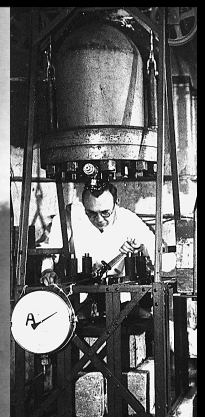
16 Claims. (Cl. 250—84)

Otto Hahn and Fritz Strassmann experimentally demonstrated neutron-induced uranium fission

1934 | 1935 | 1936 | 1937 | 1938

Erich Schumann (implosion expert) hired

Kurt Diebner (nuclear expert) for secret army weapons project



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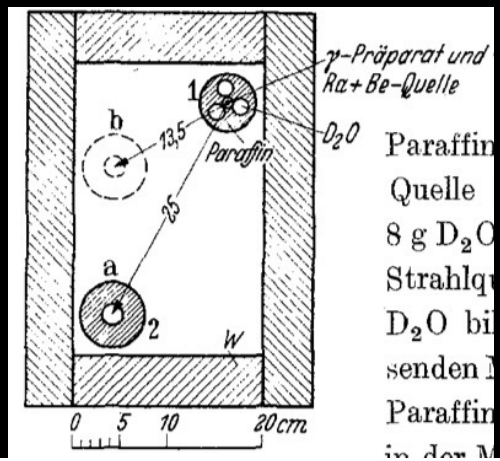

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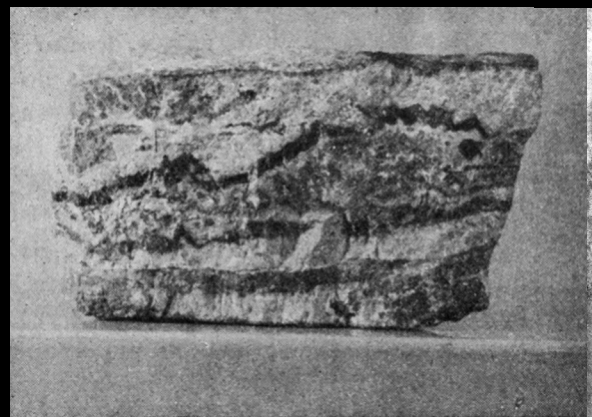

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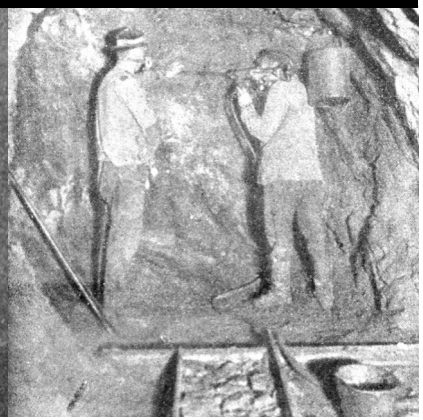

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Paul Harteck & Wilhelm Groth proposed a fission bomb, then worked on many aspects of it

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1939 | **1940**

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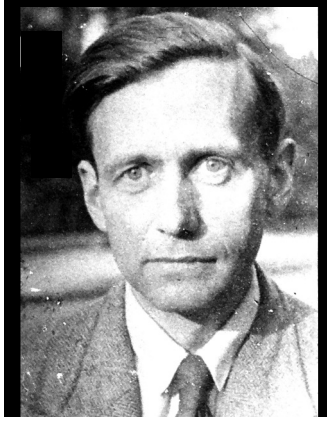

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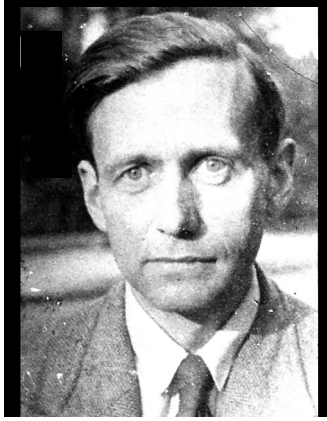

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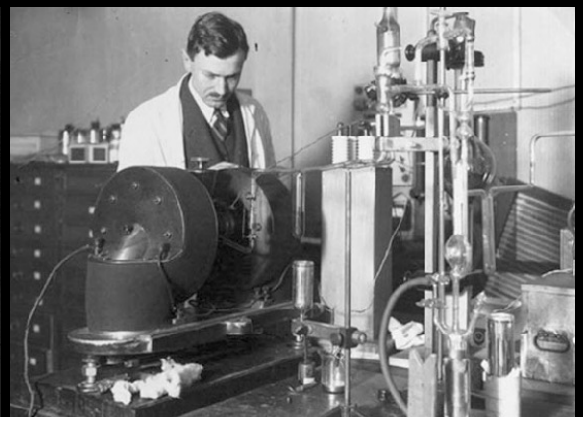

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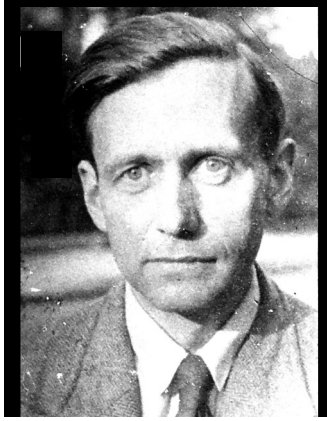

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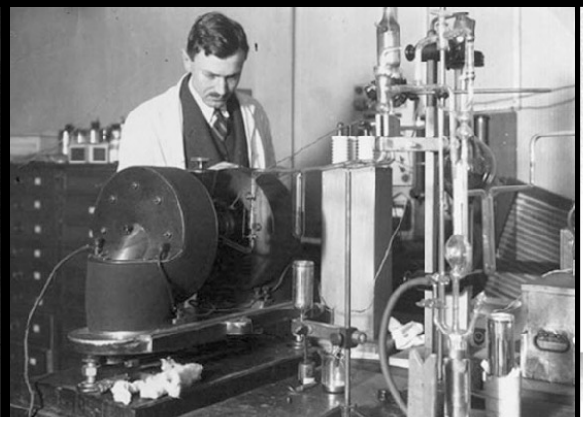

Nikolaus Riehl began processing uranium on an industrial scale for military projects

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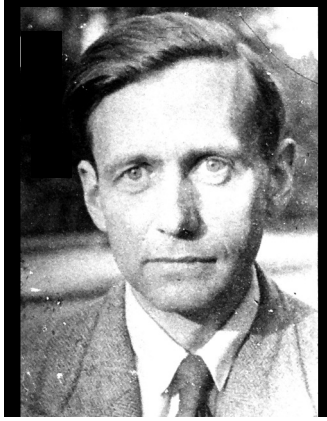

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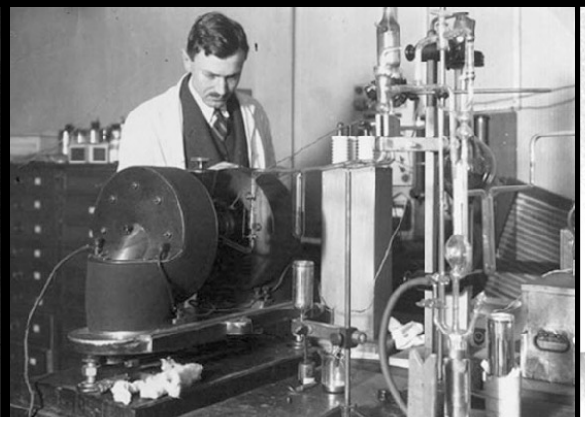

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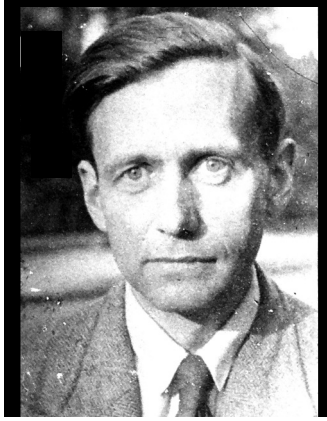

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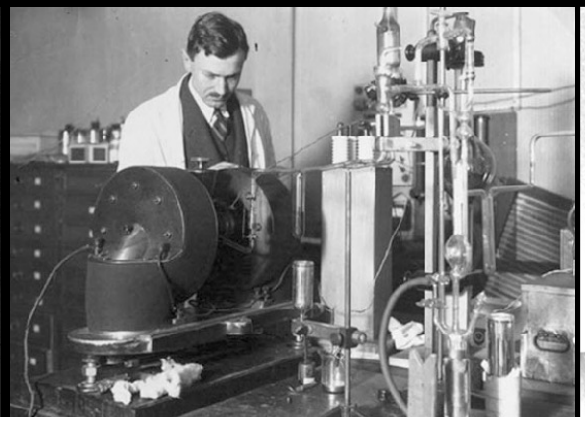

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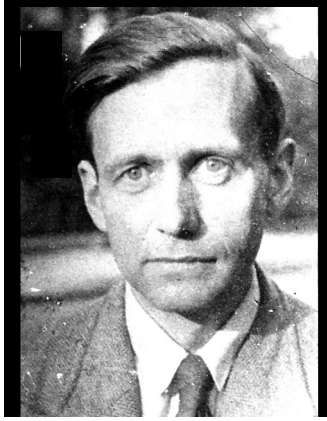

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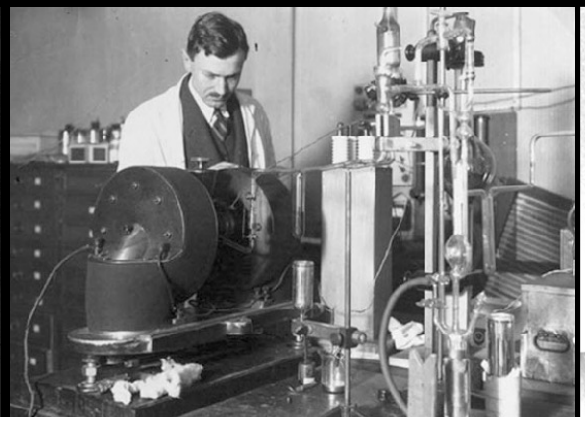
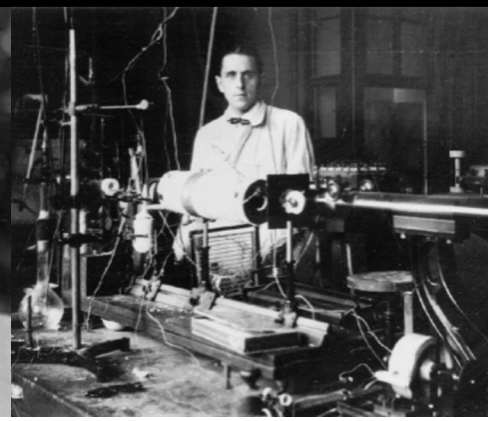


Nikolaus Riehl began processing uranium on an industrial scale for military projects

Carl Friedrich von Weizsäcker, Fritz Houtermans, and others proposed and calculated the suitability of plutonium-239 for bombs



2. Organization of German Nuclear Program

Coordination 1939-1942: Army
Head: Emil Leeb, Erich Schumann
Senior staff: Kurt Diebner, Siegfried Flügge, etc.

Coordination 1942-1945: SS
Head: Heinrich Himmler
Senior staff: Alfred Baubin, Gottlob Berger, ? Brandt, Werner Grothmann, Hans Kammler, ? Knapp, Rudolf Mentzel, Erich Purucker, Walther Schieber, Otto Schwab, etc.

Note: Names are alphabetical, not in order of importance

Reich Research Council
Head: Hermann Göring, Abraham Esau (1939-1943), Walther Gerlach (1943-1945)
Senior staff: Kurt Diebner, Siegfried Flügge, Rudolf Mentzel, etc.

Army Ordnance Office
Implosion staff: Walter Basche, Friedrich Georg Geist, Richard Glasgow, Erich Habann, Gerd Hinrichs, Gerhard Jung, Walter Kadow, Günter Sachsse, Rudi Schall, Erich Schneider, Erich Schumann, Walter Trinks, Kurt Wolk, etc.
Fission staff: Erich Bagge, Friedrich Berkei, Werner Czulius, Kurt Diebner, Georg Hartwig, Walter Herrmann, Siegward Hülsmann, E. Kamin, Oskar Pfetscher, Heinz Pose, Heinz Rackwitz, Fritz Rehbein, Ernst Rexer, Ernst Stuhlinger, etc.
U centrifuge staff: Werner Holtz, Ortwin Schulze, Werner Schwietzke, etc.
Locations: Berlin, Hillersleben, Kummersdorf/Gottow, Ohrdruf, Stadtilm, etc.

Austria-based
Head: Georg Stetter
Staff: Alfred Bönisch, Alfred Brukl, Friedrich Hernegger, Richard Herzog, Willibald Jentschke, Berta Karlik, Karl Lintner, Otto Merhaut, Gustav Ortner, Josef Schintlmeister, Adolf Smekal, Herta Wambacher, Gernot Zippe, etc.
Locations: Gusen, Linz, Lofer, Quarz, Redl Zipf, Sopron, Thumersbach, Vienna, etc.
Work: Pu breeding, H bomb, etc.

Hamburg/Kiel-based
Head: Paul Harteck
Staff: Konrad Beyerle, Rudolf Edse, K. H. Eldau, Wilhelm Groth, J. Hans Jensen, Friedrich Knauer, Werner Kuhn, Hans Martin, Hans Suess, Albert Suhr, Wilhelm Walcher, Rolf Wideröe, etc.
Locations: Celle, Hamburg, Kiel, etc.
Work: U centrifuges, D_2O production, electronuclear, etc.

Post Office
Head: Wilhelm Ohnesorge
Staff: Manfred von Ardenne, Otto Baier, Friedrich Banneitz, Siegfried Flügge, Fritz Houtermans, Detlof Lyons, Georg Otterbein, Otto Peter, Helmut Salow, Kurt Sauerwein, etc.
Locations: Berlin area--several, Silesia, Thuringia, Dresden, etc.
Work: Electromag. enrichment, implosion bomb design, electronuclear breeding, etc.

SS + Organisation Todt
Staff: Karl-Heinz Boseck, Helmut Fischer, etc.
Locations: Austria, Czech, Poland, Oranienburg, Lüneburg Heath, Thuringia, etc.
Work: U mining/enrichment, Pu breeding, testing, etc.

Czech/Silesia-based
Staff: Alesch, Bajer, Rolf Engel, Franz Hüttig, Kafka, Kappel, Odstracil, Ružek, Salow, Karel Staller, Tönies, Wilhelm Voss, etc.
Locations: Brno, Pibrams, Pilsen, Podmokly, Prague, Riese, etc.
Work: Electronuclear breeding, etc.

I.G. Farben programs
Head: Otto Ambros
Staff: Karl Geib, Paul Herold, Walter Kwasnik, Erich Noack, etc.
Locations: Auschwitz, Frankfurt, Leuna, Leverkusen, Ludwigshafen, Oppau, Pölitz, Waldenburg, etc.
Work: Chemical compounds for U enrichment, Pu extraction; D_2O production, etc.

Kaiser Wilhelm Institutes
Military-related staff: Ludwig Bewilogua, Heinz Ewald, Georg Graue, Ulrich Jetter, Alfred Klemm, Josef Mattauch, Werner Maurer, Peter Thiessen, Karl Wirtz, etc.
Non-military-related staff: Walther Bothe, Rudolf Fleischmann, Otto Hahn, Werner Heisenberg, Max von Laue, Fritz Strassmann, Carl Friedrich von Weizsäcker, etc.
Locations: KWI Physics, Chem, Bio, etc.

Auer/Degussa
Staff: Philipp Hoersch, Egon Ihwe, Fritz Klänhardt, Henry Ortmann, Kurt Quasebart, Rabbe, Nikolaus Riehl, Karl-Heinz Riewe, Walter Völkel, Karl Weis, Günter Wirths, Paul Max Wolf, etc.
Locations: Berlin, Oranienburg, Frankfurt, Stadtilm
Work: U/Th ore/metal

Buchler
Staff: ?
Location: Harz, Braunschweig
Work: U/Th ore

Maier
Staff: ?
Location: Villingen
Work: U/Th ore

Treibacher
Staff: ?
Location: Althofen
Work: U/Th ore

Union Minière
Staff: ?
Location: Brussels
Work: U/Th ore

Air Force
Head: Hermann Göring
Staff: Adolf Busemann, Gottfried Guderley, Hubert Schardin, etc.
Locations: Braunschweig, etc.
Work: Implosion, etc.

Navy
Head: Wilhelm Rhein
Staff: Helmut Hasse, Otto Haxel, Fritz Houtermans, Pascual Jordan, Heinz Schlicke, etc.
Locations: Berlin, Kiel, etc.
Work: Nuclear submarines, etc.

University of Leipzig
Staff: Karl-Friedrich Bonhoeffer, Robert Döpel, Gerhard Hoffmann
Work: Fission, cyclotrons, etc.

University of Munich
Staff: Klaus Clusius, Gerhard Dickel, Walther Gerlach, Ludwig Waldmann
Work: Thermal enrichment, etc.

Göttingen University
Staff: Wilhelm Hanle, Georg Joos, Hans Kopfermann, Wolfgang Paul
Work: Electromag. enrichment, etc.

Henschel
Staff: Herbert Wagner, etc.
Locations: Berlin
Work: Fission bomb, fission propulsion

AEG
Staff: Wolfgang Ferrant, Hartmut Kallmann, Ernst Kuhn
Locations: Berlin, etc.
Work: Fusion fuel, neutron initiators, etc.

Siemens
Staff: Heinz Barwich, Gustav Hertz, Max Steenbeck, etc.
Locations: Berlin, etc.
Work: Uranium enrichment, etc.

Reichswerke H. Göring
Head: Hermann Göring
Locations: Berlin, Salzgitter, Linz, etc.
Work: Metallurgy, etc.

Norway-based
Staff: ?
Locations: Vemork, Trondheim, etc.
Work: D_2O production, etc.

Denmark-based
Staff: ?
Locations: Bornholm, etc.
Work: ?

For more information, see *Forgotten Creators* 8.8 and Appendix D

~~C O N F I D E N T I A L~~

Ref No SAIC/FIR/15
27 Jul 45

SEVENTH ARMY INTERROGATION CENTER
APO 758

NOTES ON HIMMLER AND HIS STAFF
BY WILHELM FUEHRER, ADJ TO HIMMLER
Final Interrogation Report

4. PERSONALITIES

a. HIMMLER's Field Hq

GROTHMANN, SS-OSTUBAF (Lt Col) — Adj to HIMMLER from 1941 to the last; supervised military matters of WAFFEN-SS. Born HAMBURG; 39 years old; blue eyes, 1,75 m tall.

c. Scientific Personalities

SCHUMANN, Prof	nuclear	Director, First Physics Institute, University of BERLIN, and of HEERESWAFFENAMT (Army Ord Dept).
GERTHSEN, Prof	nuclear	Director, Second Physics Institute University of BERLIN; atom research.
GEIGER, Prof	nuclear	Director, Physics Institute, TECHNISCHE HOCHSCHULE (Technical College), BERLIN; atom research.
GERLACH, Prof	nuclear	Physics Institute, University of MUNICH.
TOMASCHEK, Prof	nuclear	Physics Institute, TECHNISCHE HOCHSCHULE, MUNICH.
VON UND ZUR MUEHLEN, Prof		Geological Institute, TECHNISCHE HOCHSCHULE, MUNICH. Expert on Geology of Russia.
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VON FICKER, Prof		Meteorological Institute, VIENNA.
GUTHNICK, Prof		Observatory, BERLIN-BABELSBERG.
HECKMANN, Prof		Director, Observatory, HAMBURG-BERGEDORF.
KIRCHNER, Prof	nuclear	Director, Physics Institute, University of COLOGNE. Expert on atom physics.

SS Coordination of the Nuclear Program 1942-1945

NARA RG 238, Microfilm M1270, Interrogation Records
Prepared for War Crimes Proceedings at Nuernberg, Roll 24

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Bundesarchiv Lichterfelde, NS 19-2012

XIa/165 22

DER REICHSFÜHRER-SS
CHEF DES SS-HAUPTAMTES
Cd/SSHA/Bo/Vo. VS-Tgb.Nr. 313/42 g.Kdos.

Berlin W 35, den 8. Sept. 1942
Lützowstraße 46/49
Postschließfach 48

2

2 Ausfertigungen
Prüf.Nr. 1

Betr.: Reichspostminister Dr. Ohnesorge.

An den
Reichsführer-SS
und Chef der Deutschen Polizei,
Feld-Kommandostelle.

Reichsführer !

Reichspostminister Dr. Ohnesorge ist sehr aktiv und sehr beweglich aus seinem Urlaub zurückgekehrt. Drängt gewaltig, zum Führer zu kommen aus folgenden Gründen:

a) Nach seinen Beobachtungen fasst im Augenblick Amerika die gesamten Professoren der Physik und der Chemie zusammen, um besondere Leistungen hervorzubringen. Er möchte hierüber kurz dem Führer Vortrag halten.

b) Dr. Ohnesorge möchte sein nun ausprobiertes Gerät, aufgebaut auf einem Panzerjäger, dem Führer vorführen, um überhaupt die Möglichkeit zu erhalten, es für die Waffen-SS in genügender Menge herstellen lassen zu können. Die Konstrukteure würden selbst in das Führerhauptquartier fahren, das Gerät an einem vorhandenen Fahrzeug, bezw. Geschütz aufbauen, sodass es kurz dem Führer gezeigt werden könnte.

c) Dr. Ohnesorge möchte dem Reichsführer-SS für seinen Kulturfonds einen Scheck über 5 Mill. Mark persönlich übergeben.

Ich wäre in besonderem Masse dankbar, wenn der Besuch von Dr. Ohnesorge im Führerhauptquartier bald ermöglicht werden könnte, jedenfalls vor dem Mitte September beginnenden Europäischen Kongress.

SS-Gruppenführer

SS Coordination of the Nuclear Program 1942-1945

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HECKMANN, Prof		Director, Observatory, HAMBURG-BERGEDORF.
KIRCHNER, Prof	nuclear	Director, Physics Institute, University of COLOGNE. Expert on atom physics.

Bundesarchiv Lichterfelde, NS 19-2012

XIa 165 22

DER REICHSFÜHRER-SS
CHEF DES SS-HAUPTAMTES
Cd/SS-HA/Be/Vo. VS-Tgb.Nr. 313/42 g.Kdos.

Berlin W 35, den 8. Sept. 1942
Lützowstraße 46/49
Postschließfach 48

2

2 Ausfertigungen
Prüf.Nr. 1

Betr.: Reichspostminister Dr. Ohnesorge.

An den
Reichsführer-SS
und Chef der Deutschen Polizei,
Feld-Kommandostelle.

Reichsführer !

Reichspostminister Dr. Ohnesorge ist sehr aktiv und sehr beweglich aus seinem Urlaub zurückgekehrt. Drängt gewaltig, zum Führer zu kommen aus folgenden Gründen:

a) Nach seinen Beobachtungen fasst im Augenblick Amerika die gesamten Professoren der Physik und der Chemie zusammen, um besondere Leistungen hervorzubringen. Er möchte hierüber kurz dem Führer Vortrag halten.

b) Dr. Ohnesorge möchte sein nun ausprobiertes Gerät, aufgebaut auf einem Panzerjäger, dem Führer vorführen, um überhaupt die Möglichkeit zu erhalten, es für die Waffen-SS in genügender Menge herstellen lassen zu können. Die Konstrukteure würden selbst in das Führerhauptquartier fahren, das Gerät an einem vorhandenen Fahrzeug, bezw. Geschütz aufbauen, sodass es kurz dem Führer gezeigt werden könnte.

c) Dr. Ohnesorge möchte dem Reichsführer-SS für seinen Kulturfonds einen Scheck über 5 Mill. Mark persönlich übergeben.

Ich wäre in besonderem Masse dankbar, wenn der Besuch von Dr. Ohnesorge im Führerhauptquartier bald ermöglicht werden könnte, jedenfalls vor dem Mitte September beginnenden Europäischen Kongress.

SS-Gruppenführer

According to his [Ohnesorge's] observations, at the moment America is gathering all the professors of physics and chemistry to produce special achievements. He would like to give a short lecture about this to the Führer.

Siegfried Flügge published detailed calculations of fission reactors and fission bombs in June 1939. During the war, he worked for the Reichspost, Heereswaffenamt, University of Berlin, Kaiser Wilhelm Institutes, Reichsforschungsrat, University of Königsberg (reported to have fission reactors), and Gusen SS facility.

Siegfried Flügge: Top Theoretical Physicist of the German Nuclear Program

thermische Neutronen einen Einfangquerschnitt von nur $1{,}3 \cdot 10^{-24}$ cm² fanden. Zählt man hierzu die von FERMI angegebenen $2 \cdot 10^{-24}$ cm² für die Spaltung, so erhält man für die gesamte Absorption erst etwa $^1/_7$ des angegebenen Gesamtquerschnitts und nicht die Hälfte. Es ist daher nicht unmöglich, daß bei der Messung noch Resonanzneutronen mitgewirkt haben, durch die das Resultat beträchtlich verfälscht wird. Immerhin können wir aus dem Versuch wohl entnehmen, daß Streuquerschnitt und Einfangquerschnitt bei langsamen Neutronen vergleichbar sind.

3. Das Auftreten von Reaktionsketten. Wir wollen die Frage, ob eine Reaktionskette zustandekommen kann, zunächst ganz ohne Berücksichtigung des Diffusionsproblems angreifen. Es sei n die Anzahl der Neutronen, die in einer Substanz von großem Volumen insgesamt enthalten ist. Wir nehmen zunächst an, diese Neutronen seien gleichmäßig dicht über die ganze Substanz verteilt. Ferner sollen verschiedene Arten von Atomen, unterschieden durch den Index i, anwesend sein, an denen Reaktionen stattfinden können, unterschieden durch den Index k, die jeweils ein Neutron zum Verschwinden bringen, also Einfang oder Umwandlung. Bezeichnen wir die Anzahl von Atomen der Art i im Kubikzentimeter mit ϱ_i, die Wirkungsquerschnitte mit σ_{ik}, und ist v die mittlere Geschwindigkeit der Neutronen, so nimmt die Gesamtneutronenzahl in der Zeiteinheit ab um

$$\frac{dn}{dt} = -nv\sum_{ik}\varrho_i\sigma_{ik}.$$

Eine Ausnahme von dieser Regel machen allein die Spaltungsprozesse am Uran, solange wir Thorium ausschließen, das noch nicht so gut untersucht ist, und Neutronenenergien unterhalb 8 MeV fordern, so daß noch keine $(n, 2n)$-Prozesse auftreten können. Ist der Spaltungsquerschnitt σ_{sp} und die Zahl der bei jeder Spaltung abgedampften Neutronen ν, so haben wir unsere Gleichung zu erweitern zu

$$\frac{1}{n}\frac{dn}{dt} = v\{-\sum_{ik}\varrho_i\sigma_{ik} + \varrho_U\sigma_{sp}(\nu - 1)\}. \qquad (4a)$$

Die Neutronenzahl nimmt also so lange zu, wie in der Klammer ein positiver Ausdruck steht. Streuprozesse sind nicht mitzuzählen, weil sie die Zahl der Neutronen nicht verändern.

Als Beispiel betrachten wir zunächst die Verhältnisse an reinem Uranmetall. Für schnelle Neutronen besteht kein merkbarer Einfangquerschnitt; wir haben außer $\sigma_{sp} = 0{,}1 \cdot 10^{-24}$ cm² nur noch Streuprozesse mit rund $6 \cdot 10^{-24}$ cm². Metallisches Uran (Dichte 8,6) enthält rund $2{,}2 \cdot 10^{22}$ Atome je Kubikzentimeter; es wird dann bei einer Neutronengeschwindigkeit von $2 \cdot 10^9$ cm/sec, entsprechend einer mittleren Energie der frei gesetzten Neutronen von 2 MeV:

$$\frac{1}{n}\frac{dn}{dt} = 0{,}44\,(\nu - 1) \cdot 10^7\ \text{sec}^{-1}. \qquad (4b)$$

Die Integration dieser Differentialgleichung ergibt

$$n(t) = n_0\, e^{0{,}44\,(\nu-1)\cdot 10^7 t}.$$

Läßt man die Reaktionskette mit $n_0 = 1$ Neutron zur Zeit $t = 0$ anlaufen und nimmt man den wahrscheinlichsten Wert $\nu = 2$, so findet man, da je Spaltung $3 \cdot 10^{-12}$ mkg frei werden, folgende Energiebeträge: Nach 10^{-7} sec: $4{,}7 \cdot 10^{-12}$ mkg, nach 10^{-6} sec: $2{,}4 \cdot 10^{-11}$ mkg, nach 10^{-5} sec: $3 \cdot 10^{+7}$ mkg und nach 10^{-4} sec: $3 \cdot 10^{+78}$ mkg. Die letzte Zahl hat natürlich keinen Sinn mehr; sie bedeutet nur, daß in weniger als 10^{-4} sec das gesamte Uran umgesetzt wird. Die Energiebefreiung geschieht also in einer so kurzen Zeit, daß wir es mit einer außerordentlich heftigen Explosion zu tun haben*.

Es ist gut möglich, daß diese Abschätzung noch in folgendem Sinne zu korrigieren ist: Der Streuquerschnitt für schnelle Neutronen ist rund 60mal so groß wie der Spaltungsquerschnitt, d. h. ein Neutron wird 60mal gestreut, ehe es ihm gelingt,

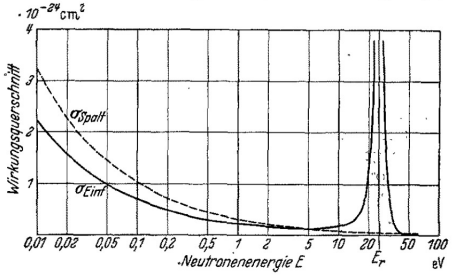


Fig. 1. Einfang- und Spaltungsquerschnitt von Uran für langsame Neutronen. Die Energie E ist in logarithmischer Skala gezeichnet.

einen Urankern zu spalten. Ist nun ein erheblicher Teil dieser Streuung unelastisch, was wir nicht wissen, so wird eine beträchtliche Verlangsamung eintreten. Obwohl bei jeder Spaltung schnelle Neutronen erzeugt werden, dürfen wir dann so rechnen, als ob wir es mit langsamen Neutronen zu tun hätten.

Den Verlauf von Spaltungs- und Einfangquerschnitt für langsame Neutronen zeigt Fig. 1. Dann tritt an Stelle von Gl. (4), wenn wir wieder $\nu = 2$ setzen,

$$\frac{1}{n}\frac{dn}{dt} = v\varrho_U(\sigma_{sp} - \sigma_{Einf}).$$

Die Neutronenproduktion wird also überall dort den Einfang überwiegen, wo der Spaltungsquerschnitt größer ist als der Einfangquerschnitt, d. h. überall außer in der Zone von etwa 5 eV bis 40 eV. Zur Durchlaufung dieser Zone sind vielleicht 4 oder 5 unelastische Streuungen notwendig, da-

* Infolge der Verarmung an Uran läuft die Reaktion allmählich langsamer. Auch dürfte sie nach Umsetzung eines kleinen, aber durchaus wägbaren Bruchteils abbrechen infolge konkurrierender Prozesse an den gebildeten Spaltungsprodukten.

DECLASSIFIED
Authority NND 907017

NARA RG 319, Entry A1-134B, Box 202, Folder XE196681 Siegfried Fluegge

The following information was received by phone from L&S Office Marburg, Wednesday, 17 Sept 47, thru Mrs. Steinbacher:

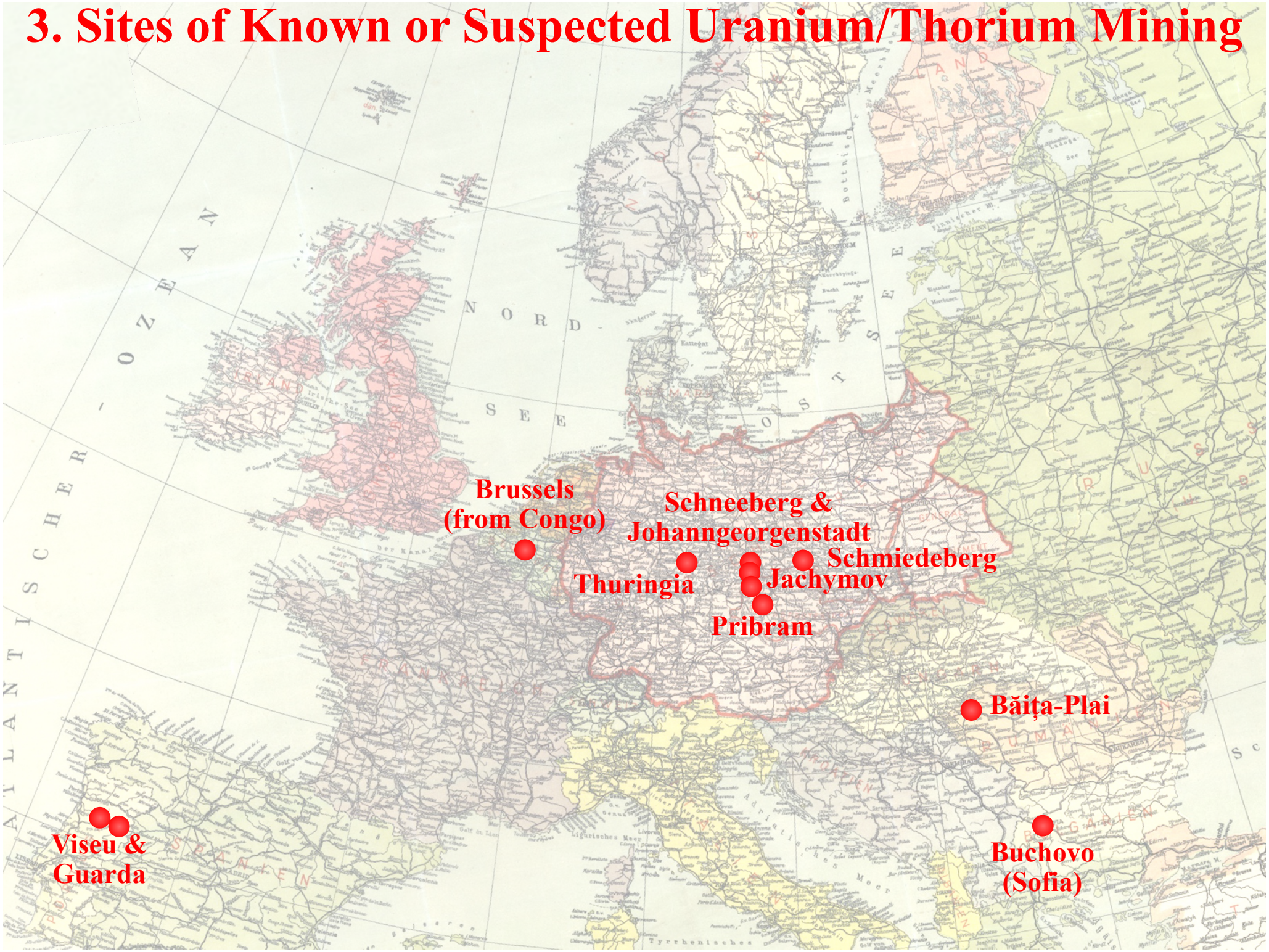
Flügge, Siegfried, Dr.

Date of birth:	16 March 1912
Place of Birth:	Dresden, Saxony, Germany
Present address:	Marburg/Lahn, Wilhelm Roser Str. 33 A
Present employment:	as professor at University of Marburg (ordentlicher Professor)
Special Field:	Nuclear Physics (Struktur der Materie)
Background information:	from 1918 - 1921: attended elementary school, Dresden
	" 1921 - 1929: " high school (Gymnasium) in Dresden
	" 1929 - 1930: attended Technical High School, Dresden.
	" 1930 - 1933: at University in Göttingen
	X 1933 Doctor of Physics at University of Göttingen.
	" 1933 - 1935: worked at University of Frankfurt as Scientific Assistant.
	" 1935 - 1937: lectured at University of Leipzig
	1937 to Berlin
	" 1937 - 1942: worked in chemical department of the Kaiser-Wilhelm-Institute in Berlin, Dahlem.
	" 1942 - 1944: assistant at the Institute of Scientific Research of the Reichspost, Berlin
	" 1940 - 1944: lectured at the University of Berlin
	" 1944 appointed professor (ausserordentlicher) at the University of Königsberg.

After the surrender, he went to Göttingen, where he was employed as Professor for History of Physical Science from 1945 to 1947.

He was not called to Military Service during the War, because he worked as a Scientist of Physics for the "Heereswaffenamt", Berlin, and was later exempted of any Army Service by the Reichsforschungsrat in Berlin.

3. Sites of Known or Suspected Uranium/Thorium Mining



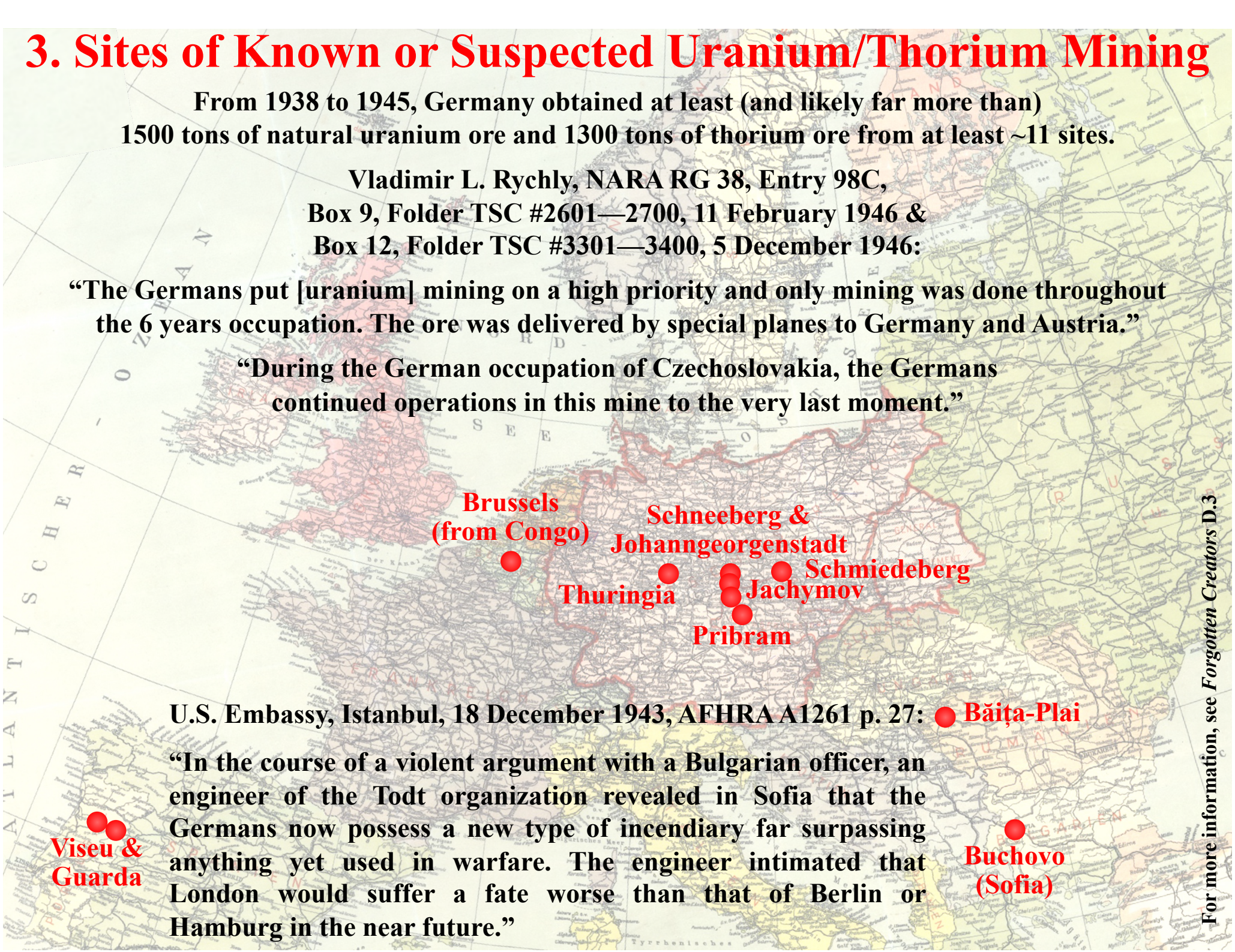
3. Sites of Known or Suspected Uranium/Thorium Mining

From 1938 to 1945, Germany obtained at least (and likely far more than) 1500 tons of natural uranium ore and 1300 tons of thorium ore from at least ~11 sites.

Vladimir L. Rychly, NARA RG 38, Entry 98C, Box 9, Folder TSC #2601—2700, 11 February 1946 & Box 12, Folder TSC #3301—3400, 5 December 1946:

"The Germans put [uranium] mining on a high priority and only mining was done throughout the 6 years occupation. The ore was delivered by special planes to Germany and Austria."

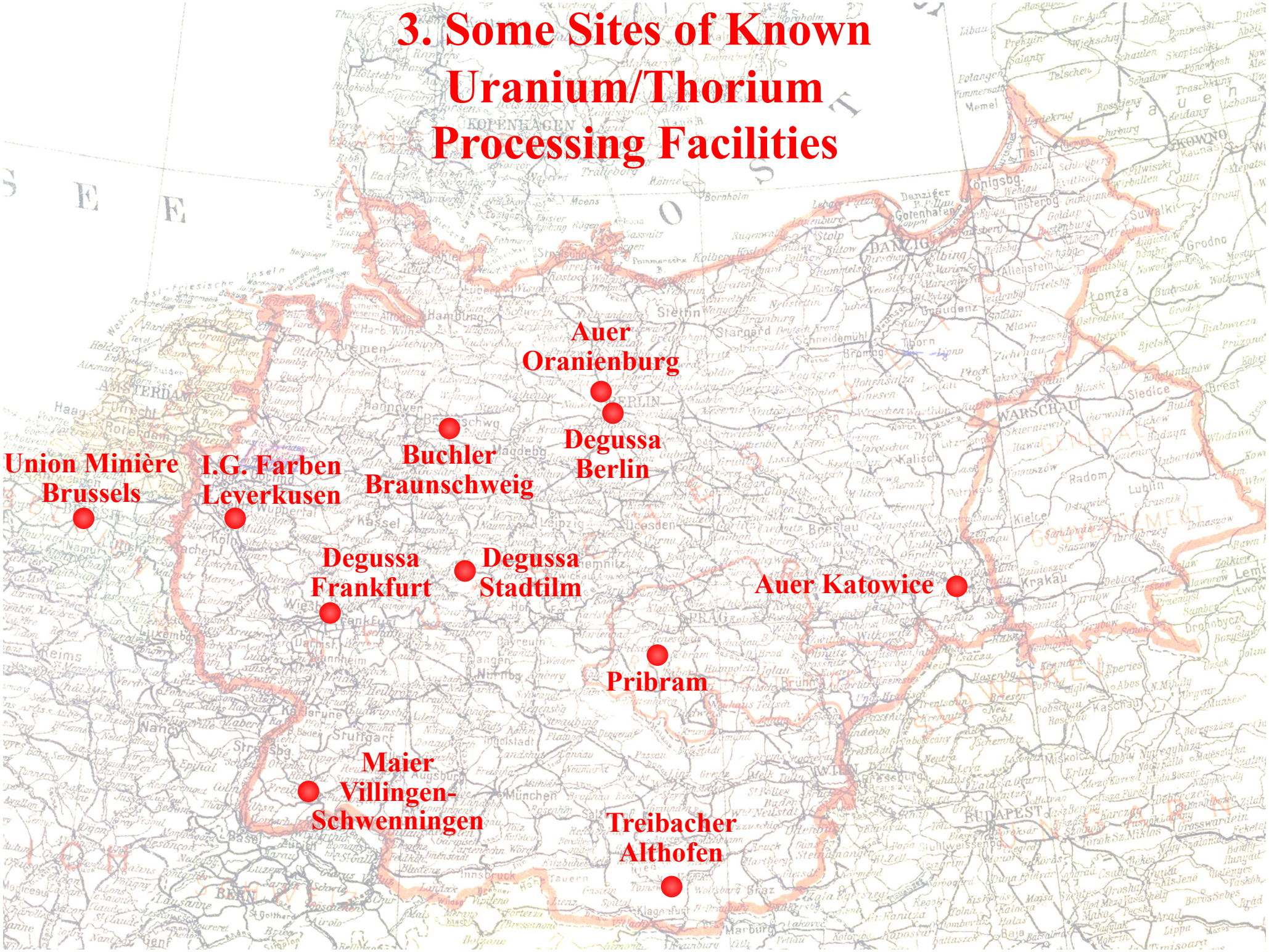
"During the German occupation of Czechoslovakia, the Germans continued operations in this mine to the very last moment."



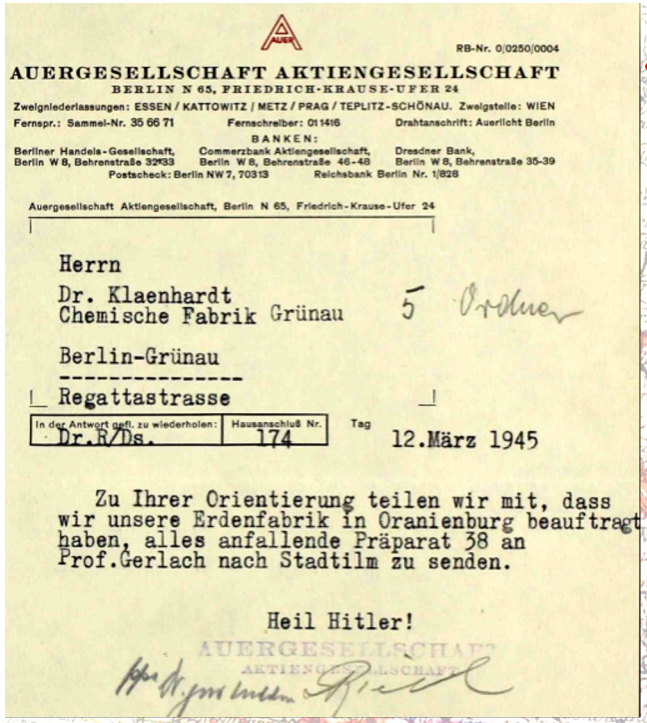
U.S. Embassy, Istanbul, 18 December 1943, AFHRA A1261 p. 27:

"In the course of a violent argument with a Bulgarian officer, an engineer of the Todt organization revealed in Sofia that the Germans now possess a new type of incendiary far surpassing anything yet used in warfare. The engineer intimated that London would suffer a fate worse than that of Berlin or Hamburg in the near future."

For more information, see *Forgotten Creators* D.3


3. Some Sites of Known Uranium/Thorium Processing Facilities
Union Minière Brussels
I.G. Farben Leverkusen
Buchler Braunschweig
Auer Oranienburg
Degussa Berlin
Degussa Frankfurt
Degussa Stadtilm
Auer Katowice
Pribram
Maier Villingen-Schwenningen
Treibacher Althofen

3. Some Sites of Known Uranium/Thorium Processing Facilities



RB-Nr. 0/0250/0004

AUERGESELLSCHAFT AKTIENGESELLSCHAFT
BERLIN N 65, FRIEDRICH-KRAUSE-UFER 24

Zweigniederlassungen: ESSEN / KATTOWITZ / METZ / PRAG / TEPLITZ-SCHÖNAU. Zweigstelle: WIEN
Fernspr.: Sammel-Nr. 35 66 71 Fernschreiber: 01 1416 Drahtanschrift: Auerlicht Berlin
BANKEN:
Berliner Handels-Gesellschaft, Berlin W 8, Behrenstraße 32/33 — Commerzbank Aktiengesellschaft, Berlin W 8, Behrenstraße 46-48 — Dresdner Bank, Berlin W 8, Behrenstraße 35-39
Postscheck: Berlin NW 7, 70313 Reichsbank Berlin Nr. 1/828

Auergesellschaft Aktiengesellschaft, Berlin N 65, Friedrich-Krause-Ufer 24

Herrn
Dr. Klaenhardt
Chemische Fabrik Grünau 5 Drahtw.
Berlin-Grünau
Regattastrasse

In der Antwort gefl. zu wiederholen: Dr.R/Ds. | Hausanschluß Nr. 174 | Tag 12.März 1945

Zu Ihrer Orientierung teilen wir mit, dass wir unsere Erdenfabrik in Oranienburg beauftragt haben, alles anfallende Präparat 38 an Prof.Gerlach nach Stadtilm zu senden.

Heil Hitler!

AUERGESELLSCHAFT AKTIENGESELLSCHAFT

Union Minière Brussels

I.G. Farben Leverkusen

Buchler Braunschweig

Auer Oranienburg

Degussa Berlin

Degussa Frankfurt

Degussa Stadtilm

Maier Villingen-Schwenningen

Pribram

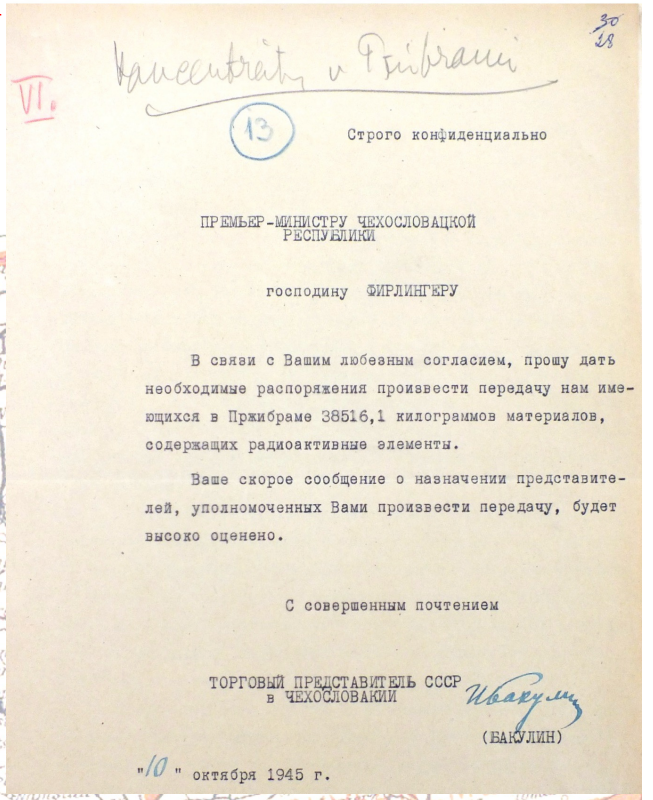
Auer Katowice

Treibacher Althofen

G-157. I.G. Farben Leverkusen. 11 June 1942.

Kwasnik developed process whereby uranium oxide is carried through a rotating inclined nickel tube heated to 650°C through which a stream of fluorine gas is passed. The UF_6 thus formed is frozen by CO_2 in containers. About 500 grams UF_6 thus produced per hour. The UF_6 to be frozen in large crystalline block to reduce amount of adsorption of other gases.

10 October 1945 letter from Ivan Bakulin to Zdeněk Fierlinger, Národní archiv, Ústřední výbor KSČ, Klement Gottwald, sv. 81, aj. 1031



Uranocentrát v Příbrami

VI. 13

Строго конфиденциально

ПРЕМЬЕР-МИНИСТРУ ЧЕХОСЛОВАЦКОЙ РЕСПУБЛИКИ

господину ФИРЛИНГЕРУ

В связи с Вашим любезным согласием, прошу дать необходимые распоряжения произвести передачу нам имеющихся в Пржибраме 38516,1 килограммов материалов, содержащих радиоактивные элементы.

Ваше скорое сообщение о назначении представителей, уполномоченных Вами произвести передачу, будет высоко оценено.

С совершенным почтением

ТОРГОВЫЙ ПРЕДСТАВИТЕЛЬ СССР в ЧЕХОСЛОВАКИИ Бакулин

(БАКУЛИН)

"10" октября 1945 г.

David Gattiker and George C. Davis. 16 May 1945. Report on visit to Joachimsthal. NARA RG 77, Entry UD-22A, Box 160, Folder APR 45--Dec. '45.

I and Davis entered Czechoslovakian target yesterday morning and spent three hours with Dr. Patzochke, German director of the mines. […] These concentrates contain 60 per cent U_3O_8 and were sent to Germany and Austria for radium extraction, and were divided equally between Auer, Buchler at Brunswick, and Goldschmidt at Treibach in Austria.

Ueber den Einfluss der Zentrifugalkraft auf chemische Systeme.

Von

G. Bredig.

(Mit 3 Figuren im Text.)

Einleitung.

Die Frage, ob durch den Einfluss äusserer Kräfte, wie z. B. durch die Gravitation, sich in einem ursprünglich homogenen Gemenge Konzentrationsverschiedenheiten in der Richtung dieser Kräfte ausbilden, ist bereits im Anfange dieses Jahrhunderts diskutiert worden. So stellte bereits Gay-Lussac[1]) in den Kellern der Pariser Sternwarte Versuche darüber an, ob eine Salzlösung in einer vertikalen 2 m langen Säule unter dem Einfluss der Schwerkraft am unteren Ende der Säule eine andere Konzentration annehme, als am oberen Ende. Er erhielt ein negatives Resultat, was nach den neueren Berechnungen von Gouy und Chaperon[2]) auch verständlich wird, da diese Autoren thermodynamisch den Einfluss der Gravitation auf die Konzentration aus der Änderung der Dichte mit der Konzentration zu berechnen vermögen und denselben so klein finden, dass seine experimentelle Feststellung schwerlich ausführbar ist.

Die Theorie solcher Systeme ist bereits mehrfach, von J. W. Gibbs[3]), Gouy und Chaperon[4]), P. Duhem[5]), van der Waals[6]) und anderen gegeben worden.

Nun hat aber unlängst Herr Th. des Coudres in einer interessanten Abhandlung[7]) beiläufig darauf hingewiesen, dass man die Betrachtungen über den Einfluss der Schwere auf die Konzentration der Lö-

[1]) Ann. chim. phys. **11**, 306 (1819). — Vergl. auch Ostwald, Lehrbuch der allg. Chemie 2. Aufl. I, 700. — Beudant, Ann. chim. phys. **8**, 15. — Bischof, Lehrbuch der ch. und ph. Geol. II, 1712. — Lieben, Lieb. Ann. **101**, 77 (1857).
[2]) Ann. chim. phys. (6) **12**, 384 (1887).
[3]) Thermodynam. Studien S. 171 ff. Deutsch von Ostwald.
[4]) Siehe oben und Compt. rend. **105**, 117.
[5]) Journ. de phys. (2) **8**, 391 (1888).
[6]) Diese Zeitschr. **5**, 157.

Zeitschrift für Physikalische Chemie A 17:459 (1895)

PATENTSCHRIFT

№ 906 094

KLASSE 12e GRUPPE 305

M 4147 IVb / 12e

Dr. Werner Kuhn, Basel (Schweiz) und Dr. Hans Martin, Kiel
sind als Erfinder genannt worden

Dr. Hans Martin, Kiel

Vorrichtung und Verfahren zur Trennung von Gasgemischen durch Anwendung von künstlich erzeugten Schwerefeldern

Patentiert im Gebiet der Bundesrepublik Deutschland vom 12. Juli 1938 an
Der Zeitraum vom 8. Mai 1945 bis einschließlich 7. Mai 1950 wird auf die Patentdauer nicht angerechnet
(Ges. v. 15. 7. 51)
Patentanmeldung bekanntgemacht am 12. März 1953
Patenterteilung bekanntgemacht am 28. Januar 1954

Es ist bekannt, daß man eine teilweise Trennung von Gas- oder Dampfgemischen, welche sich aus verschieden schweren Bestandteilen zusammensetzen, dadurch erreichen kann, daß man das Gasgemisch in einen Hohlkörper bringt und denselben mit hoher Umlaufzahl um eine Achse rotieren läßt. Durch das bei der hohen Umlaufzahl auftretende Schwerefeld wird eine Anreicherung der schwereren Bestandteile in den peripheren Teilen, eine verhältnismäßige Anreicherung der leichteren Bestandteile in den der Achse benachbarten Teilen des Hohlkörpers hervorgebracht. Es ist indessen bekannt, daß eine solche Trennung nur in recht geringem Ausmaße erfolgt und daß sie nur dann merkliche Beträge annimmt, wenn das Molekulargewicht der in dem Gemische vorliegenden Bestandteile große Unterschiede aufweist.

Um auch bei kleinen Unterschieden im Molekulargewicht, wie sie z. B. bei Luft oder bei Isotopengemischen vorliegen, eine weitgehende Trennung herbeizuführen, ist es notwendig, die bei der Zentrifugierung anfallenden Gasfraktionen wiederholt zu zentrifugieren. Es ist dabei naheliegend, anstatt einer einzigen eine Reihe von Zentrifugen vorzusehen und diese durch Rohrleitungen derart zu verbinden, daß die zweite Zentrifuge mit der in der ersten anfallenden schweren Fraktion gespeist wird, die dritte Zentrifuge mit der in der zweiten anfallenden noch schwereren Fraktion usf. Auf diese Weise können Fraktionen er-

4. ^{235}U Enrichment: Centrifuges

Gas centrifuges were invented in Germany before 1895.

By World War II, uranium gas centrifuges were produced in:

- **Kiel (2 groups)**
- **Munich**
- **Freiburg**
- **Göttingen**
- **Thuringia**
- **Breslau/Wrocław**
- **Netherlands**
- **Swiss factories (!)**
- **+ more locations?**

For more information, see *Forgotten Creators* D.4.2

Sektion veranlaßten vergleichenden Untersuchungen, welche auch Herr Gulden in seinem Artikel erwähnt, haben wenigstens gezeigt, daß die Hautpulvermenge, wenn im übrigen keine Fehler gemacht werden, das Resultat kaum beeinflußt. Wie erwähnt, halte ich es trotzdem für zweckmäßig, daß die Hautpulvermenge festgelegt wird. In diesem Punkte befinde ich mich also auch in Übereinstimmung mit Herrn Gulden; ich halte jedoch die Beweisführung, die er zur Begründung dieser Forderung heranzieht, nicht für richtig, was aber in Anbetracht der Tatsache, daß Herr Gulden kein Chemiker ist, entschuldbar ist.

Zum Schluß möchte ich noch auf eine Tatsache zurückkommen, welche Herr Gulden in seinem Artikel ebenfalls anführt, und welche leicht Anlaß zu Mißverständnissen führen kann. Herr Gulden erwähnt, daß der „Verein deutscher Farbstoff- u. Gerbstoff-Extrakt-Fabrikanten" kürzlich den Beschluß gefaßt hat, daß die zu gebenden Garantien von Extrakten wesentlich einzuschränken sind, und daß auf Grund von Analysen der Deutschen Versuchsanstalt für Lederindustrie bei flüssigen und teigförmigen Extrakten ein Mindergehalt von 3% und bei festen Extrakten ein solcher von 4% nicht zu Reklamationen Veranlassung geben darf, während bei anderen Laboratorien, deren Analysen von dem genannten Verein ebenfalls anerkannt werden, diese Zahlen mit 2, bezw. 3% festgelegt sind. Es soll an dieser Stelle nicht in eine Erörterung darüber eingegangen werden, daß diese Zahlen ziemlich hoch angenommen worden sind; ich möchte aber hervorheben, daß diese verschiedene Bemessung bei denjenigen, welche den wirklichen Sachverhalt nicht kennen, den Glauben erwecken kann, als ob die Analysen der Versuchsanstalt weniger genau seien. Wie mir von seiten eines Vertreters dieses Vereins auf mein Befragen ausdrücklich versichert worden ist, liegt dem Beschlusse in der obigen Form folgende Tatsache zugrunde: Nach den Erfahrungen des genannten Vereins fallen bei den Analysen von Extrakten durch die Versuchsanstalt die Gerbstoffgehalte häufig um ca. 1% niedriger aus, als bei einigen anderen Laboratorien. Diese Differenzen sind, wie ich auch an dieser Stelle hervorheben möchte, darin begründet, daß die Versuchsanstalt großen Wert darauf legt, daß zur Analyse nur vollständig klare Filtrate verwendet werden, damit nicht Stoffe, welche unlöslich sind, und in der Lösung in fein verteilter Form sich vorfinden, als gerbende Substanzen bestimmt werden. Auf diese Weise ergeben sich allerdings Gerbstoffgehalte, welche mitunter niedriger als die anderer Laboratorien sind. Da die Vorschrift besteht, daß die Lösungen vollständig klar sind, so halte ich in solchen Fällen die niedrigeren für diejenigen, welche den Vereinbarungen entsprechen.

Prinzipien der Gasscheidung durch Zentrifugalkraft.

Von G. Bredig und F. Haber.
(Mitgeteilt von F. Haber.)
(Eingeg. d. 8./1. 1904.)

1. Einleitung.

Seit zwei Jahren treten in technischen Zeitschriften Nachrichten über die großen Erfolge auf, welche Herr E. N. Mazza mit einem Apparate erzielt, in welchem er Gase durch Zentrifugalkraft scheidet. Auf die Mängel der bezüglichen Angaben ist wohl im Journal für Gasbeleuchtung und Wasserversorgung alsbald[1]) hingewiesen worden, aber Herr Vittorio Calzavara, der technische Direktor der venetianischen Gas- und Elektrizitätsgesellschaft und Leiter der Zeitschrift „Il Gas", hat danach dem Kongreß Deutscher Gas- und Wasserfachmänner in Zürich 1903 einen Bericht vorgelegt, welcher die außerordentlichen Erfolge des Apparates nachdrücklich betont. Der Bericht führt das Zeugnis zweier Gelehrten an, welche die Anreicherung des Sauerstoffes in der mit diesem Apparat zentrifugierten Luft festgestellt haben sollen, und bringt Angaben über eine erstaunliche Kohleersparnis, welche in der Praxis mehrerer bedeutenden Fabriken durch Benutzung der zentrifugierten und dadurch an Sauerstoff angereicherten Luft erzielt worden ist. Die italienische Regierung hat den Apparat prüfen lassen, und das deutsche Patentamt hat das gleiche getan. Herr Calzavara berichtet, daß beide Prüfungen zum Vorteil des Mazzaschen Gassscheiders ausgefallen sind: Das italienische Marineministerium hat einen solchen Apparat gekauft, das deutsche Patentamt ein D. R. P. (139210) darauf erteilt[2]). Inzwischen haben die Herren G. Claude und E. Demoussy wissenschaftliche Versuche über den Gegenstand gemacht, deren Ergebnis[3]) durchaus zu Ungunsten der Sache ausgefallen ist. Aber Herr Goffi[4]), der technischer Leiter der italienischen Gasgesellschaft in Turin, tritt demgegenüber mit neuem Nachdruck und

[1]) März 1902, **9**, 155.
[2]) Das D. R. P. 139210 handelt nicht im speziellen von der Luftscheidung.
[3]) Claude und Demoussy Compt. r. d. Acad. d. sciences vom 27. Juli 1903, 250.
[4]) J. de l'éclairage au gaz 20. Sept. 1903, 290.

Zeitschrift für Angewandte Chemie 17:452 (1904)

PATENTSCHRIFT

№ 833 487

KLASSE 12e GRUPPE 305

G 414 IVb / 12e

Dr.-Ing. Helmuth Hausen, München-Solln
ist als Erfinder genannt worden

Gesellschaft für Linde's Eismaschinen A. G.,
Höllriegelskreuth bei München

Verfahren und Vorrichtung zur Zerlegung von Gas- und Flüssigkeitsgemischen in Zentrifugen

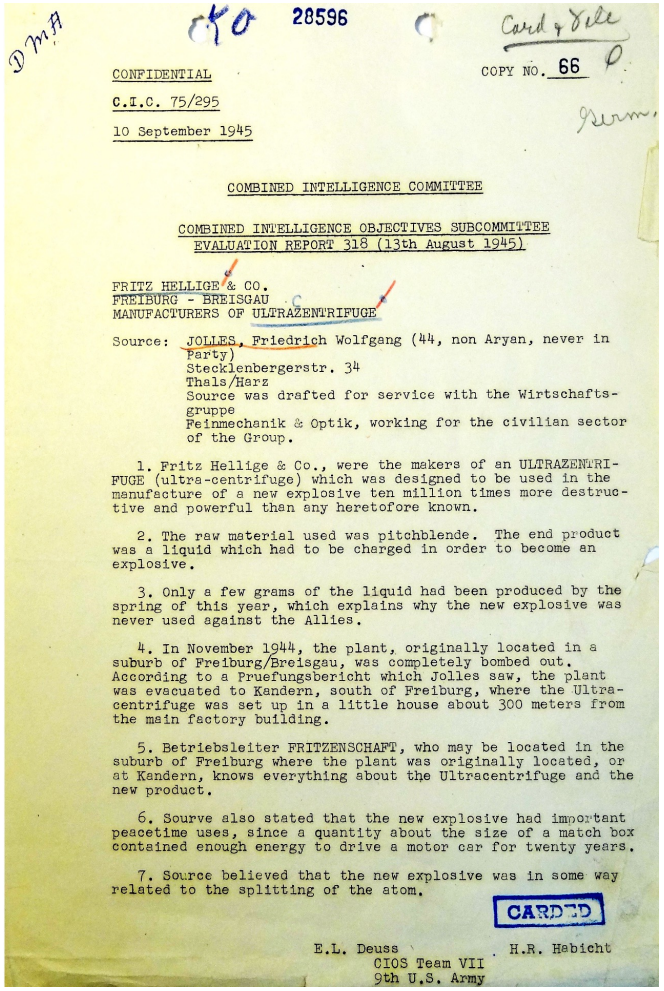
Patentiert im Gebiet der Bundesrepublik Deutschland vom 18. Juni 1939 an
Der Zeitraum vom 8. Mai 1945 bis einschließlich 7. Mai 1950 wird auf die Patentdauer nicht angerechnet
(Ges. v. 15. 7. 51)
Patentanmeldung bekanntgemacht am 26. Juli 1951
Patenterteilung bekanntgemacht am 7. Februar 1952

Es hat bisher nicht an Versuchen gefehlt, Gasgemische durch Zentrifugieren zu zerlegen. Ein brauchbares Ergebnis konnte jedoch mit diesen Verfahren nicht erzielt werden, weil die Trennwirkung der bekannten Zentrifugierverfahren verhältnismäßig gering ist. Auch theoretisch läßt sich nachweisen, daß die Zerlegungswirkung einer nach den bekannten Verfahren betriebenen Zentrifuge selbst bei den höchsten heute möglichen Umfangsgeschwindigkeiten und bei Gemischen mit großen Unterschieden im Molekulargewicht nur sehr gering ist.

Nach der vorliegenden Erfindung läßt sich aber der an sich kleine, durch Zentrifugalwirkung erzielbare Trenneffekt dadurch zu größerer Wirkung bringen, daß man ihn durch Gegenstromführung der Gase verstärkt. Eine solche Verstärkung durch Gegenstrom ist z. B. bei der Rektifikation bekannt. Die nur geringe Zerlegungswirkung eines einzelnen Rektifikationsbodens wird dadurch vervielfacht, daß man eine große Zahl von solchen Böden übereinander anordnet und Flüssigkeit und Dampf im Gegenstrom führt. Ebenso läßt sich grundsätzlich die Trennwirkung einer Zentrifuge dadurch ver-

Werner Schwietzke. 1947. National Archives of Australia. Series MT105/8, control 1/6/3094, barcode 934755.

Since the theoretical calculations of the stress distribution of the rotor rotating at high speed can only be carried out with a certain approximation, it was recommended that the precisely balanced rotor be subjected to a test run below the maximum rotational speed of 65,000 rpm, which was calculated as critical, and that any changes in the rotor be precisely determined by precision measurements after the run. After a considerable number of test series over several hours at 60,000 rpm a deformation of the rotor never could be detected, so that a constant operating speed of 56,000 rpm could be selected for the intended tests without danger. This ultracentrifuge, which requires little space and effort, has proven itself extraordinarily good in practice.



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C.I.C. 75/295

10 September 1945

COMBINED INTELLIGENCE COMMITTEE

COMBINED INTELLIGENCE OBJECTIVES SUBCOMMITTEE
EVALUATION REPORT 318 (13th August 1945)

FRITZ HELLIGE & CO.
FREIBURG - BREISGAU
MANUFACTURERS OF ULTRAZENTRIFUGE

Source: JOLLES, Friedrich Wolfgang (44, non Aryan, never in Party)
Stecklenbergerstr. 34
Thals/Harz
Source was drafted for service with the Wirtschafts-gruppe
Feinmechanik & Optik, working for the civilian sector of the Group.

1. Fritz Hellige & Co., were the makers of an ULTRAZENTRIFUGE (ultra-centrifuge) which was designed to be used in the manufacture of a new explosive ten million times more destructive and powerful than any heretofore known.

2. The raw material used was pitchblende. The end product was a liquid which had to be charged in order to become an explosive.

3. Only a few grams of the liquid had been produced by the spring of this year, which explains why the new explosive was never used against the Allies.

4. In November 1944, the plant, originally located in a suburb of Freiburg/Breisgau, was completely bombed out. According to a Pruefungsbericht which Jolles saw, the plant was evacuated to Kandern, south of Freiburg, where the Ultra-centrifuge was set up in a little house about 300 meters from the main factory building.

5. Betriebsleiter FRITZENSCHAFT, who may be located in the suburb of Freiburg where the plant was originally located, or at Kandern, knows everything about the Ultracentrifuge and the new product.

6. Sourve also stated that the new explosive had important peacetime uses, since a quantity about the size of a match box contained enough energy to drive a motor car for twenty years.

7. Source believed that the new explosive was in some way related to the splitting of the atom.

CARDED

E.L. Deuss
CIOS Team VII
9th U.S. Army

H.R. Hebicht

NARA RG 77, Entry UD-22A, Box 166, Folder 32.22-1
GERMANY—Research—TA—(1943–June 1946)

4. ^{235}U Enrichment: Centrifuges

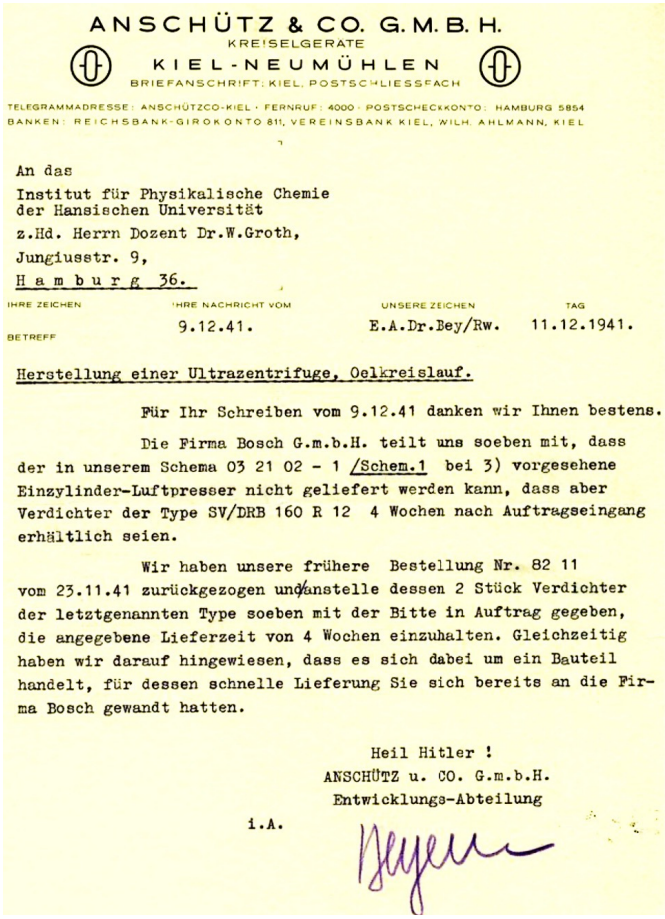
By World War II, uranium gas centrifuges were produced in:

- **Kiel (2 groups)**
- **Munich**
- **Freiburg**
- **Göttingen**
- **Thuringia**
- **Breslau/Wrocław**
- **Netherlands**
- **Swiss factories (!)**
- **+ more locations?**

For more information, see *Forgotten Creators* D.4.2

Marshal Georgy Zhukov. 2 October 1945. Report to Joseph Stalin. Archive of the President of the Russian Federation, Fund 93, Division 77 (45), List 4-11.

The main specialists in the field of isotope separation in Germany were Professor Harteck, Dr. Groth, who, together with the chief designer of the Anschütz company (Kiel, English zone), Dr. Beyerle, invented an ultracentrifuge built by the above company, as well as by the Hellige company (Breslau, USSR zone).



ANSCHÜTZ & CO. G.M.B.H.
KREISELGERÄTE
KIEL-NEUMÜHLEN
BRIEFANSCHRIFT: KIEL, POSTSCHLIESSFACH

TELEGRAMMADRESSE: ANSCHÜTZCO-KIEL · FERNRUF: 4000 · POSTSCHECKKONTO: HAMBURG 5854
BANKEN: REICHSBANK-GIROKONTO 811, VEREINSBANK KIEL, WILH. AHLMANN, KIEL

An das
Institut für Physikalische Chemie
der Hansischen Universität
z.Hd. Herrn Dozent Dr.W.Groth,
Jungiusstr. 9,
Hamburg 36.

IHRE ZEICHEN	IHRE NACHRICHT VOM	UNSERE ZEICHEN	TAG
	9.12.41.	E.A.Dr.Bey/Rw.	11.12.1941.

BETREFF

Herstellung einer Ultrazentrifuge, Oelkreislauf.

Für Ihr Schreiben vom 9.12.41 danken wir Ihnen bestens.

Die Firma Bosch G.m.b.H. teilt uns soeben mit, dass der in unserem Schema 03 21 02 - 1 /Schem.1 bei 3) vorgesehene Einzylinder-Luftpresser nicht geliefert werden kann, dass aber Verdichter der Type SV/DRB 160 R 12 4 Wochen nach Auftragseingang erhältlich seien.

Wir haben unsere frühere Bestellung Nr. 82 11 vom 23.11.41 zurückgezogen und anstelle dessen 2 Stück Verdichter der letztgenannten Type soeben mit der Bitte in Auftrag gegeben, die angegebene Lieferzeit von 4 Wochen einzuhalten. Gleichzeitig haben wir darauf hingewiesen, dass es sich dabei um ein Bauteil handelt, für dessen schnelle Lieferung Sie sich bereits an die Firma Bosch gewandt hatten.

Heil Hitler !
ANSCHÜTZ u. CO. G.m.b.H.
Entwicklungs-Abteilung

i.A.

Beyerle

British Documents

DECLASSIFIED
DOE 8803942A-HS
By MHC NARS Date 2/6/89

American Documents

DECLASSIFIED
812018
By MHC NARS Date 2/6/89

SECRET

March 14, 1944

MEMORANDUM

TO: Major R. H. Furman

FROM: H. T. Wensel

How many uranium gas centrifuges did Germany produce?

This memorandum will put on record the information which I gave you orally yesterday.

Dr. H. C. Urey of Columbia University was approached through a Professor Perrin, who was then an exchange Professor in the Chemistry Department at Columbia University, on behalf of one Constantin Chilowsky. Chilowsky was desirous of selling an invention, the exact method never disclosed to us, for accomplishing the same purpose which the Manhattan District is seeking to. Professor Urey indicated that he was not interested in the matter but passed the information on to the OSRD, and I was asked to interview Chilowsky by Dr. Conant to see what I could find out. I used my credentials as a member of the National Bureau of Standards and indicated to Chilowsky and Professor Perrin that I had no other government connection.

Chilowsky was a Swiss and refused to divulge even the approximate nature of his method but, inasmuch as I indicated that the government would be apathetic to the idea until shown that something practical was involved, in order to "sell" me on the importance of the job, he indicated to me that the Germans were actively engaged on the same objective. In particular, he told me he had personally seen in a factory in Switzerland centrifuges which were being produced to be sent to Germany for the Germans' work on this field.

Chilowsky also told me that he had a moral and financial obligation to offer first crack at his invention to the British group of Halban. It seems that Halban and his group had some part in developing the invention in question. Halban is at present with the British team in Montreal, and it may be that Chilowsky's whereabouts can be traced through Halban if no other means of approach is available.

For more information, see *Forgotten Creators* D.4.2

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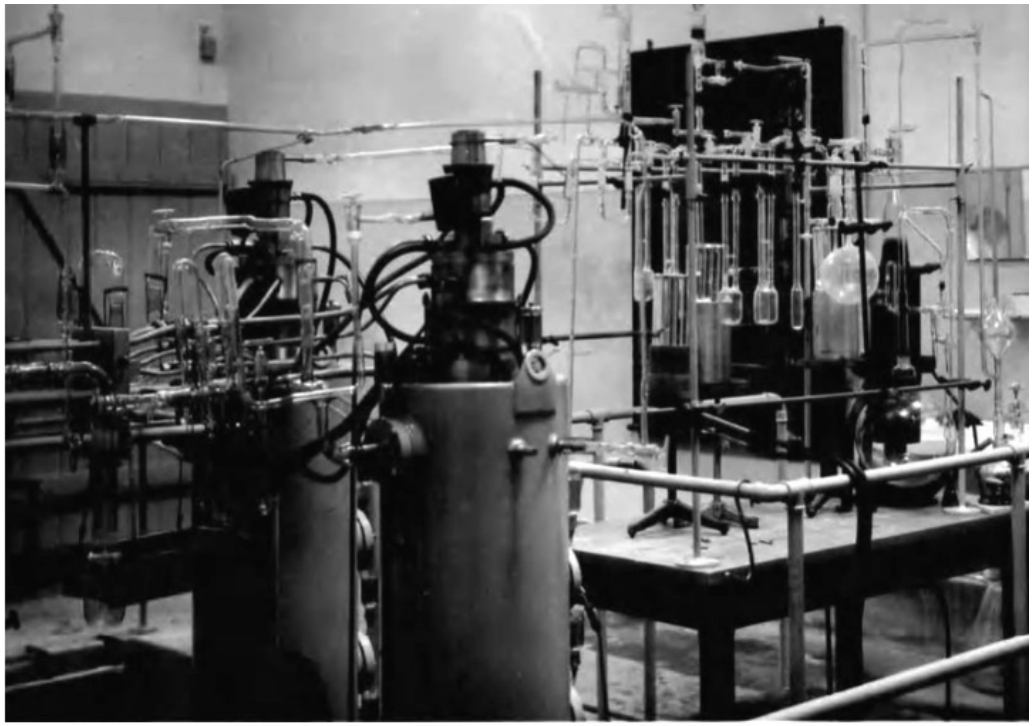
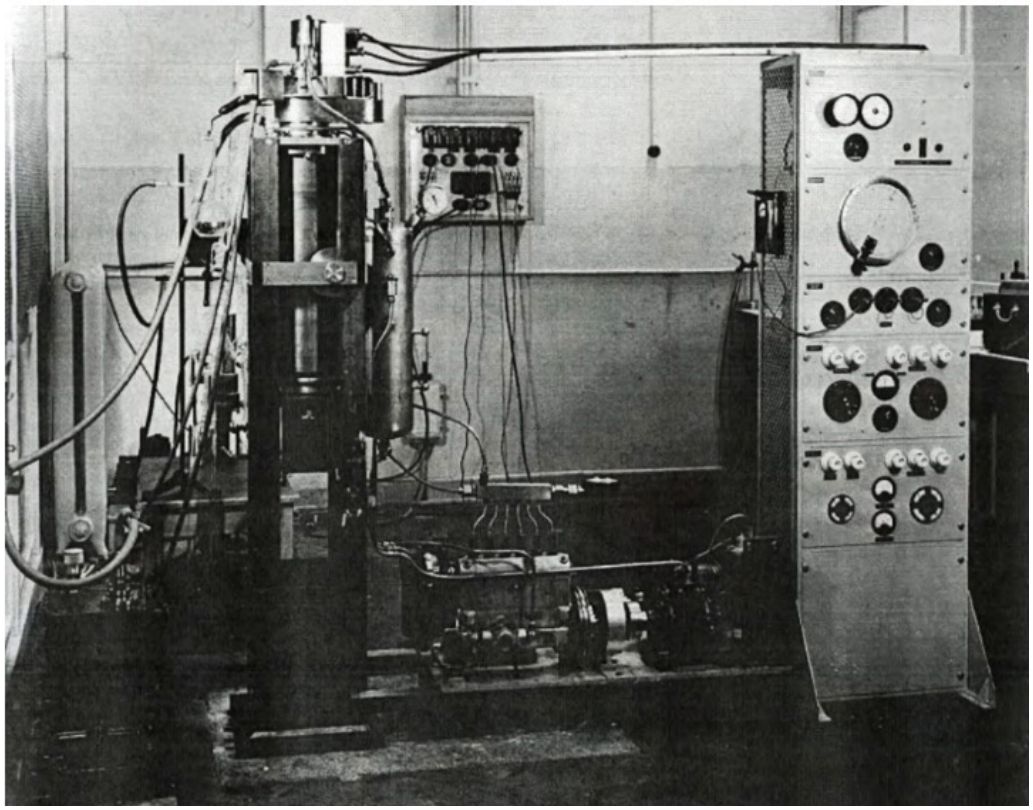
By NW NARS, Date 3/13/01

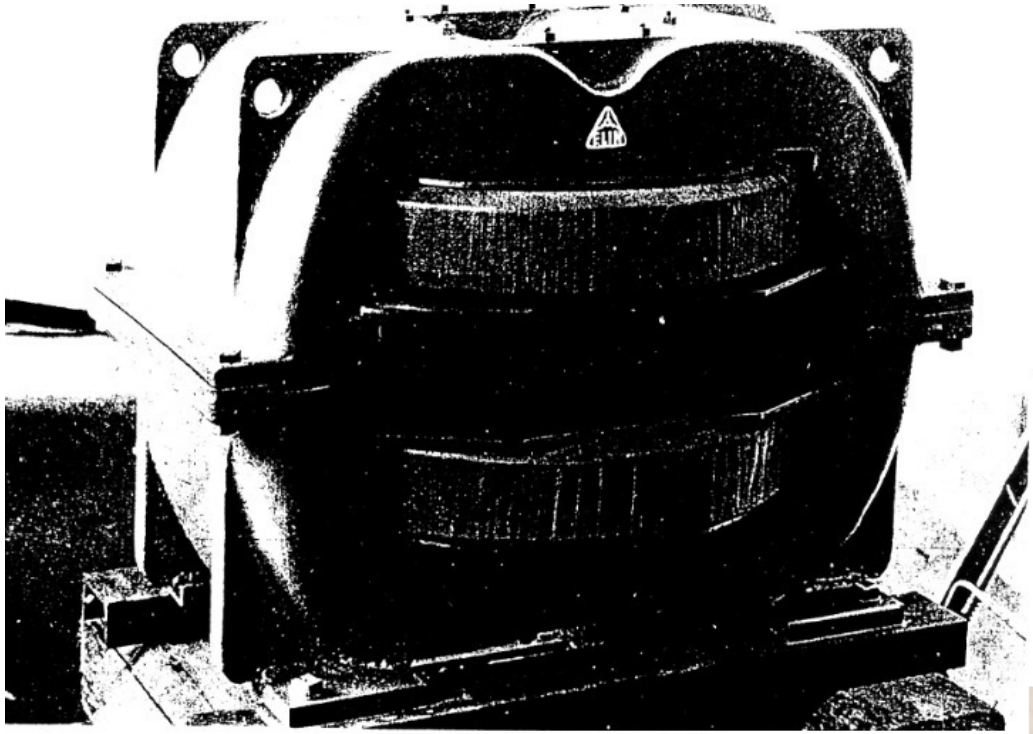
NARA RG 227, Microfilm M1392, Bush-Conant File Relating to the Development of the Atomic Bomb

Deutsches Museum Archive FA 002/811





4. ^{235}U Enrichment: Electromagnetic Separators (Calutrons)



Zum Projekt einer größeren Anlage mit Ura..- Innenionenquelle

Prototype calutron built and demonstrated by 1941 by Manfred von Ardenne and the ELIN company [Russian archive, courtesy of Rainer Karlsch]

Heinz Ewald's March 1942 final report on calculations for the optimal performance of calutrons [Deutsches Museum Archive G-139]

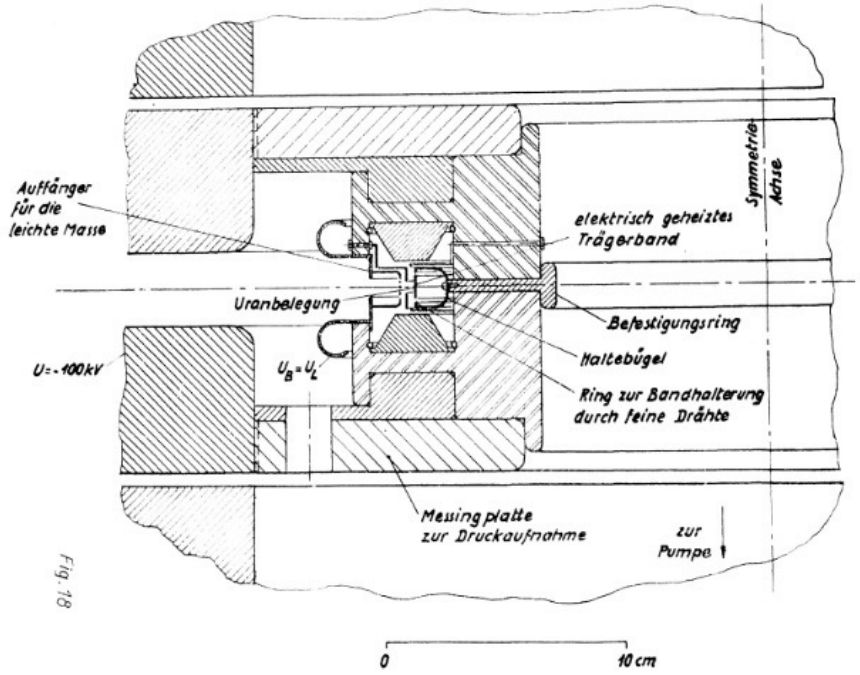


Fig. 18

For more information, see *Forgotten Creators* D.4.3

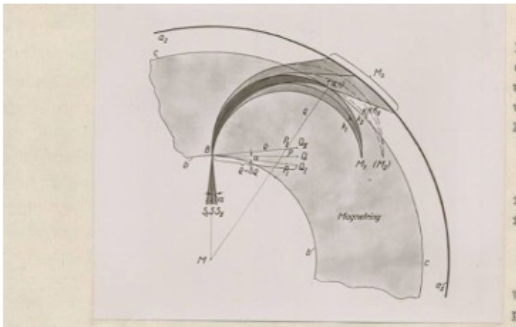


Fig. 5. Zum Auflösungsvermögen der Anordnung mit Innenionenquelle.

Punkte T, so dass der Kreis k_{II} den Kreis c in T berührt. Die Radien der Kreise k und K seien ρ und $\rho+\Delta\rho$. Wenn wir für eine bestimmte Anordnung – gegeben seien die Radien r_b und r_c und die Winkeldivergens 2α – das Auflösungsvermögen angeben wollen, dann genügt es, das Verhältnis $\rho/\Delta\rho$ für die beiden Kreise k_{II} und K_I zu bestimmen. Denn aus der Beziehung

$$\rho = \frac{const.\sqrt{M \cdot U}}{H}$$

für den Krümmungsradius von Ionen der Voltenergie U im Magnetfeld H folgt für das Auflösungsvermögen

$$\frac{M}{\Delta M} = \frac{1}{2}\cdot\frac{\rho}{\Delta\rho}$$

Wenn wir den Ursprung des Koordinatensystemes in den Mittelpunkt M der ganzen Anordnung verlegen (Fig. 7), haben die drei Kreise k_{II}, K_I und c die Gleichungen (unter Vernachlässigung höherer Potenzen von α):

$$(x-\rho)^2 + (y - r_c - \rho\cdot\alpha)^2 = \rho^2$$

$$(x-(\rho+\Delta\rho))^2 + (y - r_b + (\rho+\Delta\rho))^2 = (\rho+\Delta\rho)^2$$

$$x^2 + y^2 = r_c^2$$

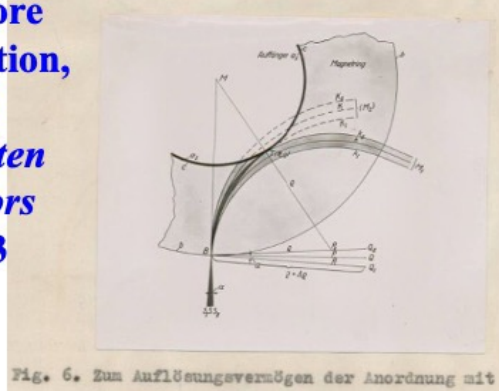


Fig. 6. Zum Auflösungsvermögen der Anordnung mit Aussenionenquelle.

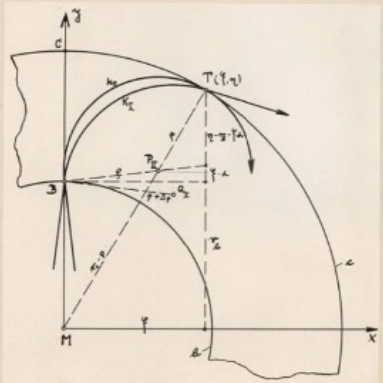


Fig. 7 Ableitung des Auflösungsvermögens.

4. ^{235}U Enrichment: Electromagnetic Separators (Calutrons)

Manfred von Ardenne. 1990. *Die Erinnerungen.* 10th ed. Munich: Herbig. p. 159

During visits to Dahlem and Lichterfelde in 1941, I had asked Professor Otto Hahn how many grams of pure uranium-235 would be needed to unleash a nuclear chain reaction in an instant. He answered me: "A few kilograms." In this absolutely confidential conversation, I expressed the opinion that it was technically quite possible to obtain uranium-235 in quantities of a few kilograms with the help of highly sophisticated magnetic mass separators (which we had previously designed and experimentally developed), if large electrical corporations were used for this purpose.

OSS. 9 June 1944. NARA RG 77, Entry UD-22A, Box Box 171, Folder 32.7003-1 GERMANY: US Wartime Positive Int. (July 42–June 44)

The Reichs Postal Administration under the direction of Pose have installed three new high tension laboratories of which the location is not known. Professors Fluegge and von Ardenn are in charge.

General Henry H. Arnold. 1949. *Global Mission*. New York: Harper. p. 491

The Germans were supposed to have perfected an electric machine which would make it possible to complete the development of the atomic bomb. I was then asked to have our bombers in England make special missions against the various branches of the Kaiser Wilhelm Institute in Berlin.

Did Germany mass-produce and use calutrons during the war?

For more information, see *Forgotten Creators* D.4.3

4. ^{235}U Enrichment: Gaseous Diffusion

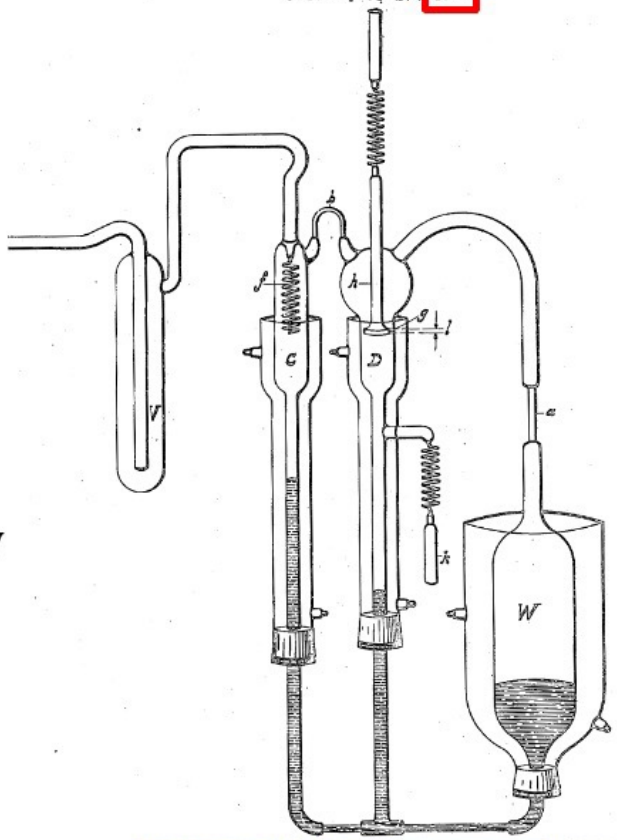
- **Gustav Hertz invented gaseous diffusion separation in 1923.**
- **Hertz (allowed to work despite his Jewish ancestry!), Erika Cremer, Erich Bagge, and others worked on high-priority isotope separation programs throughout the war.**
- **Details of their wartime work have never been publicly released. Did they help to scale up gaseous diffusion ^{235}U enrichment?**
- **Hertz also played a leading role in the postwar Soviet nuclear weapons program.**

For more information, see *Forgotten Creators* D.4.4

March 11, 1924. G. L. HERTZ 1,486,521 Klasse 12 d. Ausgegeben am 25. Oktober 1927.

METHOD OF SEPARATING GASES FROM A MIXTURE THEREOF

Filed April 17, 1923



ÖSTERREICHISCHES PATENTAMT.

PATENTSCHRIFT Nr. 107571.

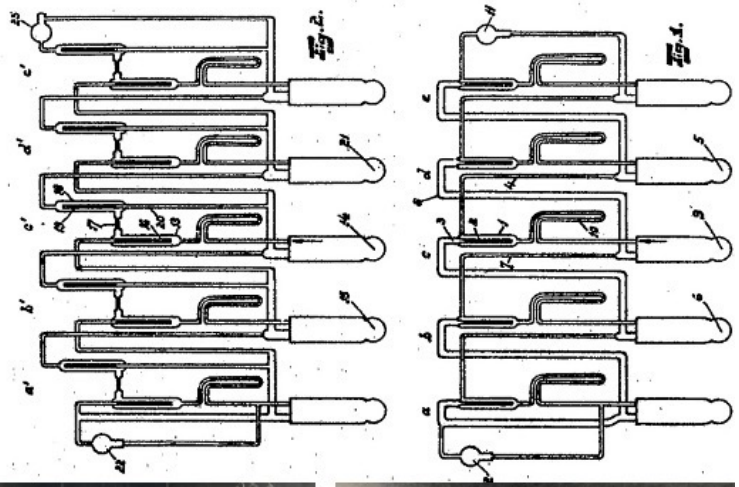
N. V. PHILIPS' GLOEILAMPENFABRIEKEN IN EINDHOVEN.

Verfahren zur ununterbrochenen Trennung eines Gasgemisches.

Angemeldet am 27. Oktober 1925; Priorität der Anmeldung in den Niederlanden vom 21. August 1925 beansprucht.

Beginn der Patentdauer: 15. Mai 1927.

Als Erfinder wird genannt: Dr. Gustav Ludwig Hertz in Eindhoven.



Deutsches Museum Archive FA 002/782

BAMAG-MEGUIN
AKTIENGESELLSCHAFT
BERLIN NW 87, REUCHLINSTR. 10-17

Einschreiben!

An das
Kaiser-Wilhelm-Institut
für Physik,
z.Hd.von Herrn Dr. Bagge,
Berlin - Dahlem.
Boltzmannstr.

Ihr Zeichen:
Ihre Nachricht vom:
Unser Zeichen: -Gd- Scho/W.
Tag: 6.10.1943.

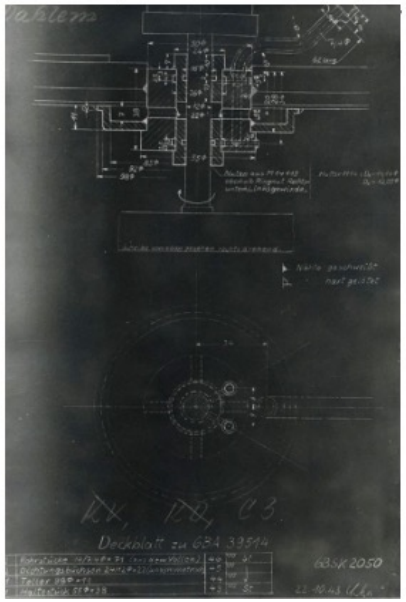
Betreff: uns. A.-Nr. 6 060 164

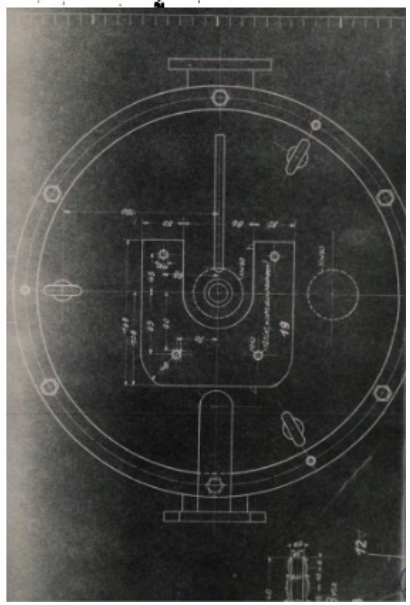
Beiliegend erhalten Sie unsere Zeichnung 6 BA 39517 über den Rotationsapparat in doppelter Ausfertigung.

Wir bitten Sie, in eine der Zeichnungen Ihre ergänzenden Eintragungen zu machen, und uns diese Zeichnung zurückzusenden.

Heil Hitler!
BAMAG-MEGUIN
AKTIENGESELLSCHAFT

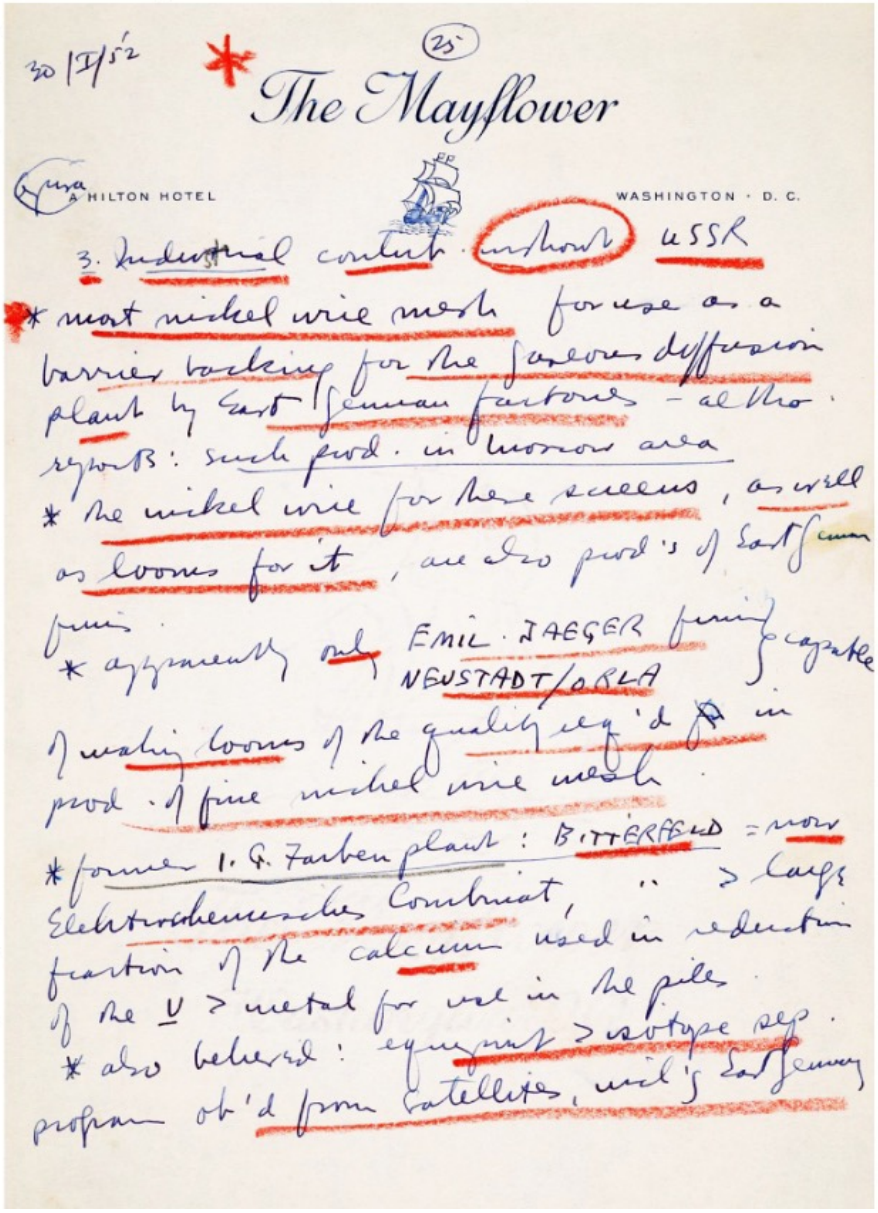
Anlage:
2 Zehng. 6 BA 39517





4. ^{235}U Enrichment: Gaseous Diffusion

Leftover wartime factories in Neustadt an der Orla, Thuringia, were already perfectly set up to make high-quality nickel filters for gaseous diffusion ^{235}U enrichment for the Soviet Union. What exactly did they do during the war?



30/IV/52 (25)

The Mayflower

HILTON HOTEL — WASHINGTON · D. C.

3. Industrial contact without USSR

* most nickel wire mesh for use as a barrier looking for the gaseous diffusion plant by East German factories - although reports: such prod. in Bitterfeld area

* the nickel wire for these screens, as well as looms for it, are also prod's of East German firms

* apparently only EMIL JAEGER firm capable of making looms of the quality req'd for prod. of fine nickel wire mesh

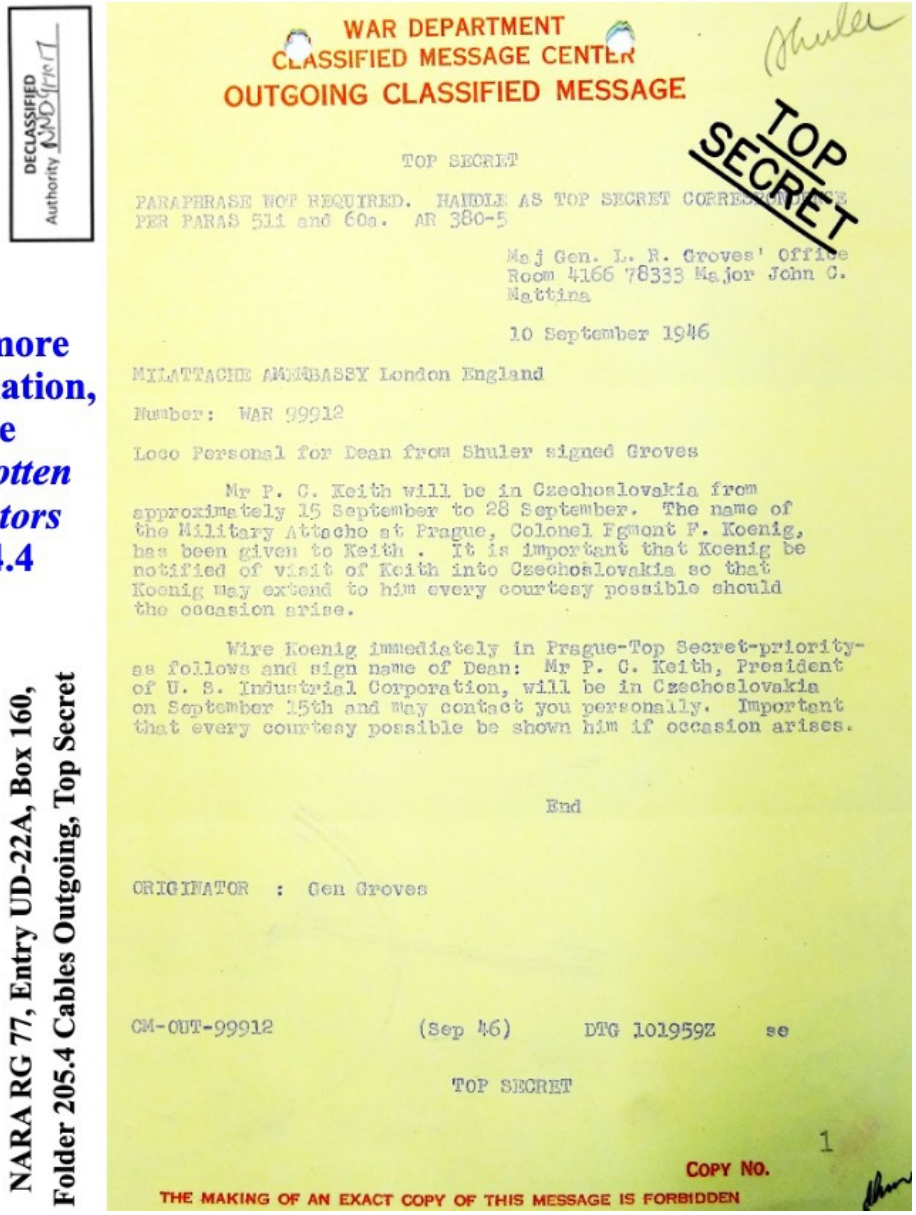
* former I. G. Farben plant: BITTERFELD = now Elektrochemisches Combinat, .. > Large fraction of the calcium used in reduction of the U > metal for use in the pile

* also believed: equipment > prototype rep. program ob'd from satellites, mil's East German

Princeton University Library, Special Collections, Moe Berg Papers (C1413), Box 20, Folder 3–Loose Notes: Central Intelligence Agency

For more information, see *Forgotten Creators* D.4.4

In September 1946, Leslie Groves sent Percival C. Keith, the chief engineer of the Oak Ridge K-25 gaseous diffusion plant, on a high-risk, two-week, Top Secret trip to Soviet-dominated Czechoslovakia. Was his mission to inspect or sabotage a former German enrichment plant?



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WAR DEPARTMENT
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Shuler

TOP SECRET

TOP SECRET

PARAPHRASE NOT REQUIRED. HANDLE AS TOP SECRET CORRESPONDENCE PER PARAS 51i and 60a. AR 380-5

Maj Gen. L. R. Groves' Office
Room 4166 78333 Major John C. Nattina

10 September 1946

MILATTACHE AMEMBASSY London England

Number: WAR 99912

Loco Personal for Dean from Shuler signed Groves

Mr P. C. Keith will be in Czechoslovakia from approximately 15 September to 28 September. The name of the Military Attache at Prague, Colonel Fgmont P. Koenig, has been given to Keith . It is important that Koenig be notified of visit of Keith into Czechoslovakia so that Koenig may extend to him every courtesy possible should the occasion arise.

Wire Koenig immediately in Prague-Top Secret-priority-as follows and sign name of Dean: Mr P. C. Keith, President of U. S. Industrial Corporation, will be in Czechoslovakia on September 15th and may contact you personally. Important that every courtesy possible be shown him if occasion arises.

End

ORIGINATOR : Gen Groves

CM-OUT-99912 (Sep 46) DTG 101959Z se

TOP SECRET

1

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THE MAKING OF AN EXACT COPY OF THIS MESSAGE IS FORBIDDEN

NARA RG 77, Entry UD-22A, Box 160, Folder 205.4 Cables Outgoing, Top Secret

4. Sites of Possible Enrichment Facilities

October 28, 1943. 493

NEW GERMAN EXPLOSIVE ** SECRET WEAPON

Dr. Berg tells me that his friends know from countless sources that several factories and hundreds of workers have been transported from the Wiesental near Bale to northern Germany. The workers' letters home are mailed from a great variety of towns-- but all these towns are on the peripherie of the Lüneburger Heide.

The story he hears is that they are all all working in vast undrground factories putting out a new explosive in aerial bombs. He has even heard that the container of the explosive is spherical.

A very large number of runways are being built in that region with calculated slowness and care to prevent detection from the air -- and these are to accomodate the planes that will eventually come to load up with the new bombs for an attack on England.

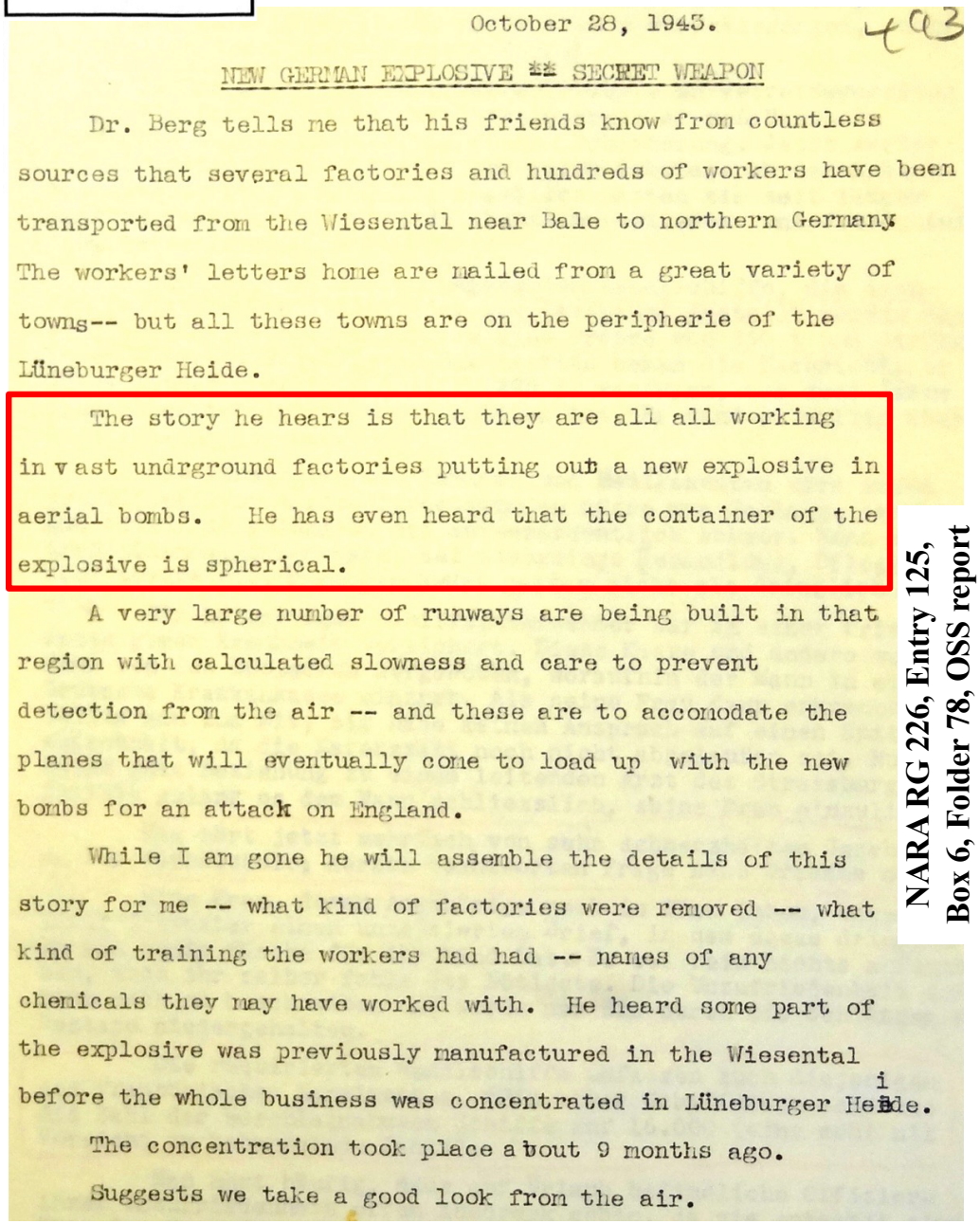
While I am gone he will assemble the details of this story for me -- what kind of factories were removed -- what kind of training the workers had had -- names of any chemicals they may have worked with. He heard some part of the explosive was previously manufactured in the Wiesental before the whole business was concentrated in Lüneburger Heide.

The concentration took place about 9 months ago.

Suggests we take a good look from the air.

NARA RG 226, Entry 125,
Box 6, Folder 78, OSS report

4. Sites of Possible Enrichment Facilities



October 28, 1943.

403

NEW GERMAN EXPLOSIVE ** SECRET WEAPON

Dr. Berg tells me that his friends know from countless sources that several factories and hundreds of workers have been transported from the Wiesental near Bale to northern Germany. The workers' letters home are mailed from a great variety of towns-- but all these towns are on the peripherie of the Lüneburger Heide.

The story he hears is that they are all all working in vast undrground factories putting out a new explosive in aerial bombs. He has even heard that the container of the explosive is spherical.

A very large number of runways are being built in that region with calculated slowness and care to prevent detection from the air -- and these are to accomodate the planes that will eventually come to load up with the new bombs for an attack on England.

While I am gone he will assemble the details of this story for me -- what kind of factories were removed -- what kind of training the workers had had -- names of any chemicals they may have worked with. He heard some part of the explosive was previously manufactured in the Wiesental before the whole business was concentrated in Lüneburger Heide.

The concentration took place about 9 months ago.

Suggests we take a good look from the air.

NARA RG 226, Entry 125, Box 6, Folder 78, OSS report

19 September 1943 OSS report: "Our sources claim that there are large explosive factories in Hiltersheim, Magdeburg district. These factories are said to have been moved here from Ludwigshafen. They are in underground, bomb-proof spaces. They are making a high-density explosive here that is supposed to have an enormous explosive effect. […] With one kilogram, everything should be literally razed away, or disintegrated to dust and ashes, within a radius of approximately four kilometers." [NARA RG 226, Entry 125, Box 6, Folder 78]

4. Sites of Possible Enrichment Facilities

October 28, 1945.

493

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NARA RG 226, Entry 125, Box 6, Folder 78, OSS report

OSS Form 69 (Revised)

OFFICE OF STRATEGIC SERVICES

OFFICIAL DISPATCH

DATE May 4, 1944

FROM MACFARLAND ISTANBUL 1944 MAY 4 16 34

X PRIORITY
ROUTINE
DEFERRED

TO OFFICE OF STRATEGIC SERVICES

Azusa file

IN-9026

DISTRIBUTION

(FOR ACTION) SHEPARDSON

(FOR INFORMATION) DIRECTOR, SECRETARIAT, MAGRUDER

U. S. GOVERNMENT PRINTING OFFICE 16—37883-1

SECRET

RECEIVED IN CODE OR CIPHER

#332. AZUSA. From Javelin to Shepardson and Cecil only.

Istanbul-London (#93)

We have been informed by Azusa-Dahlia that the component of a new explosive is being produced by the I.G. Farben factory in the vicinity of Tropau (called Opava by the Czechs). This factory has 30,000 employees. In the vicinity of Neahrisch-Ostrau (called Moravska-Ostrava by the Czechs) there is an identical factory. We evaluate the foregoing as D-3 and on April 29th, sent you Report D-1479 by pouch. Data supplied by this source regarding the Czech Protectorate is more dependable that it is for other regions.

NARA RG 226, Entry A1-134, Box 219, Folder IN AZUSA Nov. '43 Sept. '45

"Azusa" = OSS code word for German nuclear program.

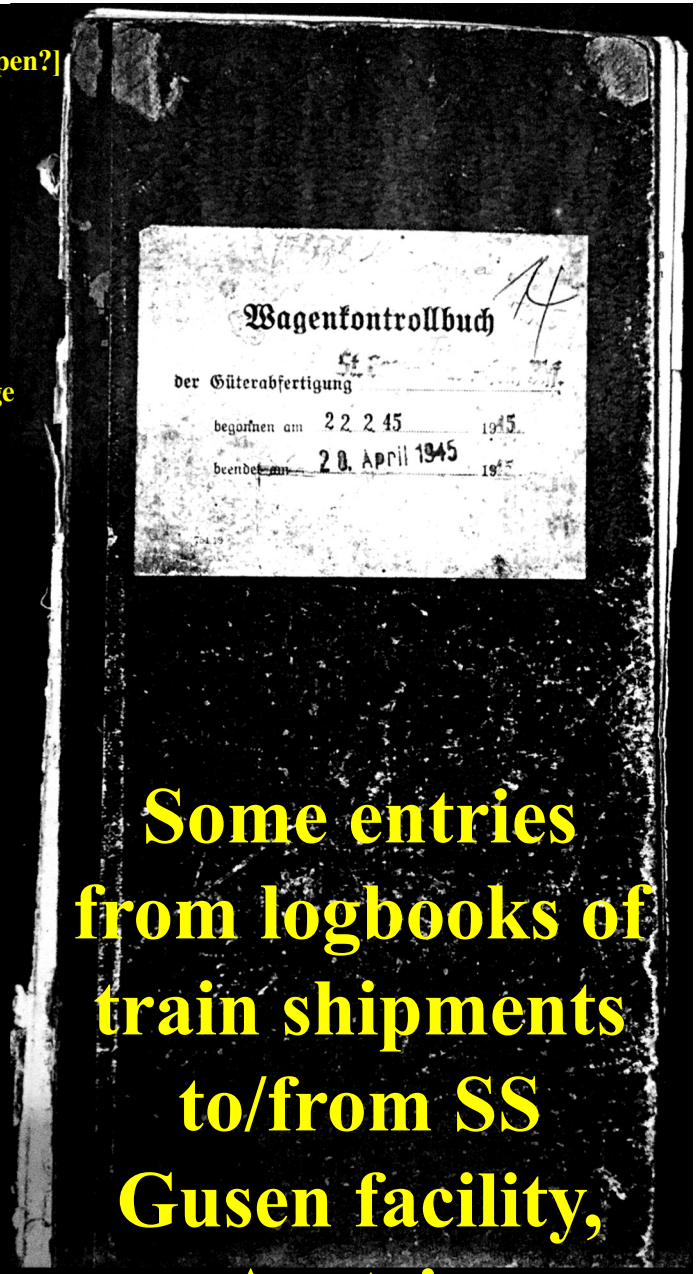
1944 Austrian train logbooks show that these locations made repeated shipments of a codenamed product to the SS Gusen facility, another suspected nuclear site.

SECRET

TOR: 5/4/44 7:36 am

19 September 1943 OSS report: "Our sources claim that there are large explosive factories in Hiltersheim, Magdeburg district. These factories are said to have been moved here from Ludwigshafen. They are in underground, bomb-proof spaces. They are making a high-density explosive here that is supposed to have an enormous explosive effect. […] With one kilogram, everything should be literally razed away, or disintegrated to dust and ashes, within a radius of approximately four kilometers." [NARA RG 226, Entry 125, Box 6, Folder 78]

[Day.mo.yr]	[From]	[To]	[Cargo (cover names)]
24.04.44	Salzgitter	Waffen SS	Atomgruppen [Domgruppen?]
26.04.44	Witkowitz	DEST	Mineralwasser
10.05.44	Oranienburg		Waffen
15.05.44	Redl Zipf	DEST	Maschinen
20.05.44	Redl Zipf	DEST	Maschinen
23.05.44	Redl Zipf	SS	Maschinen
27.05.44	Redl Zipf	Arge Mave	Pressluftrohre
06.06.44	Oranienburg		
22.08.44	Fiebinger	Witkowitz	Mineralwasserflaschen
23.08.44	Ohrdruf	Ing. Kammler	Abwasserreinigungsanlage
23.08.44	Jambes Nord (Belgien)	SSWVHA	Scharfwasser
29.08.44	Witkowitz	Eckermann	Mineralwasser
04.09.44	Ing. Kammler	Witkowitz	leere Flaschen
05.09.44	Oranienburg	SSWVHA	Maschinen
06.09.44	Oranienburg	SSWVHA	Maschinen
07.09.44	Salzgitter	Schachtbau/Böhm/Flügge	Baugeräte
07.10.44	Salzgitter	Flügge, Böhm	Baugeräte
09.10.44	Auschwitz	KZL	Unterkunftgeräte
10.10.44	Auschwitz	KZL	Effekten
11.10.44	Oranienburg	SSWVHA	E-Teile
12.10.44	Witkowitz	Eckermann	Mineralwasser
25.10.44	Nettingsdorf	Ing. Kammler	Kessel
28.10.44	Oranienburg	SSWVHA	Maschinen 2 wgs
02.11.44	Nettingsdorf	Ing. Kammler	Kessel
25.12.44	Limburgerhof	Fiebinger	Eisenteile
31.12.44	SS Führungsstab	Arnstadt	Maschinen 2 wgs
05.01.45	Auschwitz	KZL	Wehrmachtsgut 9 wgs
09.01.45	Brömme	Crawinkel	Baumaterial 3 wgs
12.01.45	Brömme	Crawinkel	Baumaterial
14.01.45	Limburgerhof	Kammler	O.V.
24.01.45	Brömme	Crawinkel	Eisenwaren
26.01.45	Oranienburg	DEST	Ersatzteile
04.02.45	Pribram	DEST	Geräte
05.02.45	Oranienburg	KDZ L	Zugladung 2 wgs
05.02.45	Berlin-Lichtenberg	Fiebinger	Eisen
09.02.45	Ing. Kammler	Kirchdorf/Tirol	Elektromaterial
09.02.45	Pribram	DEST	Geräte
22.02.45	Redl Zipf	DEST	Agelin Tank
22.02.45	DEST	Redl Zipf	Stoffflaschen
24.02.45	Ing. Kammler	Kirchdorf/Tirol	Elektromaterial
04.03.45	Oranienburg	DEST	7653069 11 wgs



Some entries from logbooks of train shipments to/from SS Gusen facility, Austria.

Rudolf A. Haunschmied,
Gusen Memorial Committee.

4. Enrichment Facilities: Many Sites, Widely Dispersed, Mostly Underground

~~SECRET~~

SIRA/L

Original Report No. FF-83

Report from Paris

O S S L O N D O N

Distribution:
G-2 FAAA
A-2 USSTAF
EWD
X-2
USEmb(G)Bartlett
WASH

Information Date : 23 August 1944
Report Date : "Recent"
Dissemination Date : 21 October 1944

Value : B-4
Source [redacted]

GERMANY: AIR-MILITARY-TECHNICAL

Atom Smashing Secret Weapon.

1. The Germans have completed a weapon which is founded on the principle of the disintegration of matter (Atomzertruemmerung). Experiments have been performed which have proved conclusive. The effect of this weapon is like that of a thunderbolt, naturally much magnified.

2. It would be possible to direct the effect of this weapon in any given direction. Possibly it is a question of a sort of a projectile rather than of a weapon properly so-called. The radius of action is supposed to be about three kilometers. The devastation produced by this weapon is said to be such that Hitler plans to use it only in the air, against planes, for example. Nevertheless, the Germans say that in case of necessity they will not hesitate to use it on the ground as well. This weapon seems to be ready, in fact, for use upon the battlefield, but it still exists only in the form of a model. Germany needs - and this appears to be absolutely certain - a delay of at least three months Practically speaking, it seems that only within five months could the weapon be ready for use.

3. Different conversations which have taken place with industrial leaders in charge of concentration of production of German war materiel give the impression that Germany has unlimited confidence in the use of this weapon, which is to bring them certain victory.

~~SECRET~~

Declassified
Authority: 25353
By: Alan Lipton Date: 12-14-2004

NARA RG 77, Entry UD-22A, Box 171, Folder 32.7003-2
GERMANY: US Wartime Positive Int. (July-Oct. 44)

4. Herr Schneider, one of the directors of the German factories called Deutsche Waffen u. Munitions-fabrik (a combine representing some fifteen factories and 250,000 workers) declared with a smile: "We shall gain the victory by new weapons, we are absolutely sure of that. Just now it is simply a case of gaining time, because the new arms will not be ready before three or four months. Bombing cannot keep us from building them. Our important factories where the assembly is carried out are all subterranean. An immense quantity of accessories is made in small lots everywhere throughout the country, so that bombing cannot interrupt the production. Our troops may retire within our frontiers. That does not matter, for nothing will be able to stand up for a ny length of time against these new weapons and we shall resume our overwhelming advance."

5 5. Directors of certain other factories have shown the same inveterate optimism, aroused by the confidence which they have in the effects of these new weapons.

6. Names of certain industrialists with whom the interviews took place:

Herr Schneider - Director of the Deutsche Waffe und Munitions-Fabrik. His German title is Wehrwirtschaftsbeauftragter (Superintendent of Armament Production) in the region of the Duchy of Baden and Wurtemberg. He has charge of the plants of the Karlsruhe region.

Director Dr. Buesse, who directs the DWM factories at Karlsruhe.

Dr. Quant, Administrator of a part of the DWM combine of factories.

JHM/jd

During the final year of the war, all of Oak Ridge (labs + town) consumed an average of 0.189 GW of electrical power.

Manhattan District History. Book I, Volume 12, Part 2, Appendix C-7.

ELECTRIC POWER CONSUMPTION AND COSTS

CLINTON ENGINEER WORKS

OCTOBER 1943 THROUGH DECEMBER 1946

Period Ending	KWH Consumed	KW Demand	Total Costs
1 November 1943	3,912,040	11,400	$ 18,834.08
1 December 1943	9,105,000	18,300	34,171.50
1 January 1944	8,365,000	18,300	33,061.50
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1 March 1944	17,105,000	31,200	60,103.50
1 April 1944	27,665,000	48,600	94,735.50
1 May 1944	33,970,000	64,500	121,365.00
1 June 1944	41,478,000	73,800	142,671.00
1 July 1944	39,870,000	98,200	166,611.00
1 August 1944	46,140,000	104,200	182,496.00
1 September 1944	52,610,000	125,900	215,637.00
1 October 1944	63,280,000	144,450	251,676.00
1 November 1944	77,700,000	187,760	320,080.80
1 December 1944	90,370,000	222,050	376,119.00
1 January 1945	107,010,000	236,900	417,117.00
1 February 1945	123,668,000	242,633	448,295.64
1 March 1945	117,442,000	253,047	450,203.76
1 April 1945	150,950,000	290,487	540,900.96
1 May 1945	166,170,000	263,626	534,721.08
1 June 1945	179,160,000	269,866	560,945.28
1 July 1945	184,350,000	283,840	583,822.20
1 August 1945	198,870,000	291,800	614,199.00
1 September 1945	200,000,000	298,627	623,267.16
1 October 1945	117,920,000	292,867	493,926.36
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1 December 1945	48,020,000	122,347	204,914.76
1 January 1946	63,620,000	145,100	252,888.00

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The Greater German Reich produced at least 22 GW of power. Including all other countries aiding Germany, the total was probably around ~44 GW.

United States Strategic Bombing Survey. 1947. *German Electric Utilities Industry Report.* p. 4.

BRIEF REVIEW OF THE ELECTRIC UTILITY INDUSTRY IN GERMANY

GENERAL.

1. Prewar Germany (including Austria and Sudeten territory) with a population according to 1939 census of 79,400,000 people and occupying an area of about 225,000 square miles, was largely industrial.

2. The principal industrial centers were:

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Other documents indicate that German enrichment was more efficient than Oak Ridge (centrifuges) and German bombs were more efficient than Little Boy (implosion), so Germany needed much less power than Oak Ridge.

4. Examples of the Generation of Large Amounts of Electrical Power for Secretive Purposes

SECRET

3 April 1944

Summary of Information

Germany: Silesian Synthetic and Power Plants.

1. A synthetic petrol plant has been built at Blechhammer. A power station of 100-250,000 KW is under construction.

2. A power station of about 260,000 KW is being built for the I.G. plant at Oswiecim. A 110 KV H.T. transmission line has been erected between Chorzow Malobadz and Jaworzno. Under construction there is a 110 kW line from Laziska to Oswiecim and from Jaworzno to Oswiecim.

3. The Schaffgott'che Oderthal power station had an output of 17 million k Wh in February. A total of 310 million kWh passed through Oderthal transformers for EWAG in 1942. From this the PE v received 105 million kWh. In February the EWAG received 31.5 million kWh of which 11.4 were OE v.

4. A new 40,000 kW turbo-generator has been mounted in Chorzow.

5. Four turbo-generators of 50,000 kW combined capacity have been installed in the Tarnow district, probably at Roxnow.

The information concerning the power lines to Oswiecim is confirmed by a recent report that the I.G. plant there was to be supplied with power from the Oberlasisk power station.

The extra power requirements in the Chorzow and Tarnow districts may be partly explaines by the new nitrogen plants there.

For purposes of comparison the power plants of other synthetic oil plants are estimated as follows:

SECRET

Blechhammer N.	250,000 kw
S.	300,000 "
Böhlen	390,000 "
Bottrop Welheim	100,000 "
Deschowitz	75,000 "
Ruhland Schwarzheide	60,000 "
Pölitz	300,000 "
Scholven	110,000 "
Syerkrade Holten	80,000 "

Germany: Blechammer (Censorship)

In early November there was a big explosion in the works which killed several people.

Germany: Blechammer (British P/W)

Informant had worked at I. G. Heydebreck until November 1942. He only did odd jobs in the Siemens section of the factory which made gas producer generators. The main factory made synthetic petrol and 15-20 tank wagons left the factory daily.

Germany: Reported Synthetic Oil Plant at Urdinger (Air Rec)

"The only significant new construction visible on available photographs of Krefelt/Urdingen, is the Plant near the I.G.F. works. The purpose of this plant is at present unknown and the plant itself appears quite unlike an oil plant. The surrounding district has also been examined, but no possible synthetic oil plant is present.

There may be a plant two or three miles distant from Krefeld/Urdingen, which has not been covered by photographs. If so the name will be misleading. It might however refer to an office address for a plant outside of town."

From : MID Military Attache Report, London - 1 Feb 44.
Incl. dated 10 Jan 44. Enemy Oil Intelligence Committee

NARA RG 77, Entry UD-22A, Box 170,
Folder 32.60-1 GERMANY: Summary Reports (1944)

4. Examples of the Generation of Large Amounts of Electrical Power for Secretive Purposes

Buna IV to Otto Ambros regarding I.G. Farben Auschwitz, 11 January 1941. *Trials of War Criminals Before the Nuremberg Military Tribunals.*

In addition, the water situation is very favourable because the draining works can be placed below the confluence of the Weichsel [Vistula], Przemsza, and Sola Rivers and sufficient water will be available, even with minimum outflow. […] Coal can be procured from 3 sides; to wit, the Cracow district, the central district, and the coal deposits southwest of the building site, where the new Brzeszcze and Jawiszowitz shafts of the Hermann Goering Werke are located, and from the Silesia Shaft, near Dzieditz[....]

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The Puzzle of Podmokly. *Time*. 12 November 1945.

When the Germans came to Podmokly (which they called Bodenbach) they seized the Krizek Works, Czechoslovakia's largest producer of copper wire, the area was rich in coal and hydroelectric power, and had excellent communication facilities. Later they imported French, Belgian and Russian laborers, and set them to work expanding the Krizek plants. Laboratories were built, buildings enlarged, new units erected. One of the new units was put underground, and was supersecret. It was known simply as "the Weser."

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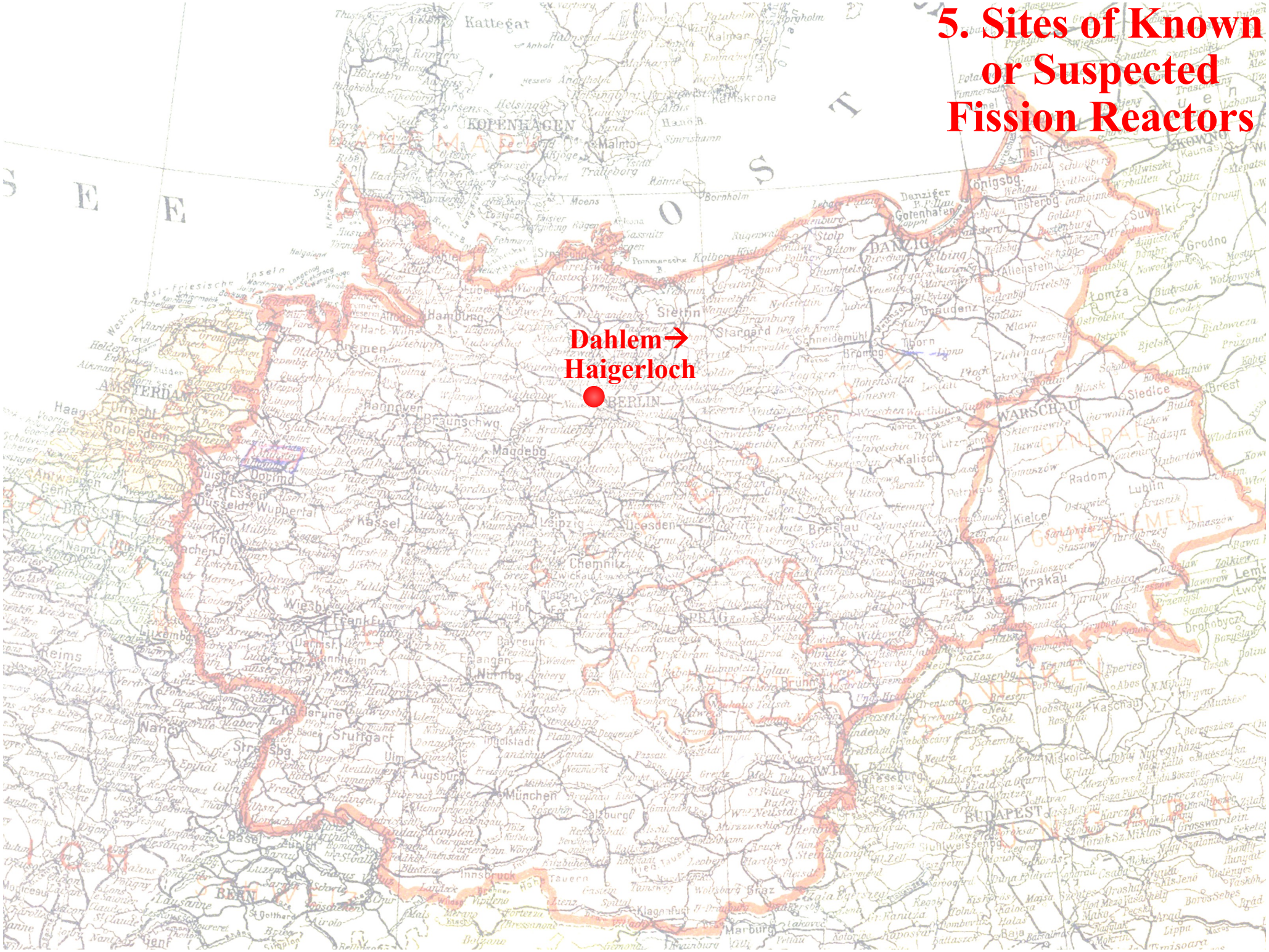
F. A. Duwell. 5th Army POW Cage. 7 November 1944. AFHRA A5417 pp. 966-967

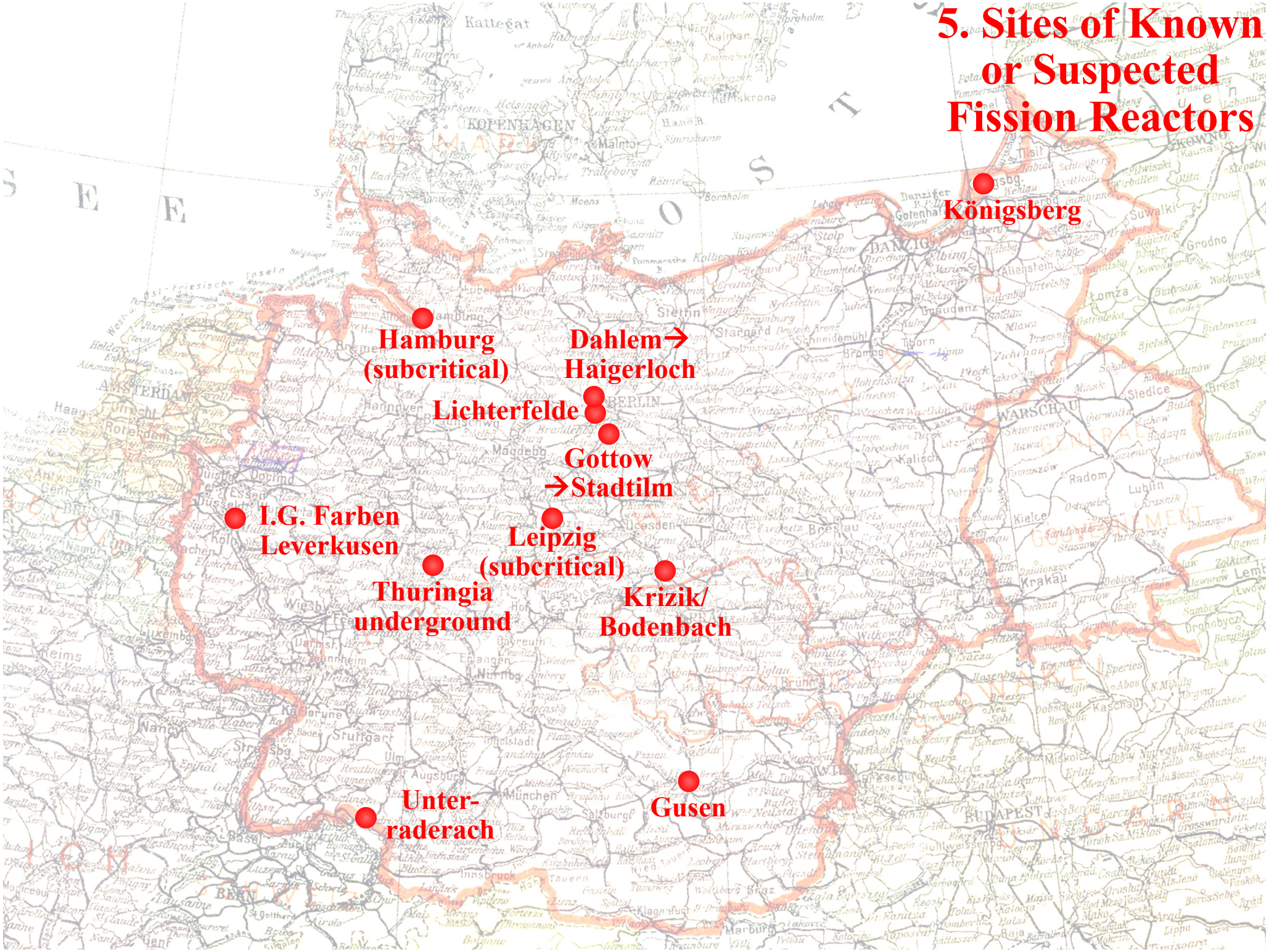
P/W claims that a number of underground factories are located between LANDSBERG and SCHONGAU on the west side of the RR line and main highway in a heavily wooded area. […] He had his information from members of Organization TODT, who had helped with construction there. […] Along the river LECH between LANDSBERG and SCHONGAU four electric power stations are located. [...]

<u>Dynamite A.G. Kaufering at Landsberg</u>

This plant was begun in 1939-40 and at that time curious civilians were informed that they need not be concerned as the project was of little importance. However, this did not quiet the suspicions that something highly secret was being performed, suspicions that are still rife today. In May 1943 there was a sudden increase in activity after which time the place was put under heavy guard. The entire complex is set in the woods and is heavily camouflaged. An extensive network of roads was built into and through the woods. P/W knew that about 30 large tanks were partially buried near the factory, painted green on top, and covered over with trees and shrubs. He also knew that […] some sort of munitions were being manufactured. He describes the location as being at approximately 48 degrees 04'N -- 10 degrees 50'E.

5. Sites of Known or Suspected Fission Reactors




5. Sites of Known or Suspected Fission Reactors
Königsberg
Hamburg (subcritical)
Dahlem→ Haigerloch
Lichterfelde
Gottow →Stadtilm
I.G. Farben Leverkusen
Leipzig (subcritical)
Thuringia underground
Krizik/ Bodenbach
Unter-raderach
Gusen

H. K. Calvert. 29 January 1945. NARA RG 77, Entry UD-22A, Box 171, Folder 32.7003-3 GERMANY: US Wartime Positive Int. (Nov. 44–June 45).

At the LEVERKUSEN I G Farben Works, PW learned through an uncle, who is a director, that a special department has been installed in concrete structures like pillboxes, to which access is gained only through special passes, even high-ranking officers being refused admission under a special order issued 18 Nov by factory police. There is heavy A.A. defence of all calibers, and the general belief is that experiments are being made with special weapons of some kind.

[I. G. Farben was also producing uranium hexafluoride, heavy water, graphite, aluminum, calcium, etc.]

S. McClintic. 6 January 1945. AFHRA A5734 pdf p. 1092.

At UNTERRADERACH, near FRIEDRICHSHAFEN, there is a large semi-underground factory which was constructed early last winter where strange experiments were taking place. Heavy clouds of smoke filled the sky in the day and at night a red glow. The experiments caused the earth to shake. These experiments are with atoms and when the experiments proved successful the plant went into operation. Workmen were not allowed to leave the factory.

Gerhard Dessauer to Leo Szilard. 6 July 1942. NARA RG 77, Entry UD-22A, Box 171, Folder 32.7003-1 GERMANY: US Wartime Positive Int. (July 42-June 44).

I learned that the chain reaction of the uranium isotope is now successful. It is not explosive, but there is now the prospect of technical utilization.

MED Foreign Intelligence. 3 April 1944. Activities from 13 March to 31 March 1944. NARA RG 77, Entry UD-22A, Box 170, Folder 32.60-1 GERMANY: Summary Reports (1944).

Mr. Chapin reported successful detection experiments and requested aircraft study.

5. Sites of Known or Suspected Fission Reactors

Königsberg

Wolfgang G. Schwanitz. *H-Soz-u-Kult, H-Net Reviews.* Feb. 2009.

After 1945 the Grand Mufti said that the enemy espionage by "Jewish, English and American intelligence services" caused "the greatest damage." They were able to discover the locations of "atomic reactors" in East Prussia.

RAF Bomber Command. Campaign Diary. webarchive.nationalarchives.gov.uk/ukgwa/20070706054833/http://www.raf.mod.uk/bombercommand/aug44.html

29/30 August 1944 189 Lancasters of No 5 Group carried out one of the most successful No 5 Group attacks of the war on Königsberg at extreme range. Only 480 tons of bombs could be carried because of the range of the target but severe damage was caused around the 4 separate aiming points selected.

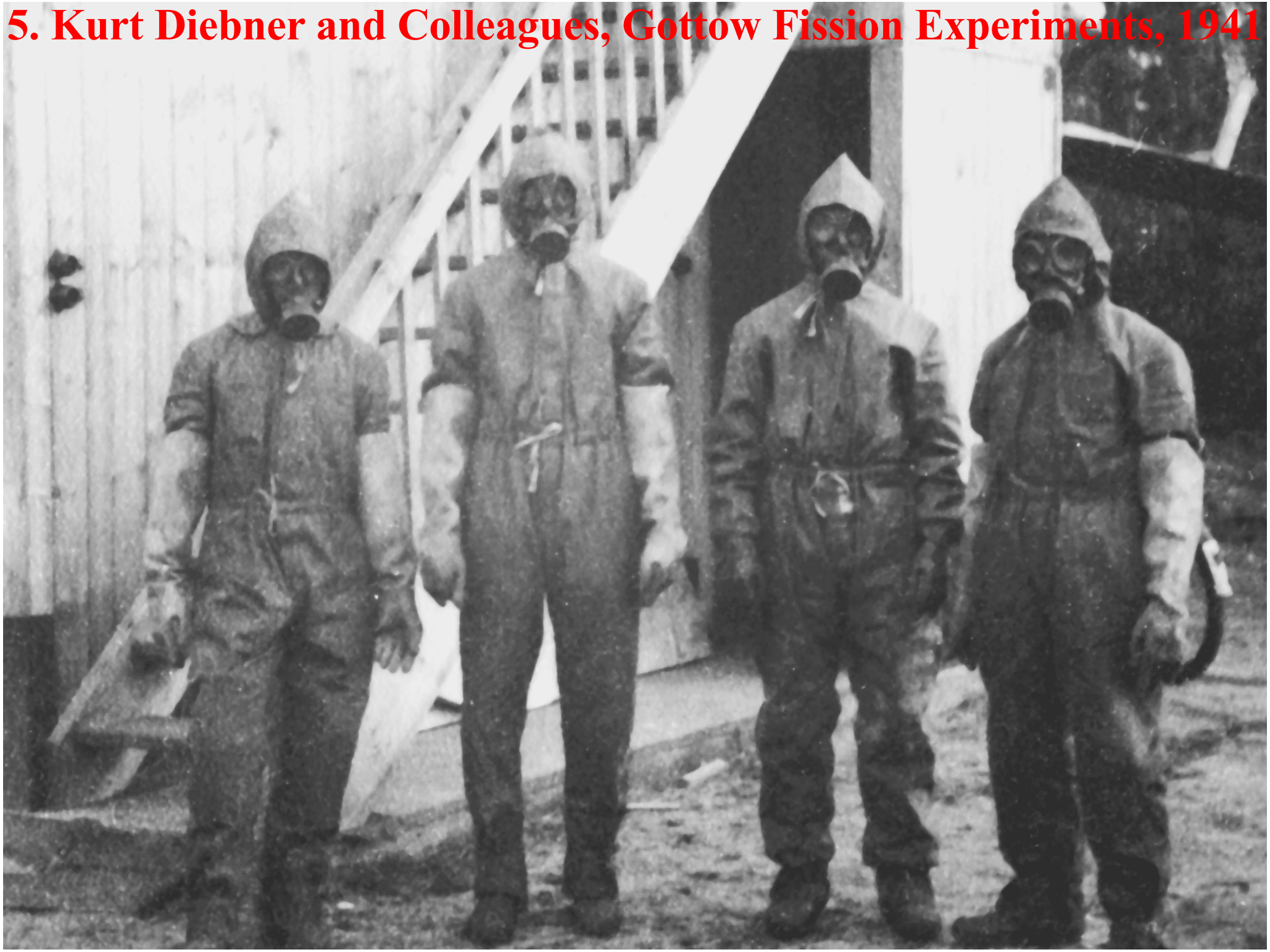
Joint Intelligence Committee. Exploitation of German Scientists and Technicians. 5 January 1946. J.I.C. 317/10. Appendix C. [NARA RG 218, Entry UD-1, Box 475, Folder CCS 471.9... (5-1-45)... Sec. 3.

Practically the entire staff of the German "URANMOTOR" Project at KRIZEK in Czechoslovakia under Prof. HUETTIG is working for the U.S.S.R.

NARA RG 319, Entry A1-134B, Folder Focke, Franz.

[T]here was once a report of an atomic pile operated by Russians at Bodenbach, CSR[….]

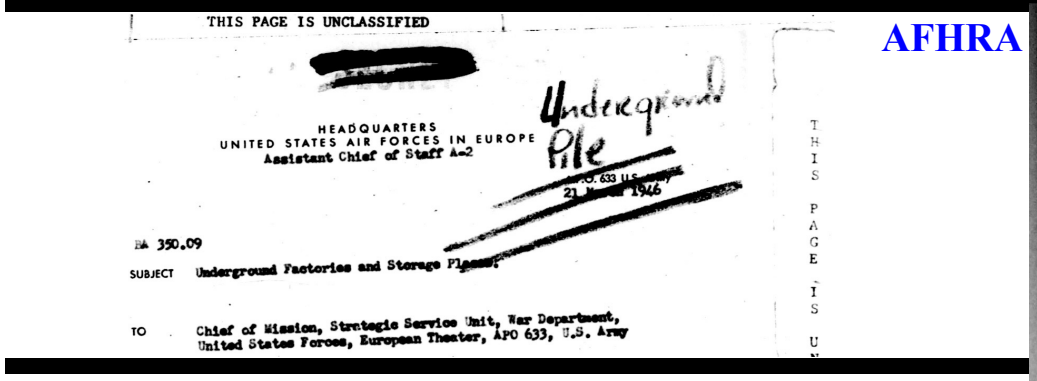
5. Kurt Diebner and Colleagues, Gottow Fission Experiments, 1941



5. Sites of Known or Suspected Reactors: Gusen, Austria

15 March 1945 U.S. aerial surveillance photo of underground reactor complex (?) under construction or operational

16 April 1945 U.S. aerial surveillance photo of underground reactor complex (?) sealed before U.S. forces arrive



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HEADQUARTERS
UNITED STATES AIR FORCES IN EUROPE
Assistant Chief of Staff A-2

Underground
Pile

APO 633 U.S. Army
21 January 1946

AA 350.09

SUBJECT: Underground Factories and Storage Plants

TO: Chief of Mission, Strategic Service Unit, War Department, United States Forces, European Theater, APO 633, U.S. Army

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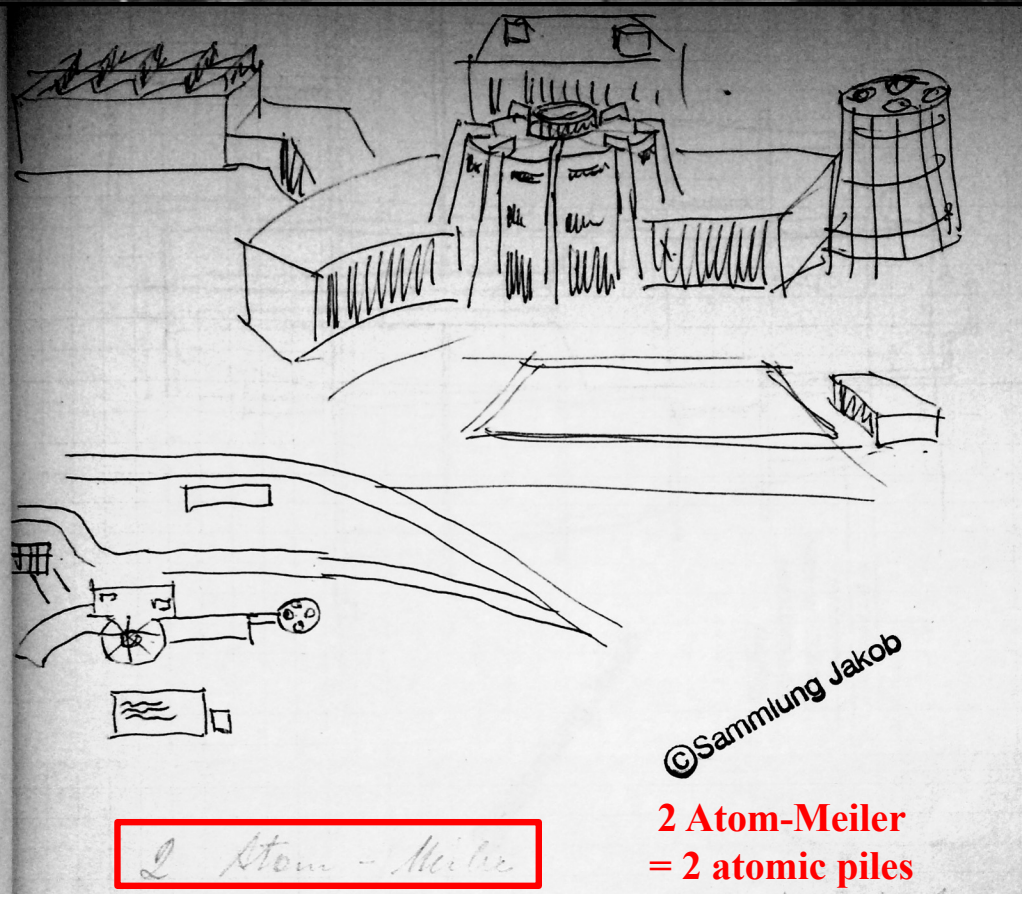
AFHRA

Walter Chmielewski, son of Gusen commandant, 2016:

There was the precise talk of a total (of about) 30–40 kilometers of tunnels which have been created and partly in fact on two levels. This came through in talks with SS people and there is now nuclear research being carried out there. Under high pressure there is research, which could still save the nation, so to speak; the atomic bomb could be constructed, so that the initiative can be recovered again, yes. This was clearly stated in conversations in Gusen, that this research is already taking place.



2 Atom-Meiler
= 2 atomic piles

5. Requirements for a Breeder Reactor

Characteristic	Approximate value (scales linearly)
Thermal power	25 MW
Reactor core volume	100 m^3
Moderator	150 tons of graphite, or 80 tons of heavy water, or some of both
Natural uranium in reactor	25 tons
Replace uranium every	100 days
Uranium consumption rate	91 tons/year
Plutonium production rate	6.9 kg/year (~1 bomb/year)
Cost (1940s U.S. dollars)	$6,000,000

Based on: Office of Technology Assessment. 1977. Nuclear Proliferation & Safeguards. NTIS Report PB-275843. Appendix Vol. 2.

6. Breeding ^{239}Pu or ^{233}U in Electronuclear Systems

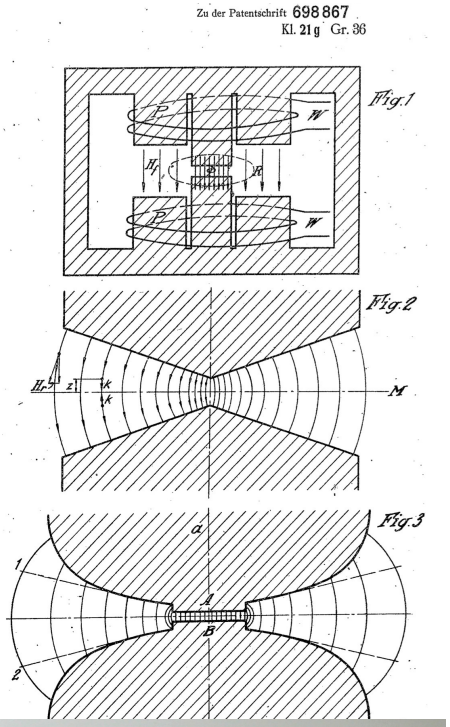
Rolf Wideröe (1902–1996)

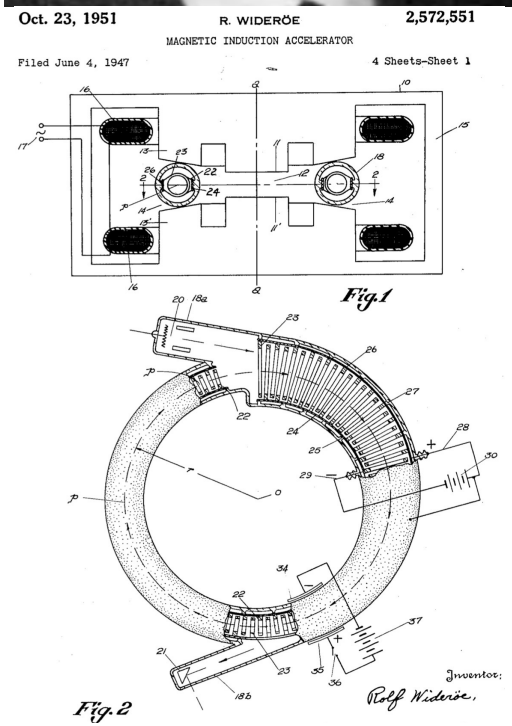
Invented & developed particle accelerators (1923–)

NARA RG 319 Entry NM3-82A, Box 6, Folder ALSOS G-20

DECLASSIFIED
Authority NND 753001

Max Steenbeck (1904–1981)
Invented & developed particle accelerators (1927–)





Dr. Rolf Wideröe
Hamburg-Fuhlsbüttel

Hamburg, den 4. 12. 1944

Reichsforschungsrat
Leiter der Fachgruppe Physik
Eingang 15/12/44 Nr. 1919
Anlagen beantwortet 4715

Herrn
Professor Dr. W. Gerlach,

(13b) München 22
Ludwigstrasse 17

Sehr geehrter Herr Professor,

wir haben bei unseren Arbeiten eine Beobachtung gemacht, die ich Ihnen möglichst schnell berichten möchte:

Während des letzten Monats haben wir mit ziemlich starken Strahlintensitäten gearbeitet. Während dieser Zeit habe ich, nach unseren bisherigen Messungen gerechnet, wohl einige r[illegible] bekommen (Dr. Kollath etwas mehr). Diese Dosen sollten viel zu klein sein, um biologische Wirkungen hervorzurufen.

Bei der letzten Blutuntersuchung zeigten sich indessen bei mir deutliche struktuelle Veränderungen der Leucocyten. Dr. med. Kruse (Krankenhaus St. Georg) hat uns untersucht und verfolgt den weiteren Verlauf dieser Erscheinungen.

Die Erscheinung kann nur dadurch erklärt werden:

1) Daß unsere Meßinstrumente doch zu wenig angeben (überschlägige Berechnungen ergeben den Faktor 3 zu wenig)
2) Daß unsere Strahlung wesentlich stärkere biologische Wirkungen haben muß, als man annehmen sollte.

Wir bitten Sie, dies Erscheinungen den anderen mit ähnlichen Geräten arbeitenden Herren mitzuteilen, um Schäden durch Unvorsichtigkeiten zu vermeiden. Wir selbst werden sofort Maßnahmen zur Herabsetzung der Strahlengefahren vornehmen.

Mit freundlichen Grüßen

R. Wideröe

P.S. Wir erwarten in den nächsten Tagen den Besuch von Prof. Dänzer und Gentner, die verschiedene Fragen über die Elektronenschleudern mit uns besprechen wollen.

6. Breeding ^{239}Pu or ^{233}U in Electronuclear Systems

Germany produced particle accelerators from the Netherlands to Czech territory for a secret, high-priority program

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Werner Grothmann, 2002, Jonastalverein Archive, Arnstadt, p. 41:

It was attempted to produce plutonium without having a reactor. […] In the summer of 1944, when the uranium program had already been developed properly, decisive measures were taken, because there was evidence that plutonium could be produced, albeit with difficulty and in very small quantities. It was Himmler who commissioned us to use our technical capabilities to build the first machines for it. The construction drawings for it were not from our [SS] people. […] In addition, the Reichspost had its own very secret research facility nearby, but I do not know anything about it. The equipment for the plutonium matter was manufactured by Austrian companies and in the [Czech] Protectorate. This was so because Austrian scientists had better contacts to their own companies, which did excellent work by the way. The operation of the facility was supposed to be organized such that we [SS] provided the facility and also the construction of the underground rooms. The technicians there should operate them for us and Ohnesorge's people would provide the technical supervision. […] After the war I heard that we had material for one or two plutonium bombs.

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Georgy Flerov, 1983 interview, www.gornictwo.walbrzych.pl/news-91-Tajemnice_kopalni_Walbrzycha.php:

Nobody knows everything, because the Germans destroyed a lot of documents and experimental materials, and the Allies, the Americans, took a lot. […] I was in Waldenburg, but just before I came back from Germany to Moscow. […] Stalin and Kurchatov sent me there. There were reports that the Germans were conducting atomic tests. I went there as a representative of the Ministry of Light Machines. It turned out on the spot that the Germans were more advanced in the tests than one could have imagined. […] I found out that in Dresden the "Service" [NKVD] had captured a German scientist, a physicist, who told me about secret experiments in Waldenburg, so I took him with me and we went there, but he knew too little. […] You see, the Germans had a lot of research groups. My German worked in an institute in Dresden that belonged to the Postal Ministry. He was in Waldenburg only one time to install equipment, because that institute belonged to the SS. […] He was there only once. The car that carried him from the railway station drove around the city for a long time until the German had forgotten the way. Then they drove into the mine and drove him underground. He sat there for two days, worked, ate, and slept underground. When he finished, the car drove him around the city again, before he reached the station. And that is why the German could not find anything with me. […] He said that when he was there for the first time he was also afraid. He said that SS people were guarding everywhere; he described them as "sharp." He said they had strange emblems on their uniforms that he had never seen before. […] He said that with his colleagues he had installed a cyclotron there, but it turned out that it was the second one, because one was already there. They installed the second one. He told us that the mine had been specially adapted. There were trolleys, tables, all the necessary equipment, and at the entrances there were locks and guards. He could not enter because he did not have a special pass.

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Air Raid, Sabotage Held Up Nazi Work on Atomic Bomb, AP 1945:

PRAGUE, Aug. 23---(AP)---A shattering American air raid, Czech sabotage and an accident frustrated German experiments in Czechoslovakia seeking to develop an atomic bomb, newspaper accounts said here today. A German engineer named [W.] Isenbeck worked with the problem of releasing atomic energy in a radio plant at Vysocany, the accounts said. A blast and fire at the plant in 1943 followed by an American raid [25 March 1945] halted work soon after the plant resumed operations. Some mysterious apparatus was dispatched to the Imperial Research Institute in Berlin, but Czech workers believed they managed to damage the delicate mechanism before it was shipped, the stories said.

Georgy Flerov, 1983 interview, www.gornictwo.walbrzych.pl/news-91-Tajemnice_kopalni_Walbrzycha.php:

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6. Requirements for an Electronuclear Breeder

$$\text{Production rate} = 3.15\times10^{4}\ \frac{N\ I\ \eta\ A}{e\ N_A}\ \frac{\text{kg}}{\text{year}}$$

N = number of particle accelerators
I = beam current per accelerator
η = number of bred atoms per accelerated charged particle
A = atomic mass of product
$e = 1.602\times10^{-19}$ Coulombs/proton
$N_A = 6.022\times10^{23}$ Avogadro's number

$$\text{Production rate} = \begin{cases} 0.78\ \text{kg/year}\ ^{239}\text{Pu or} \\ 0.76\ \text{kg/year}\ ^{233}\text{U or} \\ 9.8\ \text{g/year tritium} \end{cases}$$

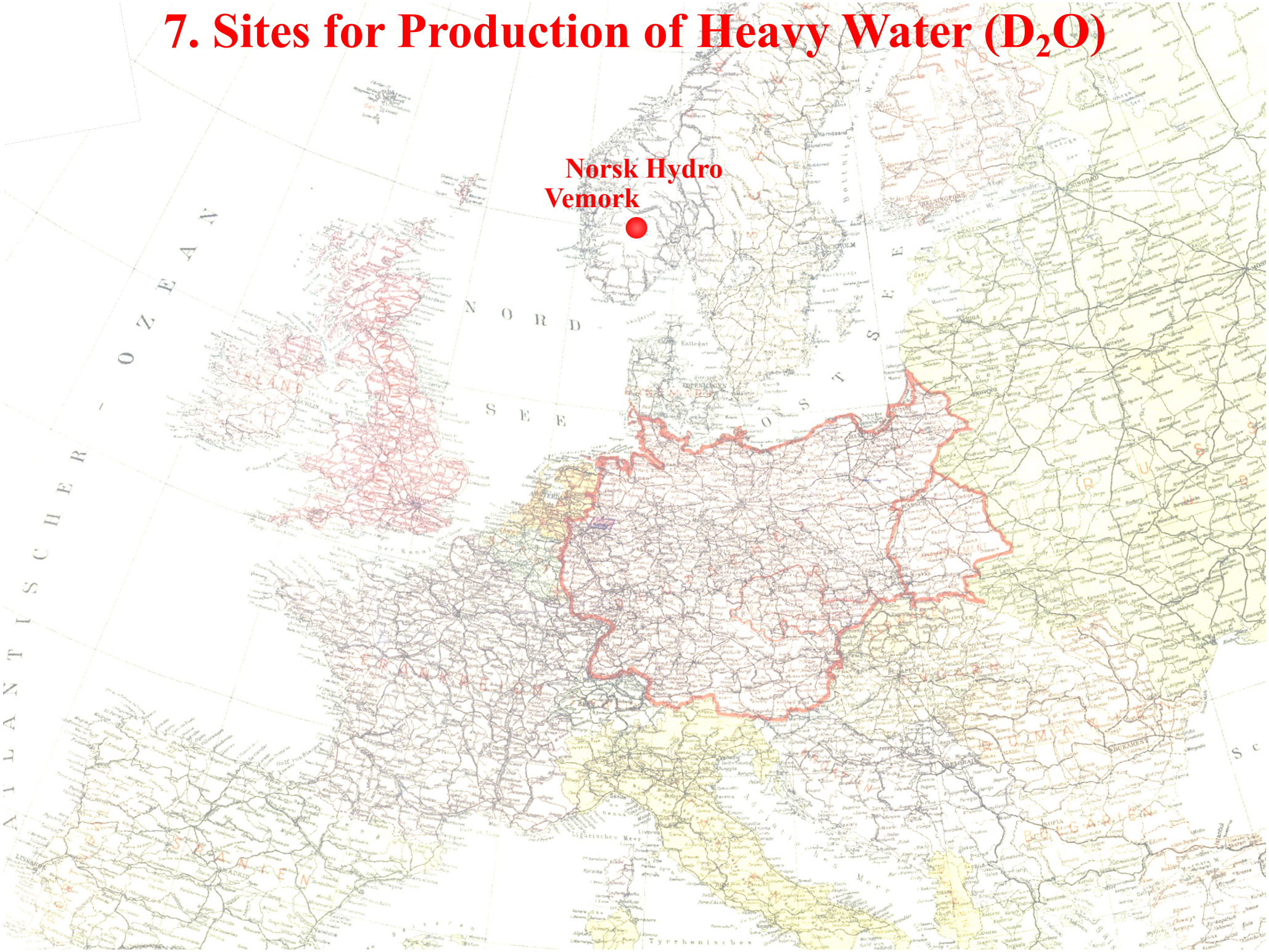
For N=10 accelerators, $I = 10^{-3}$ Amp, and η = 1 bred atom per accelerated particle

Higher production rates are possible:

- The German program could have built and operated more than 10 particle accelerators in parallel. (The United States built and operated 3120 calutron ion beams at Oak Ridge for ^{235}U enrichment.)
- Increasing the beam current by a factor of 2 or 3 would increase the amount of bred fission fuel by the same factor.
- If the accelerators began operation two years before the end of the war, twice as much fuel could have been produced.
- The efficiency could be as high as η ~ 100 by using the highest possible beam energy, using charged deuterons for the beam, and employing a neutron-multiplying target. A neutron-multiplying target would essentially be a small, subcritical fission reactor, for example chunks of unenriched uranium metal immersed in heavy water and surrounded by a beryllium reflector.

See for example: Chichester, David L. 2009. *Production and Applications of Neutrons Using Particle Accelerators.* INL/EXT-09-17312. Idaho Falls: Idaho National Laboratory. https://inldigitallibrary.inl.gov/sites/sti/sti/6302373.pdf
Kemp, R. Scott. 2005. Nuclear Proliferation with Particle Accelerators. *Science and Global Security* 13:183-207. http://scienceandglobalsecurity.org/archive/sgs13kemp.pdf

7. Sites for Production of Heavy Water (D_2O)



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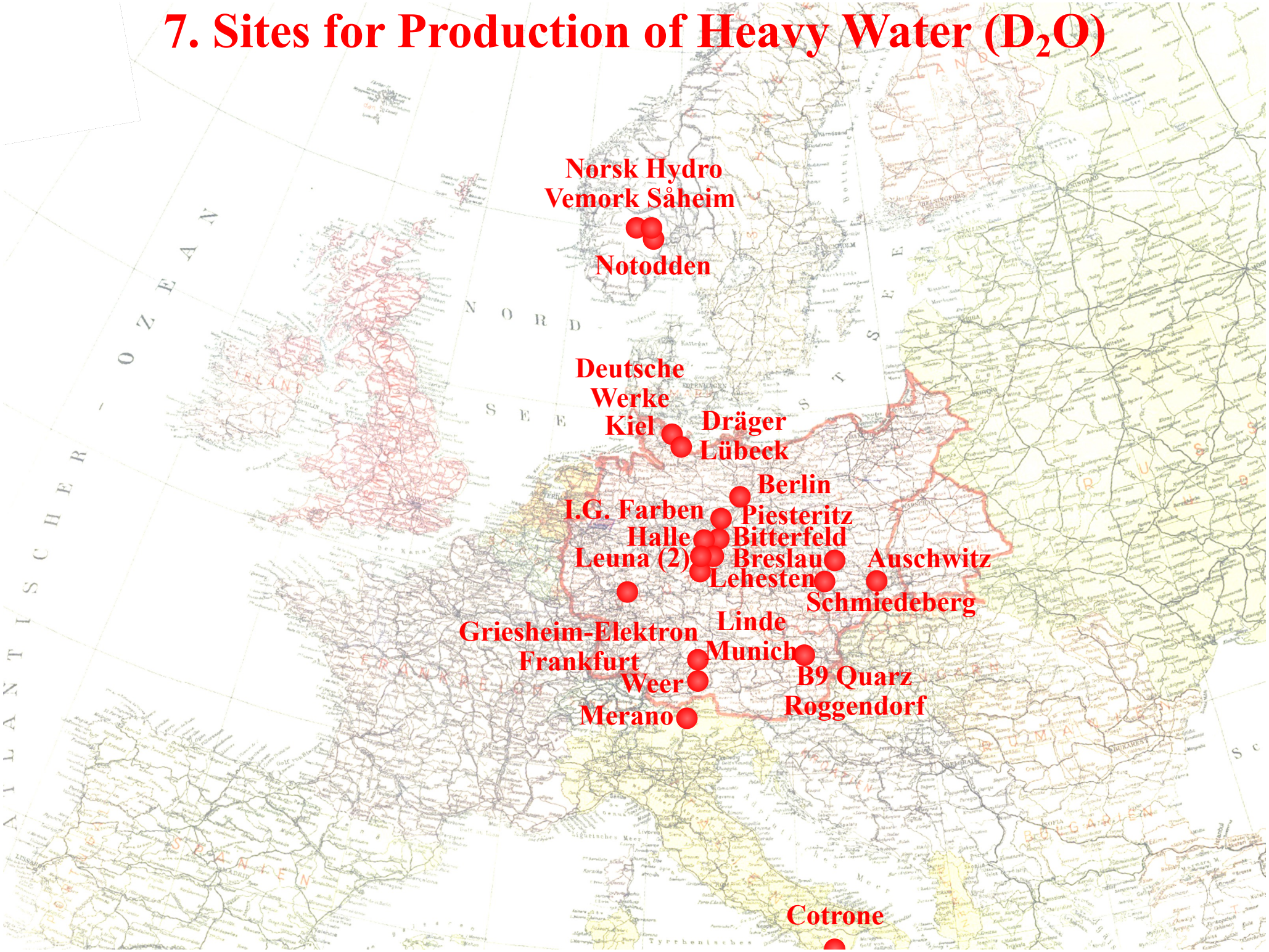


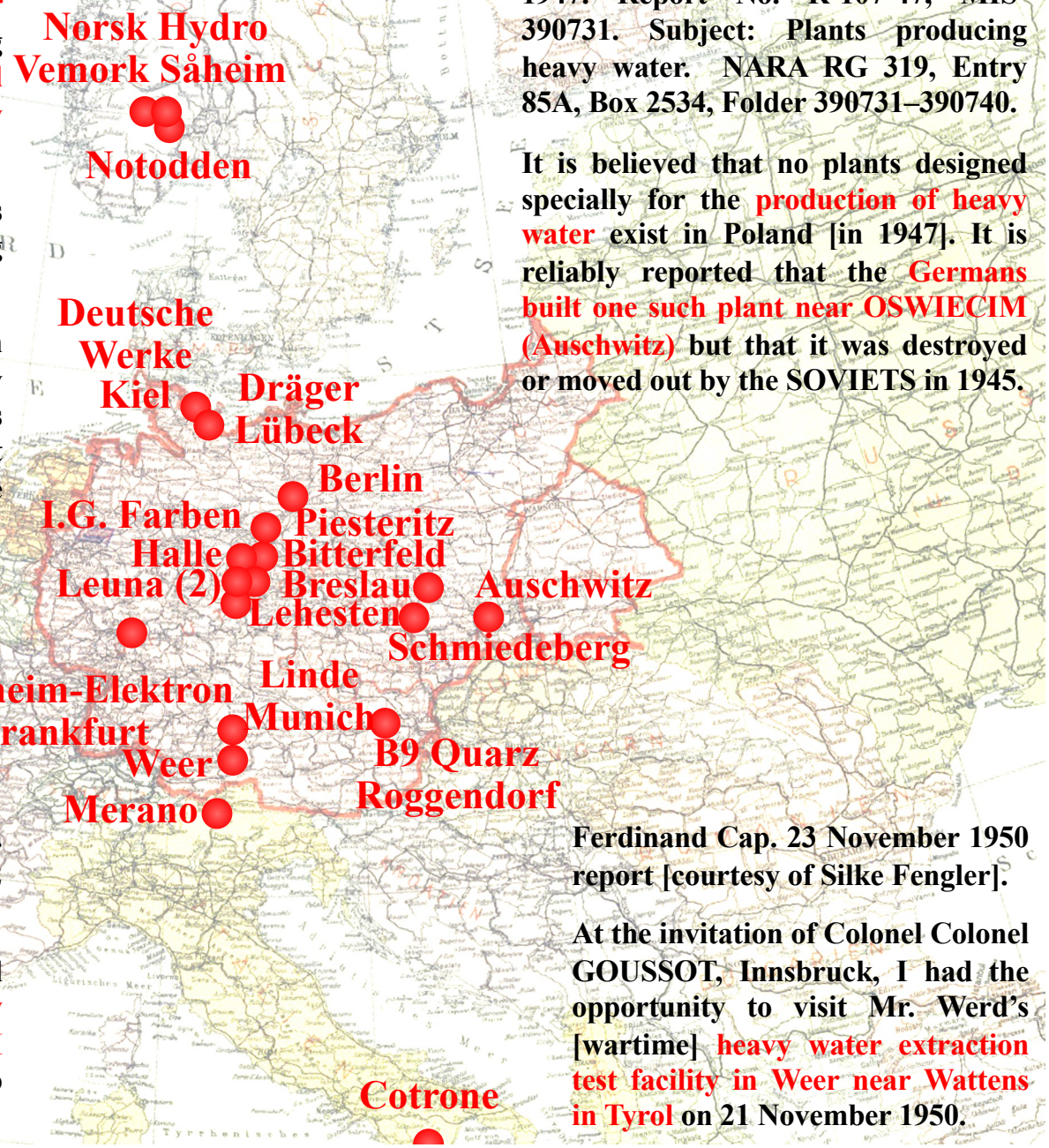
7. Sites for Production of Heavy Water (D_2O)

Charles Chamberlain. Reveal Allied Capture of Nazi Atom Factory. Chicago Daily Tribune. 9 August 1945 p. 4.

KIEL, Germany, Aug. 8 (AP)–The largest heavy water plant in Germany, where Nazi scientists were working feverishly to perfect an atomic bomb, was captured almost intact by the allies three months ago in a heavily wooded section four miles from Kiel.

Cobwebs of plastic pipes connected eight huge vats holding thousands of gallons of plain water for processing into heavy water.

I stumbled onto the factory two weeks after it was taken over by American and British technicians. Altho they gave me freedom to roam around the grounds, I was called on the carpet the next day for entering without authority from high officials and was required to pledge not to reveal what I had seen until it was released.



U.S. Embassy, Warsaw. 12 August 1947. Report No. R-107-47, MIS-390731. Subject: Plants producing heavy water. NARA RG 319, Entry 85A, Box 2534, Folder 390731–390740.

It is believed that no plants designed specially for the production of heavy water exist in Poland [in 1947]. It is reliably reported that the Germans built one such plant near OSWIECIM (Auschwitz) but that it was destroyed or moved out by the SOVIETS in 1945.

Report on Interrogation of PW MAYER. 14 July 1944. NARA RG 77, Entry UD-22A, Box 171, Folder 32.7003-2 GERMANY: US Wartime Positive Int. (July–Oct. 44).

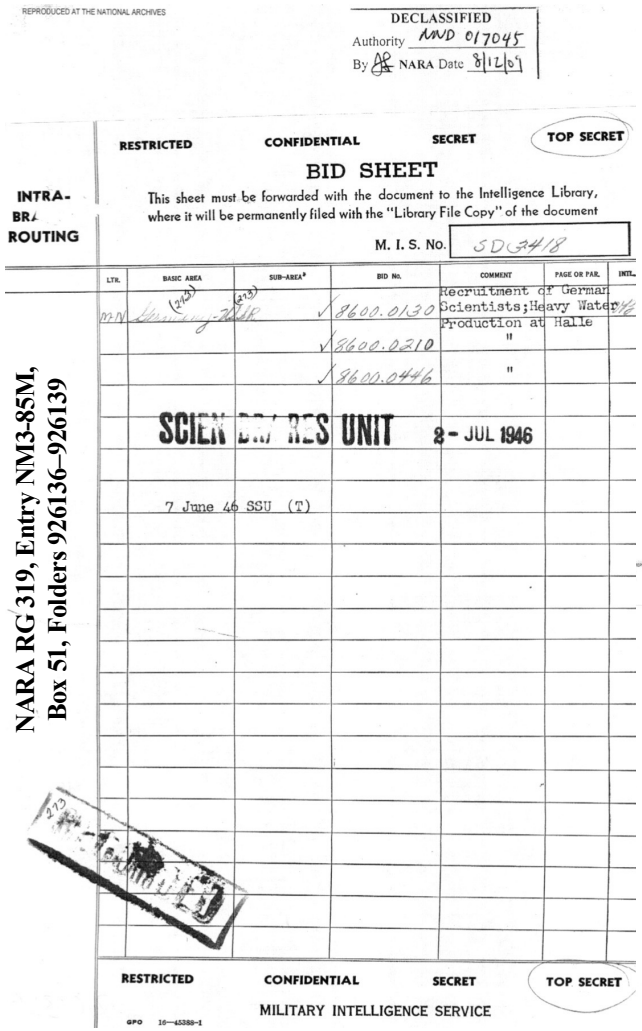
PW is an educated man in his late thirties, a physical chemist by profession[...] PW believes that D2O (Heavy Hydrogen) is manufactured principally at GRIESHEIM ELEKTRON in fairly large quantities for distribution to research and scientific establishments.

Ferdinand Cap. 23 November 1950 report [courtesy of Silke Fengler].

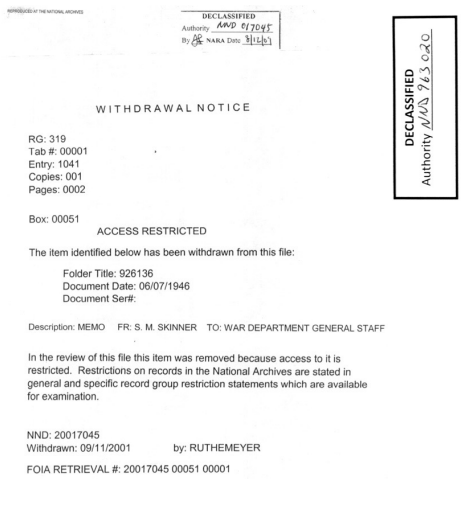
At the invitation of Colonel Colonel GOUSSOT, Innsbruck, I had the opportunity to visit Mr. Werd's [wartime] heavy water extraction test facility in Weer near Wattens in Tyrol on 21 November 1950.

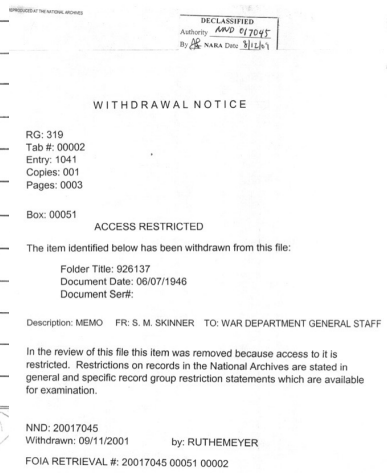
7. Sites for Production of Heavy Water (D_2O)

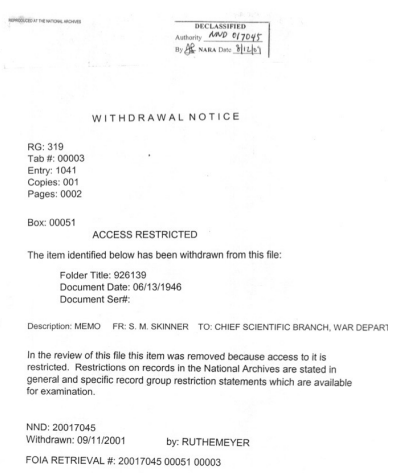
- **Why were at least ~21 plants producing D_2O, despite other urgent wartime needs?**
- **That suggests the D_2O was needed for breeder reactors, electronuclear breeders, fusion fuel, etc.**
- **Why are Allied reports on those plants still classified, or entirely missing from archives?**



NARA RG 319, Entry NM3-85M, Box 51, Folders 926136–926139







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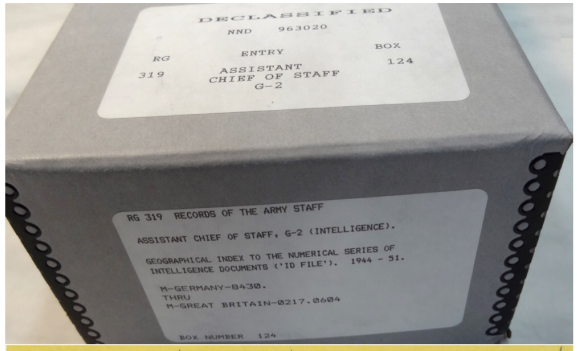
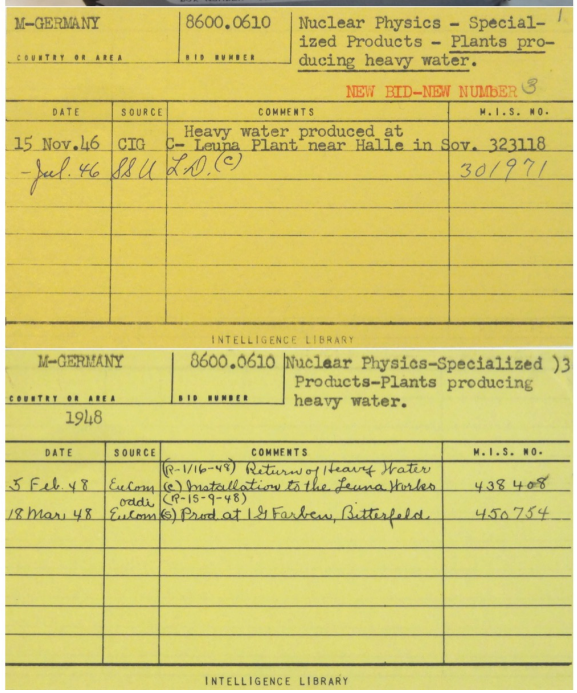
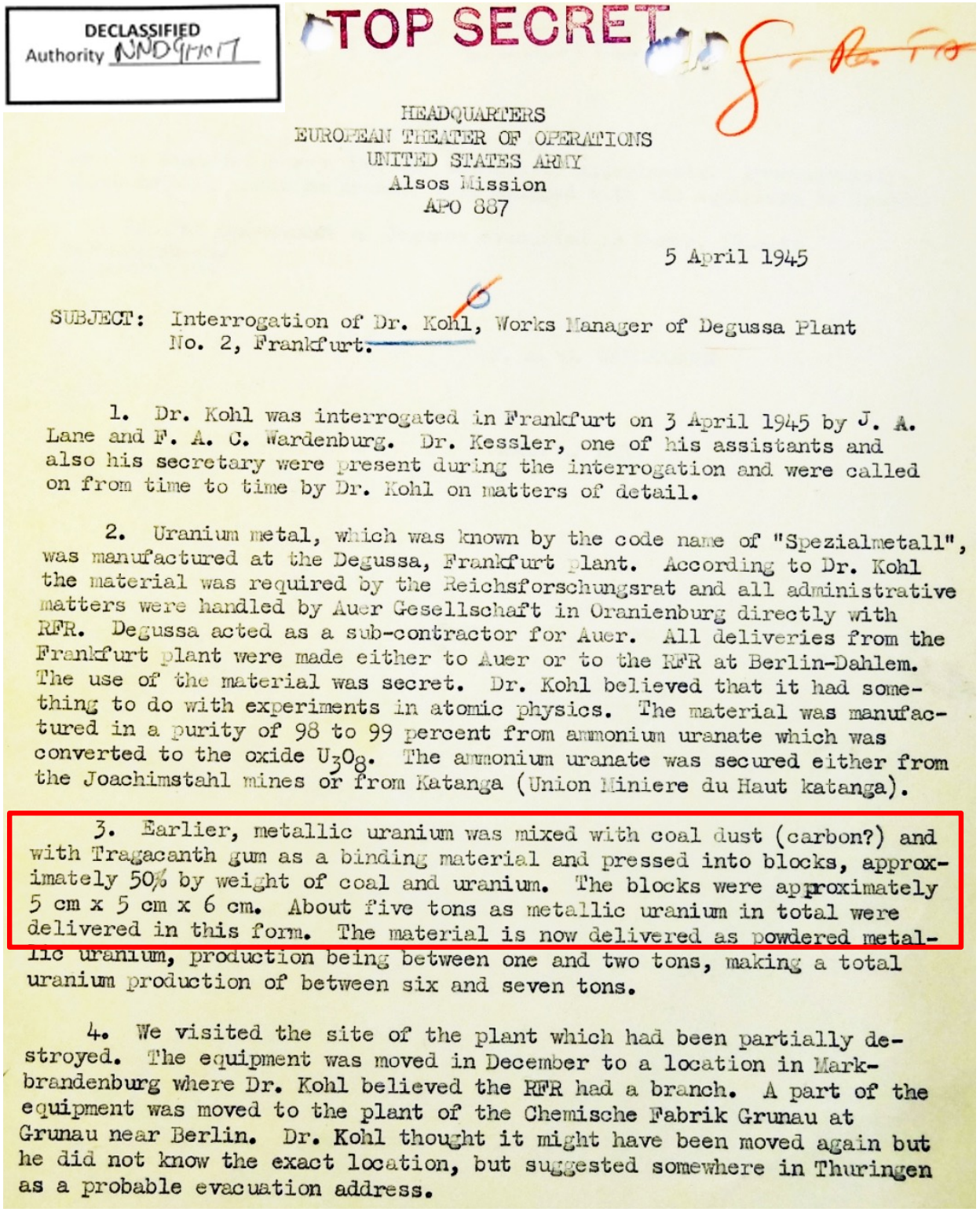
Authority NND 963020

NARA RG 319, Entry A1-84E, Box 124







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TOP SECRET

HEADQUARTERS
EUROPEAN THEATER OF OPERATIONS
UNITED STATES ARMY
Alsos Mission
APO 887

5 April 1945

SUBJECT: Interrogation of Dr. Kohl, Works Manager of Degussa Plant No. 2, Frankfurt.

1. Dr. Kohl was interrogated in Frankfurt on 3 April 1945 by J. A. Lane and F. A. C. Wardenburg. Dr. Kessler, one of his assistants and also his secretary were present during the interrogation and were called on from time to time by Dr. Kohl on matters of detail.

2. Uranium metal, which was known by the code name of "Spezialmetall", was manufactured at the Degussa, Frankfurt plant. According to Dr. Kohl the material was required by the Reichsforschungsrat and all administrative matters were handled by Auer Gesellschaft in Oranienburg directly with RFR. Degussa acted as a sub-contractor for Auer. All deliveries from the Frankfurt plant were made either to Auer or to the RFR at Berlin-Dahlem. The use of the material was secret. Dr. Kohl believed that it had something to do with experiments in atomic physics. The material was manufactured in a purity of 98 to 99 percent from ammonium uranate which was converted to the oxide U_3O_8. The ammonium uranate was secured either from the Joachimstahl mines or from Katanga (Union Miniere du Haut katanga).

3. Earlier, metallic uranium was mixed with coal dust (carbon?) and with Tragacanth gum as a binding material and pressed into blocks, approximately 50% by weight of coal and uranium. The blocks were approximately 5 cm x 5 cm x 6 cm. About five tons as metallic uranium in total were delivered in this form. The material is now delivered as powdered metallic uranium, production being between one and two tons, making a total uranium production of between six and seven tons.

4. We visited the site of the plant which had been partially destroyed. The equipment was moved in December to a location in Markbrandenburg where Dr. Kohl believed the RFR had a branch. A part of the equipment was moved to the plant of the Chemische Fabrik Grunau at Grunau near Berlin. Dr. Kohl thought it might have been moved again but he did not know the exact location, but suggested somewhere in Thuringen as a probable evacuation address.

7. Graphite as a Moderator

If wartime Germany never used graphite as a moderator for fission reactors:

- **Why was this Degussa plant producing at least 10 tons of blocks containing 50% uranium and 50% graphite?**
- **Why were both graphite and heavy water being mass-produced at:**
  - **I.G. Farben Bitterfeld**
  - **I.G. Farben Griesheim**
  - **Siemens Ratibor area**
  - **And other locations?**

NARA RG 77, Entry UD-22A, Box 166, Folder 32.22-1 GERMANY–Research–TA (1943–June 1946)

7. Beryllium

BIOS 158. *Production of Beryllia and Beryllium at Degussa Plants.*

STD FORM NO. 64

SECRET

Office Memorandum • UNITED STATES GOVERNMENT

THIS DOCUMENT CONSISTS OF 1 PAGE(S)
NO. 1 OF 2 COPIES, SERIES A

TO : Major F. J. Smith

DATE: 17 July 1945

FROM : Major John E. Vance

SUBJECT: Possibility of acquiring foreign beryllium metal

1. Major Kelley stated that Madison Square Area had been called upon to furnish increased quantities of beryllium metal. The single source of beryllium metal at this time is the Brush Beryllium Company of Cleveland, Ohio, whose facilities are to be enlarged. However, to assist in meeting the requirements, Major Kelley suggested that it would be extremely valuable if it were possible to acquire beryllium metal discovered in Germany.

2. To be useful to us, the metal should be massive, i.e., should be in pieces rather than in flakes and should contain more than 90% beryllium; it would probably not be advisable to place other specifications on the metal.

STD FORM NO. 64

CONFIDENTIAL

Office Memorandum • UNITED STATES GOVERNMENT

TO :Major F.J. Smith

DATE:19 July 1945

FROM :H.S. Lowenhaupt

SUBJECT:Beryllium, re Memorandum to Major F.J. Smith from Major J.E. Vance, 17 July 1945

A cable to Major F.J. Smith, 17 May states that considerable beryllium was found in Germany by the AT Group. Whereabouts of this metal is not known at present.

A bill from the files (from Deutsche Gold und Silber Scheideanstalt Vormals Roessler, Degussa, Frankfort am Main, 7 May 1943 to the Heereswaffenamt, Berlin) is for 100 plates made of beryllium or 27.848 kg. at 140.20 marks per kg.

I suggest this firm be contacted by our people to see if they can still supply metalic beryllium, either through purchase, or as plunder.

Mineral trade notes no. 429, 3 July 1945, American Embassy, Rio de Janeiro, Brazil states that at present 800 tons of beryl, the best source of beryllium, is stocked in Brazil awaiting the untangling of international price difficulties. If the ore rather than the pure metal should be desired by Major Kelley, either now or in the future, Brazil could become an important supplier.

Production of Beryllium Oxide and Beryllium at the Degussa Plant in Frankfurt

Year	Beryllium (Techn)	Beryllium (Flakes)
1938	about 200 kg	about 500 kg
1939 till Sept	about 300 kg	about 200 kg
Oct to Dec	869.100 kg	None
1940	3367.195 kg	1689.480 kg
1941	6305.680 kg	214.094 kg
1942	3096.575 kg	1297.770 kg
1943	4224.500 kg	601.620 kg
1944	947.000 kg	302.605 kg
1945	None	None
Totals		
Production before the war	500 kg	700 kg
Production during the war	18810.050 kg	4105.614 kg

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Authority NND 947017

NARA RG 77, Entry UD-22A, Box 163, Folder Australia

7. Production of Other Potentially Nuclear-Related Materials

Material	Non-nuclear applications	Nuclear applications	Wartime production
Deuterium/ heavy water	Isotope labeling of molecules	Producing tritium, neutrons, fusion; neutron moderator for reactor	At least ~21 production plants
Lithium	Glass, ceramics, metals	Producing tritium, neutrons, fusion	Hundreds of tons
Beryllium	Metal alloys	Neutron production/reflection	Tons
Boron	Glass, ceramics, metals	Neutron absorber	Large quantities
Graphite	Rocket rudders	Neutron moderator for reactor	Tens of thousands of tons
Fluorine	Industrial production	U hexafluoride for enrichment	Thousands of tons
Aluminum	Metal structures, packaging	Reactor fuel cladding, bomb casings	Thousands of tons
Calcium	Metal alloys	Th/U/Pu purification	Thousands of tons
Nickel	Batteries, alloys	Resists corrosion by U hexafluoride	Thousands of tons
Zirconium	High-temp. metals, ceramics	Reactor fuel cladding	Tons
Cadmium	Nickel-cadmium batteries	Neutron absorber	Thousands of tons

Some sites were producing multiple nuclear-related materials. I.G. Farben's Bitterfeld facility was producing heavy water, graphite, aluminum, and calcium, and perhaps other relevant materials.

Significant quantities of many of these nuclear-related materials were also shipped to Japan, along with at least 560 kg of (possibly enriched) uranium and other cutting-edge military technologies.

Archival documents in *Forgotten Creators* D.7

7. Disposal of Radioactive Waste at the End of the War

Hasso Ziegler. Die "Konzertsäle" von Asse sind strahlensicher: Endlagerung radioaktiver Abfallprodukte in 500-Meter tiefen Abbaukammern. *Hannoversche Allgemeine Zeitung*, 29 July 1974:

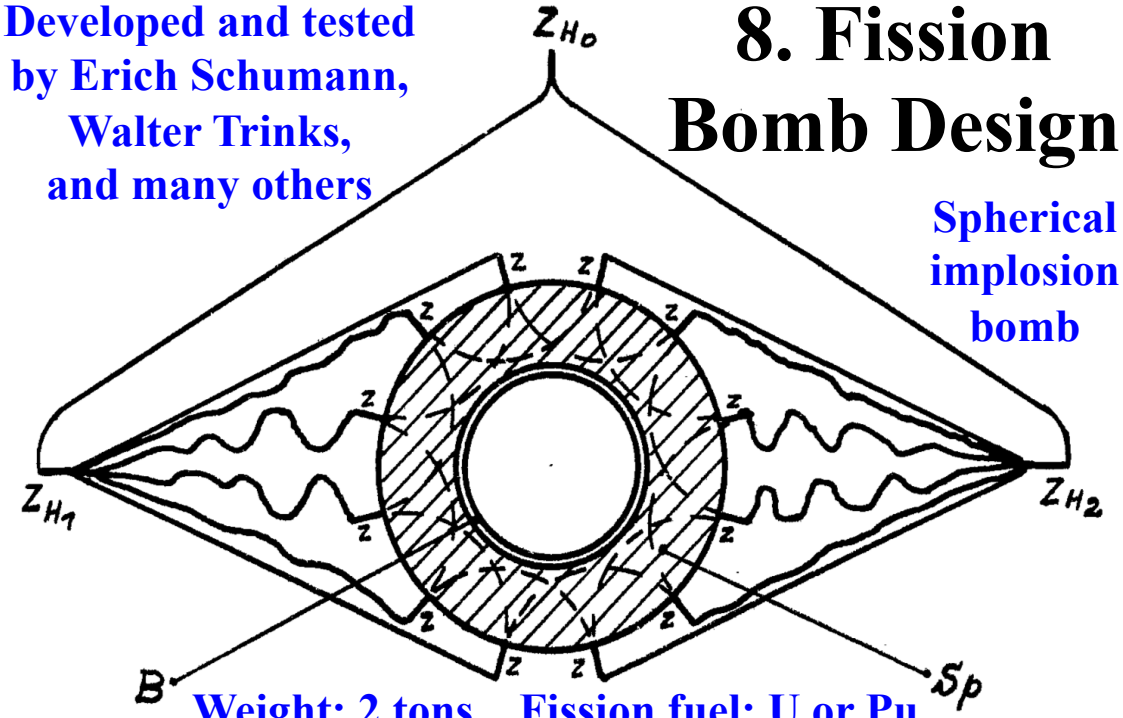
Extensive preparatory work is still going on for the highly radioactive waste, which will accumulate at the earliest from 1976 onwards in West Germany and be stored in Asse (mainly the residues from reprocessed fission products, for example reactor fuel rods). It is thought to sink them—vitrified beforehand—in special chambers (drill holes) to a depth of fifteen hundred meters.

Asked about the occasional bad news that appears every now and then regarding the supposedly dangerous storage of radioactive waste, Alwin Urff, mining engineer and deputy technical plant manager in Asse, only shook his head: "Here in the mine nothing can happen anyway. When we began storage in 1967, our company first sank radioactive waste from the last war, that uranium waste which arose in the preparation of the German atomic bomb. Specifically we had to get that out of concrete bunkers near Munich, where it had been deposited at the time, because back then one did not know where the devil one should leave the stuff…"

8. Fission Bomb Design

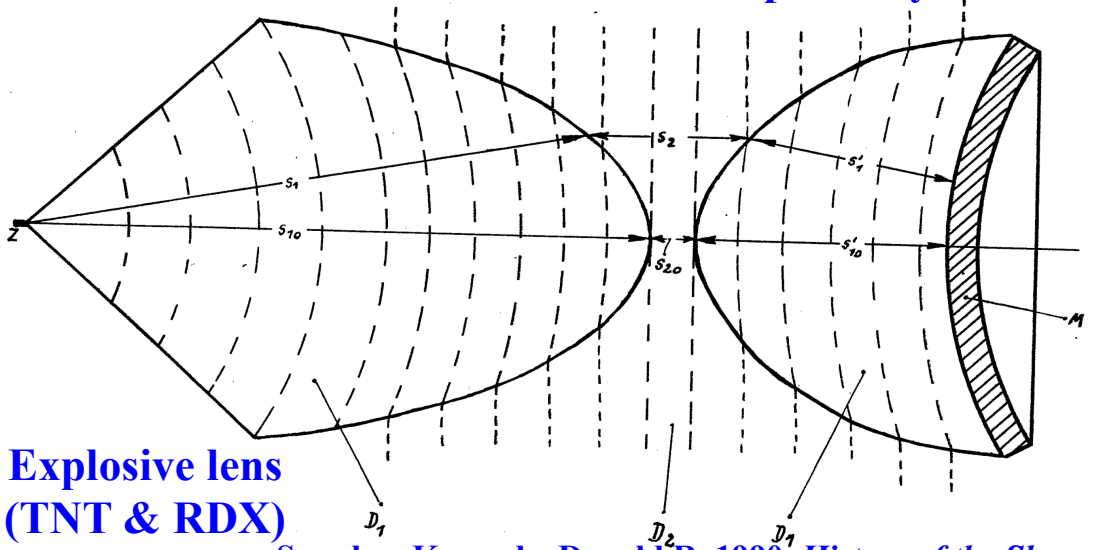
Developed and tested by Erich Schumann, Walter Trinks, and many others

Spherical implosion bomb

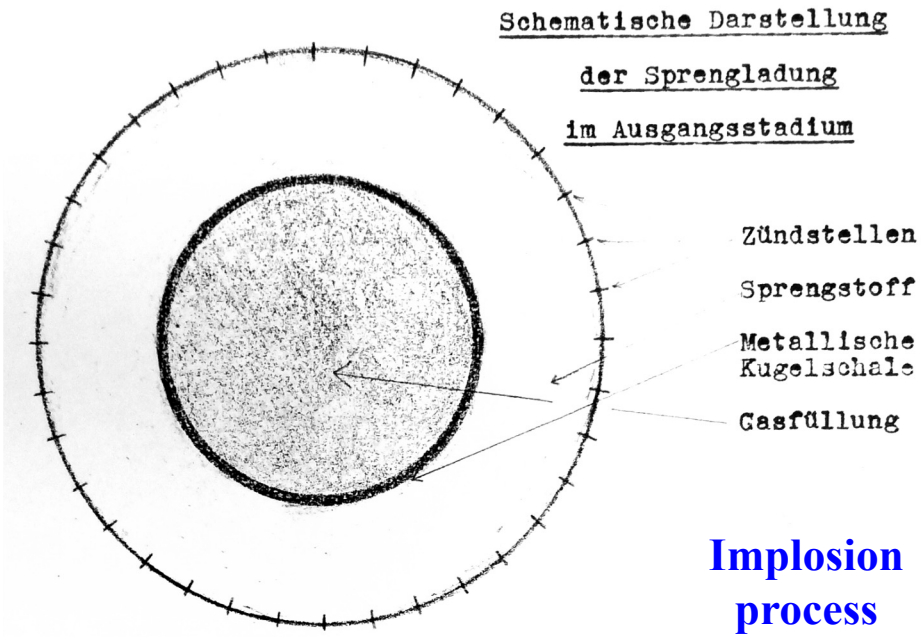


Weight: 2 tons Fission fuel: U or Pu

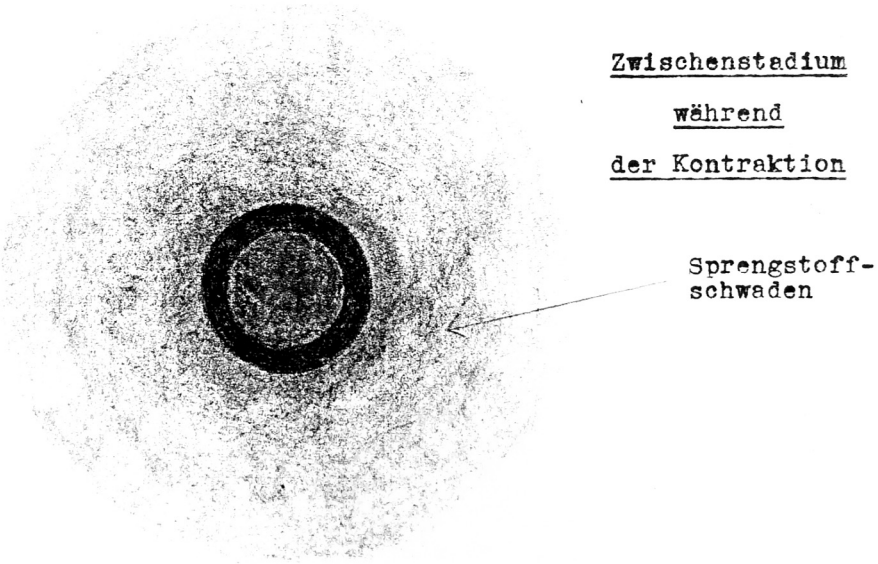
Fusion fuel in center to boost the explosive yield



Explosive lens (TNT & RDX)



Implosion process



See also: Kennedy, Donald R. 1990. *History of the Shaped Charge Effect: The First 100 Years.* https://apps.dtic.mil/dtic/tr/fulltext/u2/a220095.pdf

Krehl, Peter O. K. 2009. *History of Shock Waves, Explosions and Impact: A Chronological and Biographical Reference.* Berlin: Springer.

Nagel, Günter. 2012. *Wissenschaft für den Krieg.* Stuttgart: F. Steiner.

Patent DE 977825

AMPG, Abt. III, Rep. 83, Nr. 286

8. Testing Explosive Lenses (1940 Onward, Kummersdorf)

HEC 2590 (English translation). Erich Schumann and Gerd Hinrichs. March 1943. Report on tests of explosive lenses. Imperial War Museum, Duxford Archive.

Abb. S 1: Versuchsaufbau des Körpers H 15/I.

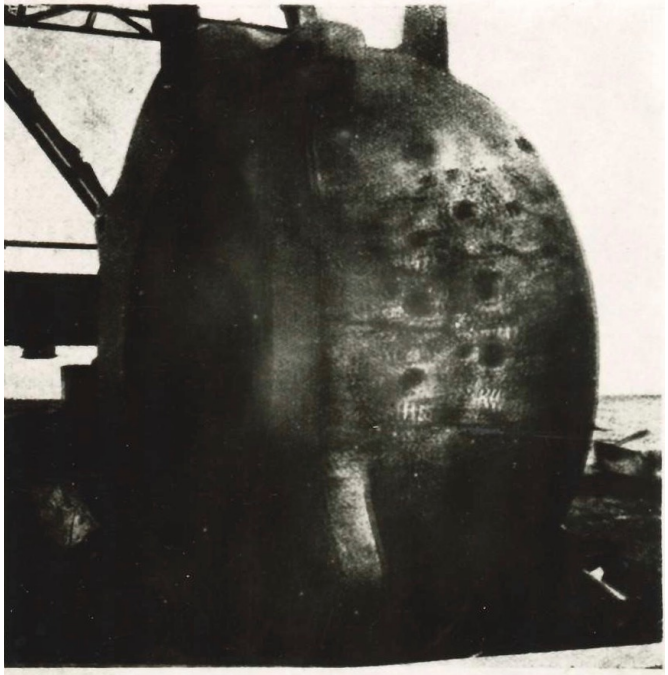


Abb. S 2: Kuppel mit Sprenglöchern der Sprengkörper H 15 u. H 15/I.

Walter Trinks. 1945 letter to U.S. Army. NARA RG 319, Entry A1-134B, Folder XE098301 Trinks, Walter

At the end of the war I was occupied with experiments for producing extreme high pressures and temperatures, extreme velocities (up to 15 km/sec) and heavy swingings of the air [shock waves]. The practical use of these researches comprises:

1st for the war: the defense against V-weapons super- and atomic bombs by destroying them before they reach their target and the initiation of atomic bombs.

Uses of the "Röntgenblitz"

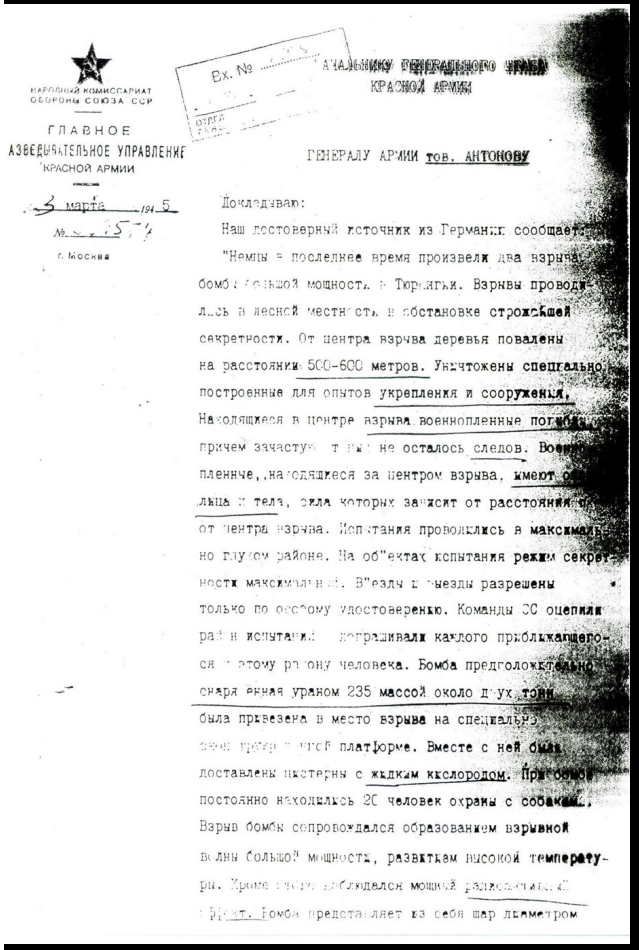
The uses to which the Germans put the "Röntgenblitz" equipment were learned by examining captured documents and by interrogation. These applications cover, (a) target cavitation produced by projectiles passing through wooden blocks and water targets, (b) the smashing of a lead bullet upon impact with various targets, (c) cavity charge phenomena studies, (d) detonation phenomena studies and (e) an interesting study of the arming of a nose fuze a short distance in front of the muzzle of the gun. With the exception of the studies on detonation of an explosive charge by Dr. Rudi Scholl, all work with the "Röntgenblitz" equipment was done by Schardin's group, working principally with Dr. Thomer. Only a few German documents covering the above work were available for examination by the author during the investigation of this subject, but it is believed that a complete series of the reports of both Prof. H. Schardin's and Dr. Erich Schumann's groups have been recovered and forwarded through the proper military channels for filing and examination, (see Col. L. E. Simon's, U. S. Ord. Dept. report).

It was, however, definitely ascertained that the experimental techniques utilized to obtain flash radiographs of cavity charges and high explosive specimens were sensibly the same as those familiar to U. S. research workers. The German scientific groups recognized the value of this technique because it was learned that at least eight more "Röntgenblitz units were under construction at the Siemenswerke, Berlin.

J. C. CLARK
Major, Ord.

J. C. Clark. 18 September 1945. Development and Use of Röntgenblitz Technique by the German Scientists during Period 1938-45. Alsos Intelligence Report KO-29365. AFHRA B1763 frames 0252-0259.

8. Fission Bomb Design: 23 March 1945 Letter from General Ivan Ilyichev (Head of GRU) to Joseph Stalin



НАРОДНЫЙ КОМИССАРИАТ ОБОРОНЫ СОЮЗА ССР

ГЛАВНОЕ РАЗВЕДЫВАТЕЛЬНОЕ УПРАВЛЕНИЕ КРАСНОЙ АРМИИ

Вх. №

НАЧАЛЬНИКУ ГЕНЕРАЛЬНОГО ШТАБА КРАСНОЙ АРМИИ

ГЕНЕРАЛУ АРМИИ тов. АНТОНОВУ

23 марта 1945

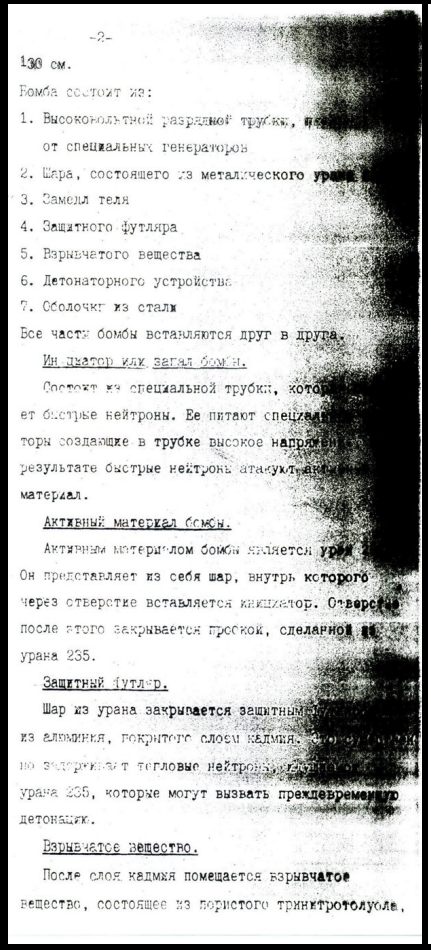
№ 25/ш

г. Москва

Докладываю:

Наш достоверный источник из Германии сообщает:

"Немцы в последнее время произвели два взрыва бомб большой мощности в Тюрингии. Взрывы проводились в лесной местности в обстановке строжайшей секретности. От центра взрыва деревья повалены на расстоянии 500-600 метров. Уничтожены специально построенные для опытов укрепления и сооружения. Находящиеся в центре взрыва военнопленные погибли, причем зачастую от них не осталось следов. Военнопленные, находящиеся за центром взрыва, имеют ожоги лица и тела, сила которых зависит от расстояния их от центра взрыва. Испытания проводились в максимально глухом районе. На об"ектах испытания режим секретности максимальный. В"езды в районы разрешены только по особому удостоверению. Команды СС оцепили район испытаний и проверяли каждого приближающегося к этому району человека. Бомба предположительно снаряженная ураном 235 массой около двух тонн была привезена в место взрыва на специальной [illegible] платформе. Вместе с ней были доставлены цистерны с жидким кислородом. Территория постоянно находилась в 20 человек охраны с собаками. Взрыв бомбы сопровождался образованием взрывной волны большой мощности, развитием высокой температуры. Кроме этого наблюдалось мощное радиоактивное [illegible]. Бомба представляет из себя шар диаметром



-2-

130 см.

Бомба состоит из:

1. Высоковольтной разрядной трубки, питаемой от специальных генераторов
2. Шара, состоящего из металического урана
3. Замедлителя
4. Защитного футляра
5. Взрывчатого вещества
6. Детонаторного устройства
7. Оболочки из стали

Все части бомбы вставляются друг в друга.

Инициатор или запал бомбы.

Состоит из специальной трубки, которая дает быстрые нейтроны. Ее питают специальные генераторы создающие в трубке высокое напряжение. В результате быстрые нейтроны атакуют [illegible] материал.

Активный материал бомбы.

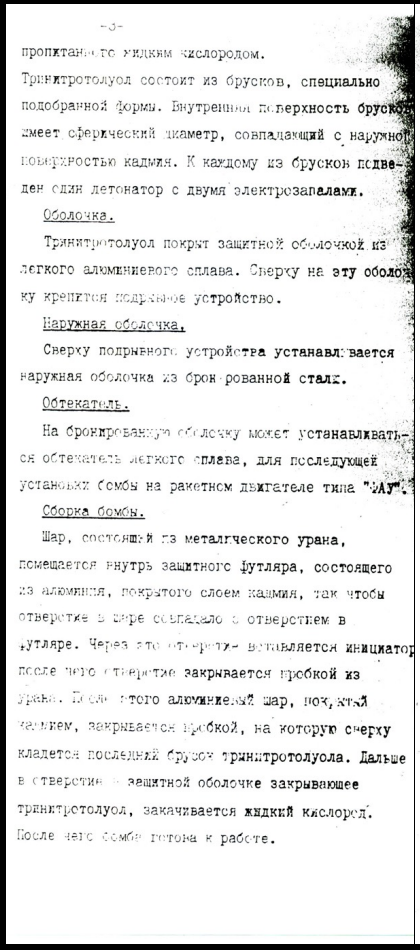
Активным материалом бомбы является уран. Он представляет из себя шар, внутрь которого через отверстие вставляется инициатор. Отверстие после этого закрывается пробкой, сделанной из урана 235.

Защитный футляр.

Шар из урана закрывается защитным [illegible] из алюминия, покрытого слоем кадмия. [illegible] задерживает тепловые нейтроны, [illegible] урана 235, которые могут вызвать преждевременную детонацию.

Взрывчатое вещество.

После слоя кадмия помещается взрывчатое вещество, состоящее из пористого тринитротолуола,



-3-

пропитанного жидким кислородом.

Тринитротолуол состоит из брусков, специально подобранной формы. Внутренняя поверхность брусков имеет сферический диаметр, совпадающий с наружной поверхностью кадмия. К каждому из брусков подведен один детонатор с двумя электрозапалами.

Оболочка.

Тринитротолуол покрыт защитной оболочкой из легкого алюминиевого сплава. Сверху на эту оболочку крепится подрывное устройство.

Наружная оболочка.

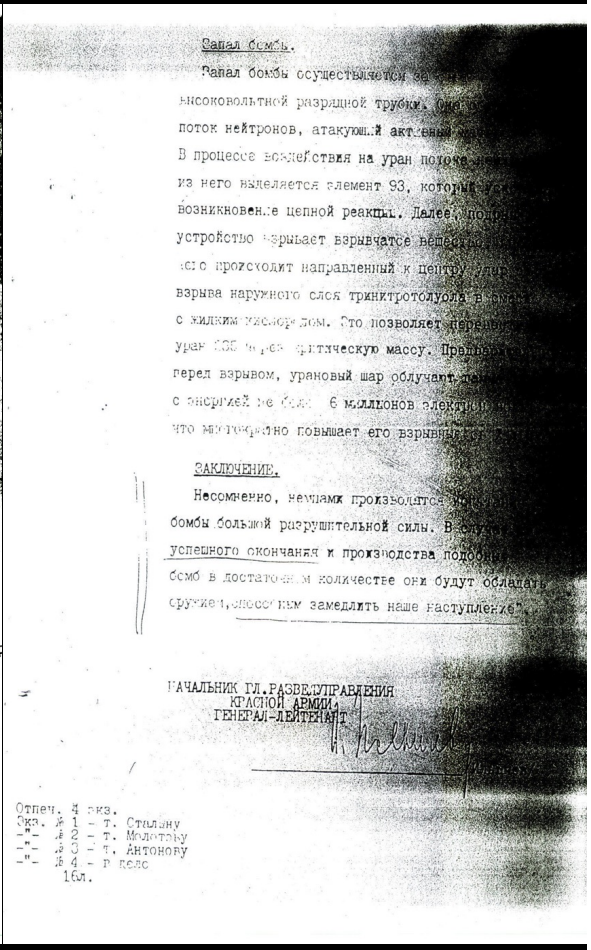
Сверху подрывного устройства устанавливается наружная оболочка из бронированной стали.

Обтекатель.

На бронированную оболочку может устанавливаться обтекатель легкого сплава, для последующей установки бомбы на ракетном двигателе типа "ФАУ".

Сборка бомбы.

Шар, состоящий из металического урана, помещается внутрь защитного футляра, состоящего из алюминия, покрытого слоем кадмия, так чтобы отверстие в шаре совпадало с отверстием в футляре. Через это отверстие вставляется инициатор, после чего отверстие закрывается пробкой из урана. После этого алюминиевый шар, покрытый кадмием, закрывается пробкой, на которую сверху кладется последний брусок тринитротолуола. Дальше в отверстие в защитной оболочке закрывающее тринитротолуол, закачивается жидкий кислород. После чего бомба готова к работе.



Запал бомбы.

Запал бомбы осуществляется за[illegible] высоковольтной разрядной трубки, [illegible] поток нейтронов, атакующий активный [illegible]. В процессе воздействия на уран потока [illegible] из него выделяется элемент 93, который [illegible] возникновение цепной реакции. Далее, подрывное устройство взрывает взрывчатое вещество, [illegible] с чего происходит направленный к центру удар взрыва наружного слоя тринитротолуола [illegible] с жидким кислородом. Это позволяет перевести уран 235 в [illegible] критическую массу. Примерно перед взрывом, урановый шар облучают [illegible] с энергией не более 6 миллионов электрон-вольт, что многократно повышает его взрывную [illegible].

ЗАКЛЮЧЕНИЕ.

Несомненно, немцами производится [illegible] бомбы большей разрушительной силы. В случае успешного окончания и производства подобных бомб в достаточном количестве они будут обладать оружием, способным замедлить наше наступление".

НАЧАЛЬНИК ГЛ.РАЗВЕДУПРАВЛЕНИЯ КРАСНОЙ АРМИИ ГЕНЕРАЛ-ЛЕЙТЕНАНТ

Отпеч. 4 экз.
Экз. № 1 - т. Сталину
-"- № 2 - т. Молотову
-"- № 3 - т. Антонову
-"- № 4 - в дело
16л.

Archive of the President of the Russian Federation, Fund 93, Division 81 (45), List 37. Found in 2003 by Rainer Karlsch.

The letter appears to be genuine. It is part of a paper trail of earlier and later documents, some of which were already published.

8. Fission Bomb Design: Ilyichev to Stalin, 23 March 1945

Our trustworthy source from Germany reports:

The Germans have in recent times carried out two large-capacity bomb explosions in Thuringia. The explosions took place in a forest area, under conditions of strictest secrecy. Trees fell at a distance of 500–600 meters from the center of the explosion. Buildings and fortifications specially constructed for the tests have been destroyed.

Prisoners of war who were near the epicenter of the explosion died, often without leaving a trace. Prisoners of war who were in the area beyond the center of the explosion have burns on their face and body, the strength of which depends on their position in relation to the epicenter of the explosion. The tests were carried out in a remote deserted area. The regime of secrecy at the test site was at maximum level. Entrance and exit from the territory are by special pass only. SS soldiers have surrounded the area of tests and interrogated any person approaching the area.

The bomb, supposedly filled with uranium 235 and weighing approximately two tons, was brought to the test site on a specially constructed truck. Dewars of liquid oxygen were delivered together with it. The bomb was permanently guarded by 20 guards with dogs. The bomb explosion was accompanied by a large explosive wave and high temperature. In addition, a massive radioactive effect was observed. The bomb is a sphere with a diameter of 130 cm.

The bomb consists of:

1. High-voltage discharge tube, which is charged by special generators
2. A sphere made of metal uranium 235
3. A delay mechanism [tamper]
4. Protective casing
5. Explosive substance
6. Detonating mechanism
7. Steel casing

All parts of the bomb fit inside each other.

8. Fission Bomb Design: Ilyichev to Stalin, 23 March 1945

Initiator or bomb fuse.

Consists of a special tube, which creates fast neutrons. It is charged by special generators, which create high voltage inside the tube. As a result, fast neutrons attack active material.

Active bomb material.

Active bomb material is uranium 235. It represents a sphere with an opening into which an initiator is inserted. Once this is done, the opening is sealed by a cork made of uranium 235.

Protective casing.

The uranium sphere is encased in a protective aluminum casing, which is covered by a layer of cadmium. This significantly impedes thermal neutrons emanating from uranium 235, which can cause premature detonation.

Explosive matter.

After the layer of cadmium it is placed inside explosives that consist of porous TNT saturated with liquid oxygen; TNT is made up of bars of a specially chosen shape. The inner surface of the bars has a spherical curvature, which is the same as that of the external surface of the cadmium layer. Each of the bars is supplied with one detonator or two electrical fuses.

Casing.

TNT is covered by a protective layer made of a light aluminum alloy. A blasting mechanism is attached on top of this casing.

Exterior casing.

An exterior casing of armored steel is installed above the blasting mechanism.

Fairing.

A fairing made of a light alloy can be installed on top of the armored casing for future installation on a rocket of the V-type.

Bomb assembly.

The sphere, which consists of metal uranium, is placed inside a protective casing, which consists of aluminum, covered in a layer of cadmium, so that the opening in the

8. Fission Bomb Design: Ilyichev to Stalin, 23 March 1945

sphere coinciding with the opening is sealed off by a uranium cork. After this the aluminum sphere, covered in cadmium, is sealed off by a cork, on top of which the last bar of TNT is placed. Next, liquid oxygen is pumped through the opening inside a protective casing, which covers the TNT. After this the bomb is ready for deployment.

Bomb ignition.

The bomb ignition is carried out with the help of a high-voltage discharge tube. It forms a flow of neutrons, which attack the active material. When the flow of neutrons impacts upon uranium, element 93 fissions, which speeds up the creation of a chain reaction. Next, the detonating mechanism detonates the explosive matter, after which a shock from the explosion of the external layer of TNT mixed with liquid oxygen takes place, which is directed toward the center. This allows the uranium to reach a critical mass.

Ahead of this, before the explosion, the uranium sphere is irradiated with gamma-rays, the energy of which does not exceed 6 million electron volts, which many times increases its explosive qualities.

CONCLUSION.

Without doubt, the Germans are carrying out tests of a bomb of high destructive force. In the event of their successful conclusion and production of such bombs in sufficient quantities, they will have weapons capable of slowing down our advance.

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Marshal Georgy Zhukov. 2 October 1945. Report to Joseph Stalin. Archive of the President of the Russian Federation, Fund 93, Division 77 (45), List 4-11.

Based on the collected materials, it can be concluded that the German scientists in the field of theoretical and practical research and application of atomic energy have achieved good results up to the creation of the atomic bomb.

8. Fission Bomb Design: Primary Sources

Component	Primary sources for fission bomb design										
	Guderley 10/1942	**Loofbourow 10/1943**	***Time* 11/1944**	**Ilyichev 3/1945**	**Kurchatov 3/1945**	**Respondek 11/1945**	**Schumann 1945-1952**	**Polish eng. 3/1946**	**Diebner 1956-1962**	**Grothmann 2000-2002**	**König 2004**
Neutron initiator				1. Internal high-voltage fusion neutrons 2. External gamma rays (via betatron)	1. Internal high-voltage fusion neutrons 2. External gamma rays (via betatron)	Neutron source	Fusion fuel	Neutron source (implied)	Fusion fuel	Ignition system	
Pit		High-density, high-energy new material, laborious to produce	Uranium	U-235	U-235	U-235	Uranium	Fission fuel	Uranium	U-235	
Reflector /tamper				``Delay mechanism'' that was apparently also uranium			Uranium				
Neutron absorber				Cadmium	Cadmium		Cadmium	Cadmium			
Pusher				Aluminum			Aluminum				Aluminum
Explosive	Explosive designed for spherical implosion	Explosive designed for spherical implosion (implied)	Explosive designed for spherical implosion	Shaped segments of TNT with liquid oxygen, made lighter for rocket	Shaped segments of TNT with liquid oxygen, made lighter for rocket	Explosive designed for spherical implosion (implied)	Many shaped segments of TNT, RDX (explosive lenses) with simultaneous ignition		TNT and RDX	Complex explosive system with simultaneous ignition, made lighter for rocket	
Explosive case	Spherical case	Spherical case	Spherical case	Spherical aluminum	Spherical case	Case	Spherical aluminum	Case	Spherical case	Spherical aluminum	Spherical aluminum
Ballistic case				Steel case for rocket			Iron/ steel			Part of rocket	
Position for test				Positioned in a test area	Positioned in a test area		Suspended a few meters above the ground			On metal scaffold	

For more information, see *Forgotten Creators* D.8 and D.15

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OSS. 19 September 1943. NARA RG 226, Entry 125, Box 6, Folder 78.

Our sources claim that there are large explosive factories in Hiltersheim, Magdeburg district. These factories are said to have been moved here from Ludwigshafen. They are in underground, bomb-proof spaces. They are making a high-density explosive here that is supposed to have an enormous explosive effect. […] With one kilogram, everything should be literally razed away, or disintegrated to dust and ashes, within a radius of approximately four kilometers.

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[O]n 4 June 1942 Heisenberg was summoned to Berlin for the crucial secret meeting of the German atomic body[….] So Heisenberg immediately turned to the military applications of nuclear fission—to uranium-235 and to plutonium. When he had finished his paper, a brief dialogue ensued that has been vividly remembered by all present. Milch inquired about the size of a bomb whose effect would be enough to destroy a large city. Heisenberg: "About the size of a pineapple." He referred to the [fissile] explosive charge and demonstrated its size with his hands.

A.P.W.I.U. (Ninth Air Force) 96/1945. 19 August 1945. Investigations, Research, Developments, and Practical Use of the German Atomic Bomb. AFHRA B-5737, pp. 340-345.

2. Dr. EDSE, well known chemist, wrote: At the Institute for Physical Chemistry of the Hamburg University I worked on problems concerning nuclear physics under the direction of Prof. Dr. P. HARTECK. […] The disintegration of one kg ^{235}U delivers an amount of energy of (1000/235) x 160 x $23x10^6$ kg cal = $1.6x10^{10}$ kg cal, whereas one kg of TNT only delivers 1000 kg cal when detonating. Out of this follows that an atomic bomb of 3 lbs ^{235}U has the same effect as a bomb of 20,000 tons of TNT.

OSS. 19 September 1943. NARA RG 226, Entry 125, Box 6, Folder 78.

Our sources claim that there are large explosive factories in Hiltersheim, Magdeburg district. These factories are said to have been moved here from Ludwigshafen. They are in underground, bomb-proof spaces. They are making a high-density explosive here that is supposed to have an enormous explosive effect. […] With one kilogram, everything should be literally razed away, or disintegrated to dust and ashes, within a radius of approximately four kilometers.

Erich Rundnagel, in: Gerhardt Remdt and Gunter Wermusch. 2006. Rätsel Jonastal. 2nd ed. Meiningen: Heinrich Jung. pp. 125-126.

I was mainly involved with Dr. Rehbein and engineer Rackwitz, with whom I came into a kind of relationship of trust. […] Then he told me that something was being developed here that had a greater explosive power than anything I could imagine as an old pioneer. Rehbein just smiled and said the whole bomb was only a few decimeters tall, but weighs about eight kilograms. When I asked him if I could see the thing, he waved it off: "That could cost us both our heads."

8. Some Manufacturers of Suitable Bomb Components

D+Li fusion neutron initiator	C.H.F. Müller (Hamburg) and other suppliers
Betatron ($e^- \rightarrow \gamma \rightarrow n$) initiator	Siemens-Reiniger (Erlangen) and other suppliers
Uranium-235 fission pit	SS-controlled enrichment sites (discussed earlier)
Unenriched uranium tamper	Auer/Degussa (Oranienburg and other locations)
Cadmium-electroplated aluminum	Kampschulte, Blasberg, Wilhelm Meyer, etc.
Pure TNT and RDX	WASAG (Allendorf and other locations)
Explosive lenses (TNT + RDX)	Heereswaffenamt (Kummersdorf/Hillersleben)
Simultaneous detonators	Heereswaffenamt (Kummersdorf/Hillersleben)
Liquid oxygen	V-2 rocket program (Friedrichshafen, etc.)

C. H. F. Muller A.-G., working in cooperation with, and under the direction of, the M. V. Research Association (M. V. Forschungs-Vereign), at Wrist, completed the construction of a 15 megavolt betatron about the first of this year. This betatron operates on 50 cycles. The average current of the high voltage electron beam is approximately .03 microamperes. The output of gamma radiation was reported to be approximately equivalent to one kilogram of radium. This betatron is now installed at Wrist.

In December, 1944, the M. V. Research Association completed the calculations and layouts of a 200 megavolt betatron, to operate on 50 cycles. It was estimated that the average electron beam current of this betatron would be in the order of one milliampere. The total weight was expected to be approximately 30 tons. This betatron was to be constructed by Brown Boveri and Cie A.-G. in Heidelberg. It is understood that Brown Boveri completed detailed construction drawings of this betatron about the first of March of this year.

Dr. W. Müller, of C. H. F. Müller, recently constructed a very small 2 megavolt betatron which weighed less than 100 pounds. This betatron operated on 50 cycles and had a sealed off tube but the output was only sufficient to increase a Geiger counter to about three times its normal rate.

Two betatrons had recently been constructed and were being tested at the Siemans-Reiniger plant in Erlangen. The first of these betatrons to be completed operates on 500 cycles and provides an electron acceleration of 6 megavolts. The second, most recently constructed, betatron operates on 50 cycles and provides an electron acceleration of 7 megavolts. Plans were being made at this plant to construct a 50 cycle, 15 megavolt betatron. Siemens reported that their particular interest in betatron development was in order to provide a means for experimental work with electron beam cancer therapy.

CIOS XXVIII-31

Prof. Bierman of A.E.G., in Berlin, was reported to be working on the design of a 20 megavolt betatron.

During the past two years, C. H. F. Muller has constructed and delivered five "neutron generators". Three of these were rated at 1.5 megavolts, one at 1.2 megavolts, and one at .9 megavolts. They have on order, but have not yet completed,

one additional neutron generator rated at .9 megavolts and another rated at 2.4 megavolts. These "neutron generators", or "deutron accelerators", accelerate ionized heavy hydrogen against a beryllium or a lithium target. The neutron output at .9 megavolts when using a beryllium target was estimated to be equivalent to the neutron output of 2 kilograms of radium plus beryllium; when using a lithium target, 3 kilograms; when using a beryllium target at 1.5 megavolts, 13 kilograms; when using a lithium target, 8 kilograms.

The Phillips "cascade" circuit was used for these neutron generators. Although the electrical output of these generators could be as high as 5 ma., the ion source limited this equipment to 0.8 ma. for continuous operation, regardless of voltage.

At 0.8 ma. the ripple was about 1%, at 5 ma., about 5%.

BIOS 1615

(A) Plating on Aluminium and its Alloys

Although aluminium is widely used in Germany, no actual samples of nickel plus chromium plated aluminium were seen. Samples of lead plated battery lugs were encountered at Robert Bosch, Stuttgart and direct chromium plated aluminium at Blasberg's, Solingen. Numerous references are made to the plating of aluminium and its alloys, however, and the most popular treatment for plating on this metal appears to be a primary application of a zincate dip followed by either a copper or brass deposit and then final plating.

(B) Testing of Plated Coatings, etc.

The testing of the plated coating for thickness, porosity, corrosion resistance etc., was apparently seldom done and the platers seemed to be little concerned about these points. Testing of solutions was equally haphazard. pH was rarely controlled except by litmus and pH papers; comparators were

B. CADMIUM

I. Firm: KAMPSCHULTE.

Solution:	47.5 g/litre	Cadmium Cyanide
	42.5 g/litre	Sodium Cyanide
	5.0 g/litre	Sodium Chloride
	5.0 g/litre	Turkey Red Oil

Operating Conditions

Temperature:	25 - 30°C.
Current Density:	10 amps/dm²
Voltage:	Not given

II. Firm: BLASBERG.

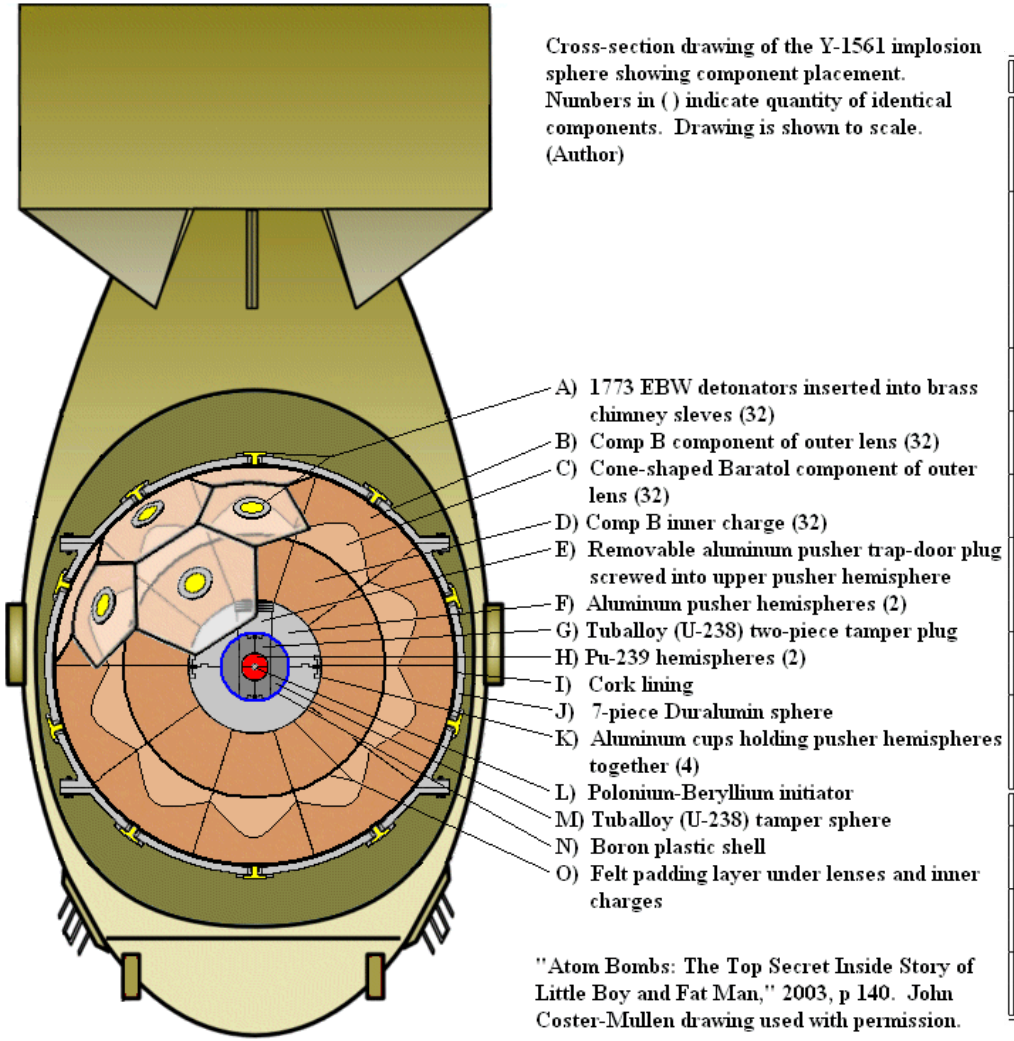
Solution:	50 - 120 g/litre	Sodium Cadmium Cyanide
	20 - 60 g/litre	Sodium Cyanide
	10 - 30 g/litre	Sodium Hydroxide

Nickel Salts as bright addition agents.

Operating Conditions

Temperature:	20 - 35°C.
Current Density:	0.5 - 1.2 amps/dm²
Voltage:	Not given
Time:	10 - 60 minutes
pH:	12 - 13.5

8. Fission Bomb, Mass 2000 kg, Yield 10s of kT, Tested 1944-45



Cross-section drawing of the Y-1561 implosion sphere showing component placement. Numbers in ( ) indicate quantity of identical components. Drawing is shown to scale. (Author)

"Atom Bombs: The Top Secret Inside Story of Little Boy and Fat Man," 2003, p 140. John Coster-Mullen drawing used with permission.

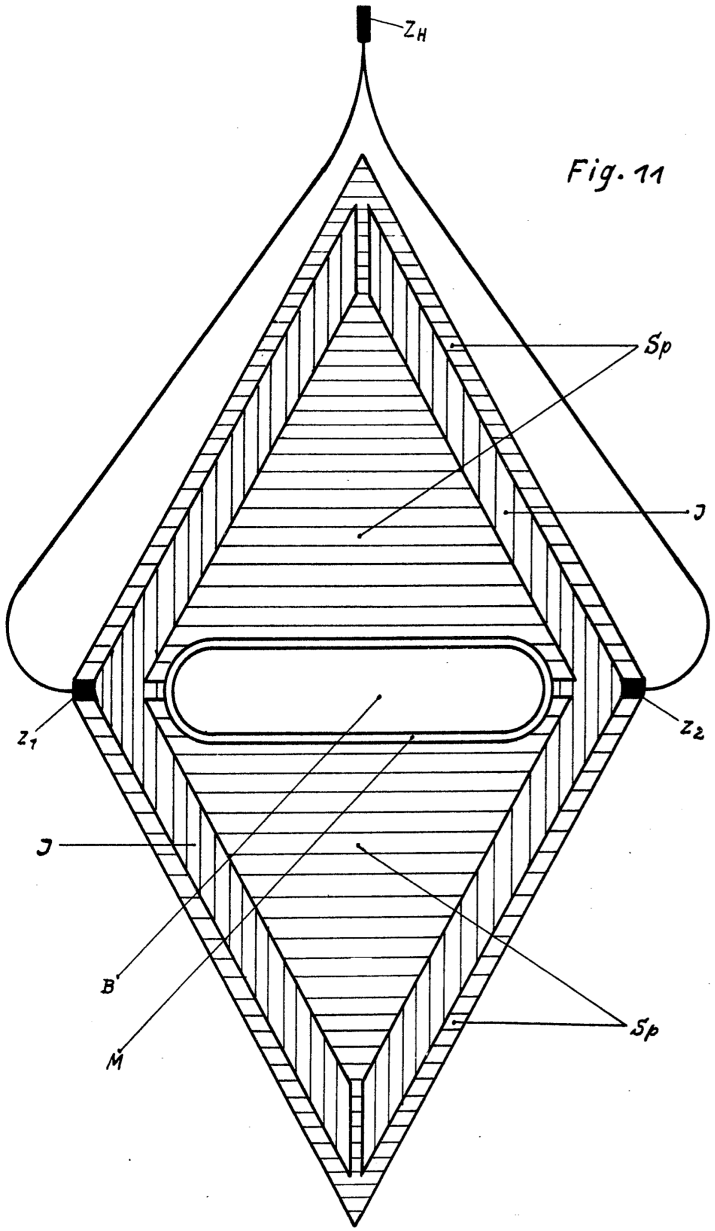
Component	Gadget/Fat Man	Thuringian Device
Neutron initiator	~ 7 g beryllium/polonium-210 "urchin" 1.25 cm radius	Deuterium + lithium with high voltage ~ 1.25 cm radius and/or external 6 MeV betatron
Pit	6.2 kg ^{239}Pu 4.6 cm radius	**For test:** <1 kg inner layer of ^{235}U with ~ 5–10 kg natural or low-enriched U outer layer **For deployment:** ~ 5–10 kg ^{235}U ~ 5 cm radius
Tamper/ reflector	108 kg natural U 11.1 cm radius	~ 100 kg natural U ~ 11 cm radius
Neutron absorber	Boron-10 plastic 3.2 mm thick	~ 1.3 kg cadmium ~ 1 mm thick
Pusher	130 kg aluminum 23.5 cm radius	~ 130 kg aluminum ~ 23 cm radius
Explosive	Composition B and baratol 2500 kg, segmented ~ 70 cm radius	TNT, RDX, and liquid oxygen ~ 1400 kg, segmented ~ 63 cm radius
Explosive case	~ 180 kg aluminum 72.5 cm radius	~ 140 kg aluminum ~ 64 cm radius
Ballistic case	Steel 4.5 mm thick 75 cm radius	~ 190 kg steel ~ 4.5 mm thick 65 cm radius
Overall radius	75 cm	~ 65 cm
Total mass	3000 kg (bomb only) 4670 kg (with shell and fins)	~ 2000 kg
Delivery system	Boeing B-29 heavy bomber	A-4, A-9, or A-9/A-10 ballistic missile
Explosive yield	20 kilotons	**For test:** < 1 kiloton **For deployment:** ~ 5–100 kilotons

- **A number of sources reported at least four successful test explosions from October 1944 to March 1945.**
- **The test explosions were likely kept as small as possible by using just enough fuel to briefly achieve criticality, both to conserve weapons-grade fuel and to minimize the mess made in German territory.**
- **With enough fuel, fielded versions could have had larger explosive yields than the first U.S. fission bombs.**

For more information, see *Forgotten Creators* D.8 and D.15

8. Fission Bomb, Mass ~300 kg, Yield <1 kT, Tested 1944-45?

Erich Schumann and Walter Trinks. Patent DE977825.



For more information, see *Forgotten Creators* D.8 and D.15

Werner Grothmann (Himmler's adjutant). 2000. Jonastalverein Archive, Arnstadt. pp. 9, 18.

What I know is the actual preparation for the prototype production of the two fully constructed atomic bomb types for uranium and plutonium. [...] I was not allowed to know anything about it, so I can only say that there were two standard types for use against cities and two more of a different size, which were supposed to be [tactical] front-usable and contain smaller charges. I learned only after the war that one of the two smaller ones would have had a charge equivalent, that is a comparable explosive material quantity, of I believe 130 tons. This was supposed to be used against railway tunnels, port facilities and military installations. The point was that the small weapons required only very little material, which overcame first of all the shortage [of fission fuel]. […] I know that the smaller was about the size of the SC 250, but the weight was higher.

R. P. Linstead & T. J. Betts (U.K. & U.S. CIOS chairs). 15 September 1945 final report. *The Intelligence Exploitation of Germany.* AFHRA A5186 pp. 904–1026.

Certain items have been omitted because of security considerations. […] Of particular significance were the statements, made by German experts in the rocket and controlled missile field, that much of the priority accorded their work by the German High Command was in anticipation of the use of atomic explosives. These authorities stated that KWI had repeatedly assured Hitler that an atomic explosive would be available for use within a comparatively short time. During the last months of work by the Peenemünde staff, V-weapons were designed with much smaller war-heads. Quite possibly this trend was in anticipation of the successful development of a German atomic explosive.

National Museum of the U.S. Air Force, Wright-Patterson AFB, Ohio

Distribution: 27 Mar 45
Mr Merck
Lt Col Cole (2)
SGO
NDD
OSS
OSRD

ETOUSA
Col Paget
Dr. Maas
Scien.Br.
Col Pash

SECRET

WAR DEPARTMENT
Military Intelligence Service
Washington

26 March 1945

BW INFORMATION

SOURCE: MFIU No 1, 13 March 45, (From CPM) PW Intelligence Bulletin No 1/47 Desperation Warfare

E X T R A C T

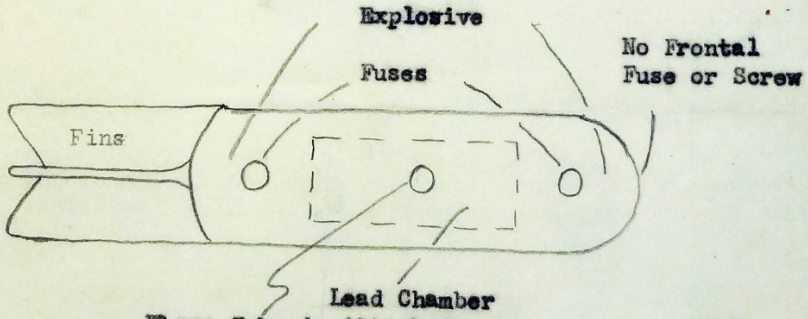
* * * * * * * * *

16. Microbe Bombs

PW (captured 1 Mar vic AMMERN) saw appr one hundred 250 kg bombs stored in a hall at Flughorst Ost, MAGDELBURG. PW was told that these were microbe bombs.

As described to PW, the bomb has two detonating chambers (one in front and one in back) with 2 side fuzes. In the center of the shell is an empty lead lined chamber with threaded opening on the side into which a tube is screwed. The opening has 8 threads and when the tube is screwed into the last thread it is opened and the microbes which have been stored in the tube escape into the chamber. The opening is smeared with a gelatinous substance to prevent the escape of germs.

PW thinks the germs are of cholera type.



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G-2 COMMENT:

This (250kg) seems quite large for a single BW bomb. Further interrogation is contemplated, and information will be forwarded.

9. H-Bomb, Mass 6000 kg, Yield ~MT, Expected Test 1945-46

Primary sources for hydrogen bomb design

	Sänger 1944	*Daily Mail* 44	*Evening Std.* 45	Kober 1945	Ferrant 1945	Schumann 1945-52	Kästner 1946	Sorg 1946	Thirring 1946	von Braun 1946	Zumpe 1946	U.S. Intel 1946-51	Klemm '47, '04	Granziani 1948	Jetter 1950	Grothmann 2000-2002
Bomb mass	6 tons					Tons	6 tons	6 tons	6 tons	6 tons	6 tons				Tons	"Swollen bomb" (apparently very large)
Explosive energy		6-mile blast radius (~1.6 mega-tons)	6-mile blast radius (~1.6 mega-tons)	10^6 greater than nitro-glycerin (mega-tons)	Mega-tons poten-tially	Megatons potentially						"Even more deadly weapon than the atomic bomb" (>>20 kilotons)		6-mile blast radius (~1.6 mega-tons)	Mega-tons	"100x greater than that of the uranium bomb" (megatons)
Method of action	H-bomb implied by bomb mass and priority	H-bomb implied by blast radius	"Atomic" reactions; H-bomb implied by blast radius	H-bomb with lithium hydride (LiD?)	Explosive with lithium deuteride (LiD) and fission fuel	H-bomb with lithium deuteride (LiD) and fission fuel	Radio-active; H-bomb implied by bomb mass and parachute	H-bomb implied by bomb mass and priority	Lithium hydride (LiD?) H-bomb with fission bomb trigger	H-bomb implied by bomb mass and priority	H-bomb implied by bomb mass and priority	H-bomb with lithium hydride, deuterium and/or tritium	Highly secret military project using lithium -6 and tritium	H-bomb implied by blast radius	H-bomb with lithium deuteride (LiD) & fission bomb trigger	Hydrogen bomb; fission bomb as trigger
Vehicle	Rocket	Rocket					Parachute from plane	Plane		Rocket	Rocket	Rocket		Rocket		
Ready			Oct. 1945	"Test site" by 1945				Later 1945						Soon		1946
People involved	Aus-trian scien-tists		Groth	Stetter, other Austrian scientists, Gerlach, Toma-schek, AEG scientists	Ferrant, AEG scientists, Austrian scientists (implied)	Schumann, Trinks	Kästner, Petersen, Sorg, Austrian nuclear scientists, Schulz-Kampf-henkel	Peter-sen, Sorg	Jentschke and other Austrian nuclear scientists	von Braun, SS and Kammler (implied)	(Likely Puru-cker and his car full of bomb plans)	Stetter, Jentschke, Lintner, Mattauch, Ortner, Czulius, Schintl-meister	Klemm, Mattauch, Austrian nuclear scientists (implied), production elsewhere		Jetter	Himmler, SS, Kammler (implied), Austrian nuclear scientists
Places	Austria	French launch site	Celle	Austria, Berlin, Munich	Berlin, Austria	Berlin area	Austria	Austria and Baltic coast	Austria	Baltic coast		Austria	Tail-fingen, Berlin, Austria			Austria, Berlin

For more information, see *Forgotten Creators* D.9 and D.14

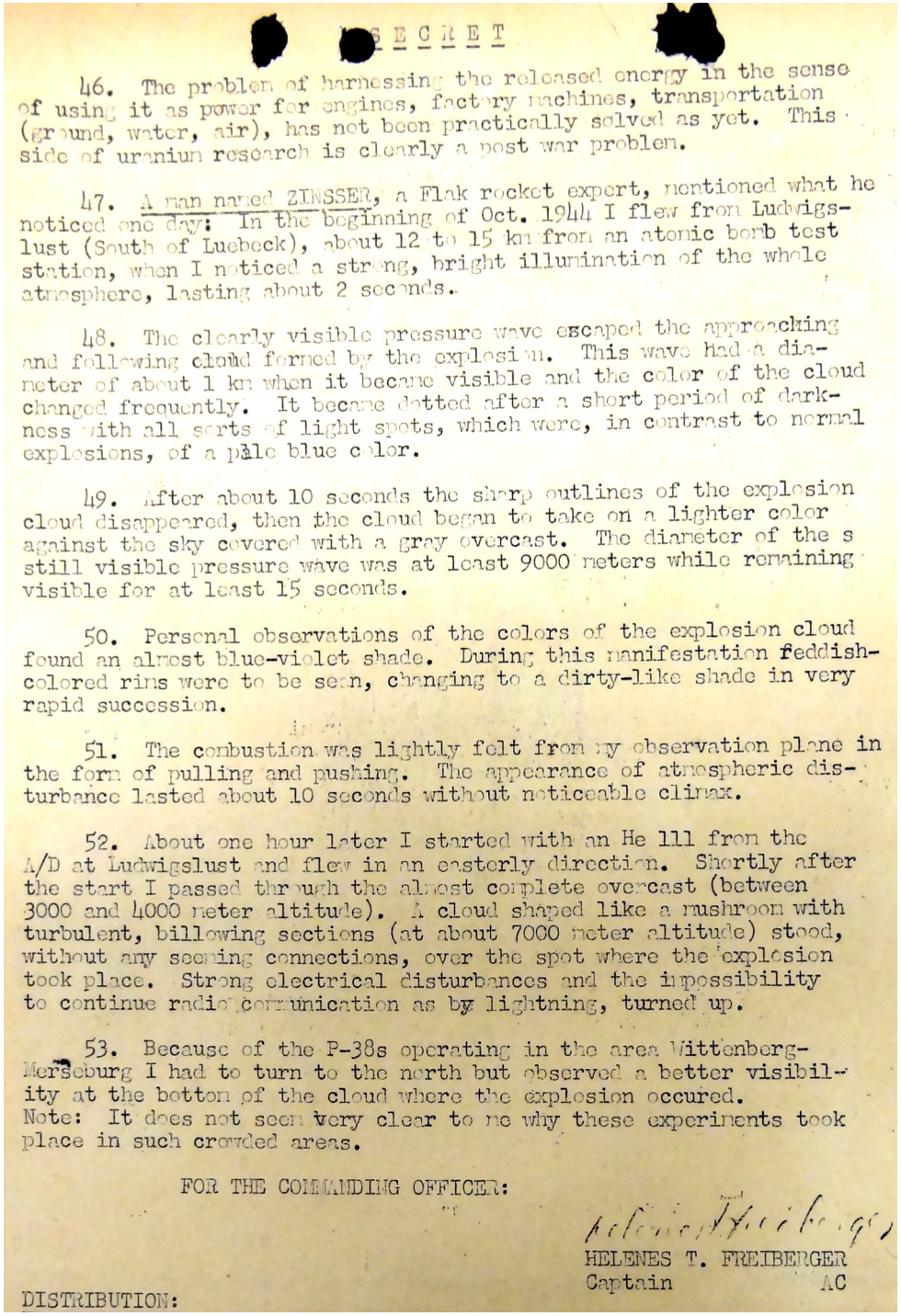
10. Possible October 1944 Test Explosion on Baltic Coast

		Primary sources for October 1944 test						
		German PW Aug. 1944	**Morrison Oct. 1944**	**Olmes May 1945**	**Zinsser Aug. 1945**	**Romersa 1955--2005**	**Grothmann 2000--2002**	**Mestlin 2004**
Details	**Test date**	Preparing for test as of ~July 1944	First half of October 1944	Sometime near the end of the war	Early October 1944	11:45 a.m. on 12 October 1944	First half of October 1944	12 October 1944
	Test location	Near an estate in Pomerania (Baltic coast)	Baltic coast	Baltic coast	Baltic coast	Rügen island on Baltic coast	Location would provoke negative public reaction [Baltic coast is tourist area]	Rügen island on Baltic coast
	People who were involved	Military	Military	SS, military, scientists (implied)	Military	Army Ordnance Office, SS	SS, Himmler, Kammler, Gerlach, Post Office, Diebner, Flügge	Military
	Blast	Expected blast radius of kilometers	Suspiciously large explosion(s)	Blast kilometers wide	Bright fireball, mushroom cloud, shockwave that grew to >9 km wide	Blinding flash; heat and shockwave in bunker 2 km away; mushroom cloud; vaporized animals, trees, buildings	Successful nuclear test, possibly ~3 kilotons	Violent explosion, big dust cloud, visible from kilometers away
	Radio-activity	Development related to use of heavy water		Demonstrated atom splitting	Ionized glowing mushroom cloud, severe radio interference	Had to remain inside bunker for over 5 hours after explosion, then wear protective suit to visit test site	Nuclear fission	
	Device design	New weapon that was an extremely powerful explosive and was extremely secret	Possibly an atomic bomb test	Atomic bomb with ~1 kg of fuel	Atomic bomb	Atomic disintegration (i.e., fission) bomb mounted above the ground	> 1 m dia. sphere Very heavy Aluminum case A little U-235 for test More U-235 for deployment Ignition by special system Tested on a stand	Something that produced an extraordinarily large explosion

For more information, see *Forgotten Creators* D.10

10. Possible October 1944 Test Explosion on Baltic Coast

A.P.W.I.U. (Ninth Air Force) 96/1945. 19 August 1945. Investigations, Research, Developments, and Practical Use of the German Atomic Bomb. NARA RG 38, Entry 98C, Box 9, Folder TSC # 2601--2700; AFHRA B-5737 pp. 340—345. Upgraded from Secret to Top Secret in October 1945.



SECRET

46. The problem of harnessing the released energy in the sense of using it as power for engines, factory machines, transportation (ground, water, air), has not been practically solved as yet. This side of uranium research is clearly a post war problem.

47. A man named ZINSSER, a Flak rocket expert, mentioned what he noticed one day: In the beginning of Oct. 1944 I flew from Ludwigslust (South of Luebeck), about 12 to 15 km from an atomic bomb test station, when I noticed a strong, bright illumination of the whole atmosphere, lasting about 2 seconds.

48. The clearly visible pressure wave escaped the approaching and following cloud formed by the explosion. This wave had a diameter of about 1 km when it became visible and the color of the cloud changed frequently. It became dotted after a short period of darkness with all sorts of light spots, which were, in contrast to normal explosions, of a pale blue color.

49. After about 10 seconds the sharp outlines of the explosion cloud disappeared, then the cloud began to take on a lighter color against the sky covered with a gray overcast. The diameter of the s still visible pressure wave was at least 9000 meters while remaining visible for at least 15 seconds.

50. Personal observations of the colors of the explosion cloud found an almost blue-violet shade. During this manifestation reddish-colored rims were to be seen, changing to a dirty-like shade in very rapid succession.

51. The combustion was lightly felt from my observation plane in the form of pulling and pushing. The appearance of atmospheric disturbance lasted about 10 seconds without noticeable climax.

52. About one hour later I started with an He 111 from the A/D at Ludwigslust and flew in an easterly direction. Shortly after the start I passed through the almost complete overcast (between 3000 and 4000 meter altitude). A cloud shaped like a mushroom with turbulent, billowing sections (at about 7000 meter altitude) stood, without any seeming connections, over the spot where the explosion took place. Strong electrical disturbances and the impossibility to continue radio communication as by lightning, turned up.

53. Because of the P-38s operating in the area Wittenberg-Merseburg I had to turn to the north but observed a better visibility at the bottom of the cloud where the explosion occured.
Note: It does not seem very clear to me why these experiments took place in such crowded areas.

FOR THE COMMANDING OFFICER:

HELENES T. FREIBERGER
Captain AC

DISTRIBUTION:

John Hooper, 30 September 2005, Author Fuels Row Over Hitler's Bomb, *The Guardian*, www.theguardian.com/world/2005/sep/30/books.italy:

Mussolini provided him [Luigi Romersa] with letters of introduction to both Josef Goebbels, the Nazi propaganda chief, and Hitler himself. After meeting both men in Germany, he was shown around the Nazis' top-secret weapons plant at Peenemünde and then, on the morning of October 12 1944, taken to what is now the holiday island of Rügen, just off the German coast, where he watched the detonation of what his hosts called a "disintegration bomb".

"They took me to a concrete bunker with an aperture of exceptionally thick glass. At a certain moment, the news came through that detonation was imminent," he said. "There was a slight tremor in the bunker; a sudden, blinding flash, and then a thick cloud of smoke. It took the shape of a column and then that of a big flower.

"The officials there told me we had to remain in the bunker for several hours because of the effects of the bomb. When we eventually left, they made us put on a sort of coat and trousers which seemed to me to be made of asbestos and we went to the scene of the explosion, which was about one and a half kilometres away.

"The effects were tragic. The trees around had been turned to carbon. No leaves. Nothing alive. There were some animals—sheep—in the area and they too had been burnt to cinders."

On his return to Italy, Mr Romersa briefed Mussolini on his visit. In the 1950s, he published a fuller account of his experiences in the magazine *Oggi*. But, he said, "everyone said I was mad".

10. Possible October 1944 Test Explosion on Baltic Coast

- Rügen island on the Baltic coast of Germany was used for the "most secret research" during the war, according to U.S. wartime intelligence documents.
- In particular, the isolated Bug peninsula was used as a military base 1935–1945.
- It may have been the location of a nuclear test explosion in October 1944.

11. Possible ~November 1944 Test Explosion in Poland

		Primary sources for ~November 1944 test							
		Polish engineer March 1946	**Jackson June 1946**	**Rumor cited by Hahn Dec. 1946**	**Mansfeldt Dec. 1946**	**Edmund Tilley August 1947**	**Kersten 1947**	**Wulff 1973**	**Grothmann 2000-2002**
Details	**Test date**	Prior to end of war (implied)	Late 1944?	~November 1944	Prior to January 1945	Prior to January 1945 (implied)	1944	1944	~November 1944
	Test location		Near Auschwitz	Somewhere in Poland	Associated with Auschwitz	Somewhere in Poland (implied)	Near Auschwitz	Near Auschwitz	Location would provoke negative public reaction [war crimes]
	People who were involved	German-run industry in Poland	SS	SS (implied)	SS	SS, I.G. Farben, German-run industry in Poland	SS	SS	SS, Himmler, Kammler, Gerlach, Post Office, Diebner, Flügge
	Blast		Immediately vaporized entire test village with 400-500°C [4000-5000°C?]	Like Hiroshima but smaller			Single burst of 6000°C incinerated entire test village	Explosion, heat of 6000°C incinerated entire test village in a flash	Highly explosive, ~3 kilotons?, detonated in air over test site
	Radio-activity	Atomic	Atomic	Like Hiroshima but smaller	Atomic	Nuclear fission	Atomic	Atomic	Nuclear fission
	Casu-alties		20,000 Jewish prisoners in specially constructed test village	Like Hiroshima but smaller			20,000 Jewish prisoners in specially constructed test village	20,000 Jewish prisoners in specially constructed test village	
	Device design	Atomic bomb with a layer of cadmium in the case	Newly invented atomic weapon of mass destruction	Atomic bomb	Atomic bomb	Atomic bomb with a 1-5 kg pit of U-235 or Pu-239	Atomic bomb detonated above the test site	Atomic bomb detonated above the test site	> 1 m dia. sphere Very heavy Aluminum case Larger amount of U-235 than other tests Ignition by special system Dropped over the test site on a parachute

For more information, see *Forgotten Creators* D.11

11. Possible ~November 1944 Test Explosion in Poland

Robert Jackson (chief U.S. prosecutor at the Nuremberg trials), cross-examination of Albert Speer, 21 June 1946, avalon.law.yale.edu/imt/06-21-46.asp:

MR. JUSTICE JACKSON: And certain experiments were also conducted and certain researches conducted in atomic energy, were they not? [...] Now, I have certain information, which was placed in my hands, of an experiment which was carried out near Auschwitz and I would like to ask you if you heard about it or knew about it. The purpose of the experiment was to find a quick and complete way of destroying people without the delay and trouble of shooting and gassing and burning, as it had been carried out, and this is the experiment, as I am advised. A village, a small village was provisionally erected, with temporary structures, and in it approximately 20,000 Jews were put. By means of this newly invented weapon of destruction, these 20,000 people were eradicated almost instantaneously, and in such a way that there was no trace left of them; that it developed, the explosive developed, temperatures of from 400 to 500 [4000 to 5000?] centigrade and destroyed them without leaving any trace at all. Do you know about that experiment?

Letter of Prof. Dr. Gezo Mansfeldt, Professor of Physiological Institute of the University of Budapest (former inmate of the Rajsko camp) to Dr. Hans Münch (during the war at the SS-Hygiene Institute in Rajsko), 5 December 1946, US Holocaust Memorial Museum, RG-15.169M (1998.A.0247) microfilm reel 8:

The next day was uneventful, and on 27 January [1945], 4:00 in the afternoon the first Russian vanguard marched through the Auschwitz camp. Thus we approximately 3,000 men—physicians, nurses, and patients—were free. [...] I was the only living witness who knew about the Hygiene Institute information and so I was at least 2–3 times weekly interviewed and had to drive to Raisko several times, but now in the fine car, and show everything there. The various scientific commissions were difficult to convince that poison gas and the like was not produced there, and what was actually suspected was clear to me only much later, when I learned of the atomic bomb tests.

11. Possible ~November 1944 Test Explosion in Poland

12. Possible March 1945 Test Explosions in Thuringia

		Primary sources for March 1945 test									
		Ilyichev 11/1944	**Ilyichev 3/1945**	**Kurchatov 3/1945**	**Flerov 5/1945**	**Döpel 1946**	**Werner 1962**	**Wachsmut 1962**	**Rundnagel 1966**	**Koch 1960s**	**Grothmann 2000-2002**
Details	**Test date**	Preparations at fastest pace	Two in ~March 1945	~March 1945	Recent months	Prior to end of war	Evenings of 4 & 12 March 1945	4 March 1945	Work from 1944 to end of war	Early March 1945	4 March 1945
	Test location	Thuringia Wooded area Very remote	Thuringia Wooded area Very remote	Remote area (implied)	Wooded area Very remote	Truppen-übungs-platz military base	Behind Röhrensee from Wachsenburg	Near Ringhofen estate	Thuringia near Diebner lab, possibly other installations	Thuringia Wooded area Near research installation	Thuringia near Ohrdruf base, SS lab, Diebner lab, bomb production
	People who were involved	SS	SS			SS (implied), scientists (implied)	SS, Post Office, Research Council	SS, Kammler, Post Office, Research Council, special doctors	Diebner's scientists, SS (implied)	SS (implied), scientists (implied)	SS, Himmler, Kammler, Gerlach, Post Office, Diebner, Flügge, special doctors
	Blast	Large destructive power	High temp., large blast, buildings/trees in 500-600 m radius	Several hundred meter radius		Atomic bomb test	Bright flash and strong wind from kilometers away	Stinging flame to edge of forest		Far larger than normal bomb, destroyed test site, knocked down trees	Deployed: ≥ 3 kt Tested: ≥ 0.13 kt but << 3 kt, larger than expected
	Radio-activity	Probably atomic	Massive radioactive effect	Probably atomic	Test for residual radioactivity	Atomic bomb test	Radiation sickness in surrounding towns	Protective gear, decon., radiation sickness			On-site production Horrible test effects Doctors had to help surrounding areas
	Casu-alties	Rapid SS construction → many POWs likely present	Many POWs vaporized, killed, and burned		POWs present		Many bodies to be collected	~450-700 POWs killed or burned; more than expected		People in the area would have been killed	Many workers at test site killed, doctors had to help surrounding areas
	Device design	Probably atomic, 1.5 m diameter, several nested hollow spheres	1.3 m dia. 2 tons Al case U-235 fuel Ignition by neutrons Detailed implosion design Designed for rocket Used LOX to reduce weight	Spherical U-235 fuel Ignition by neutrons Implosion design Designed for rocket Used LOX to reduce weight	Probably atomic bomb	Uranium bomb	Something new that will make world history	Something new of which the whole world will speak	Atomic bomb capable of killing >100,000 people. At least two bombs. 8 kg fuel each, small enough to store in safe.	New and unusual weapon	> 1 m dia. sphere Very heavy Aluminum case A little U for test More U-235 for deployment Ignition by special system Designed for rocket Integrated design to minimize weight Tested on a stand

The provenance of the 1962 Werner and Wachsmut sources is unknown and open to question.

For more information, see *Forgotten Creators* D.12

12 August 1944

12. Possible March 1945 Test in Thuringia

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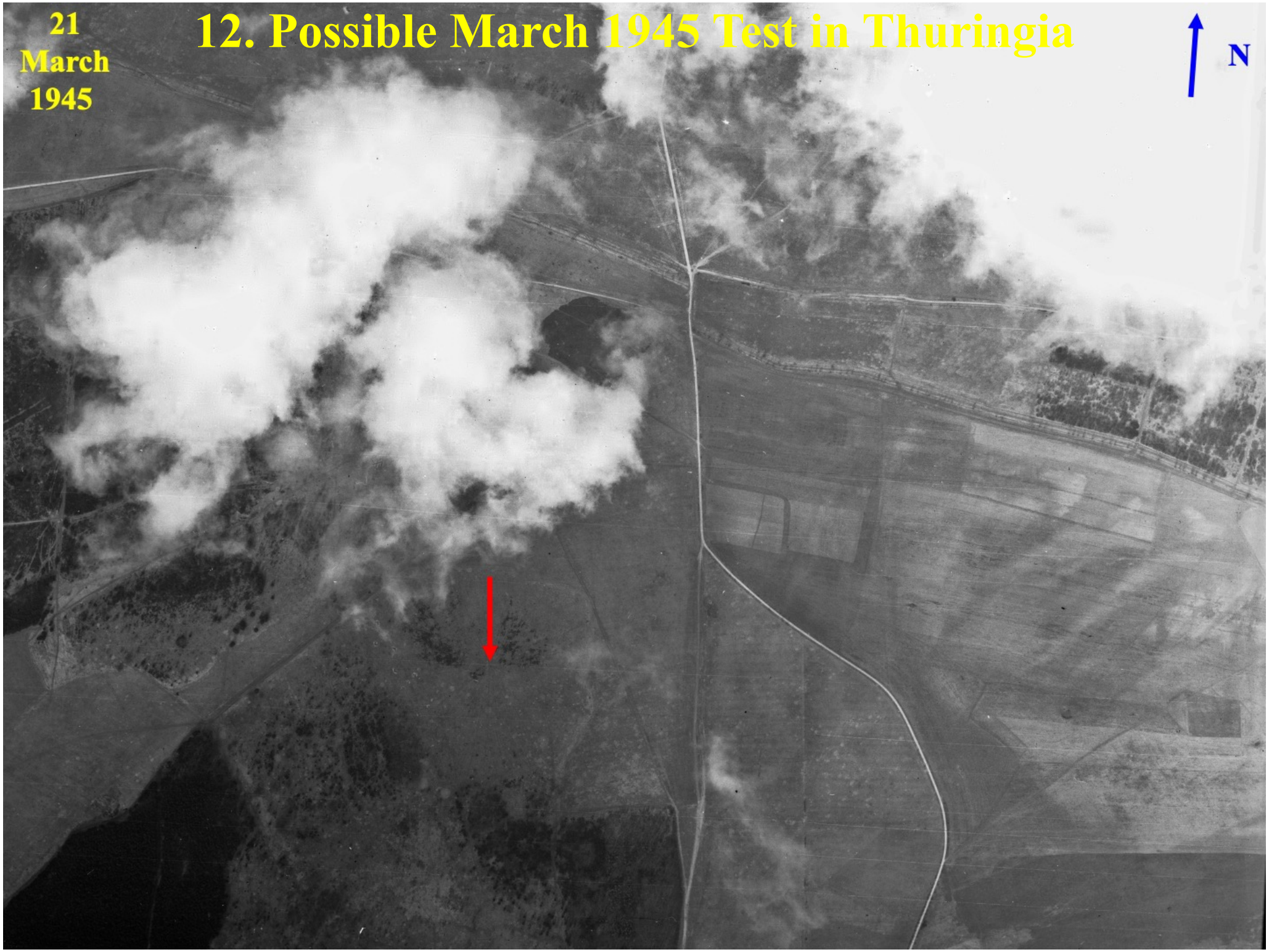
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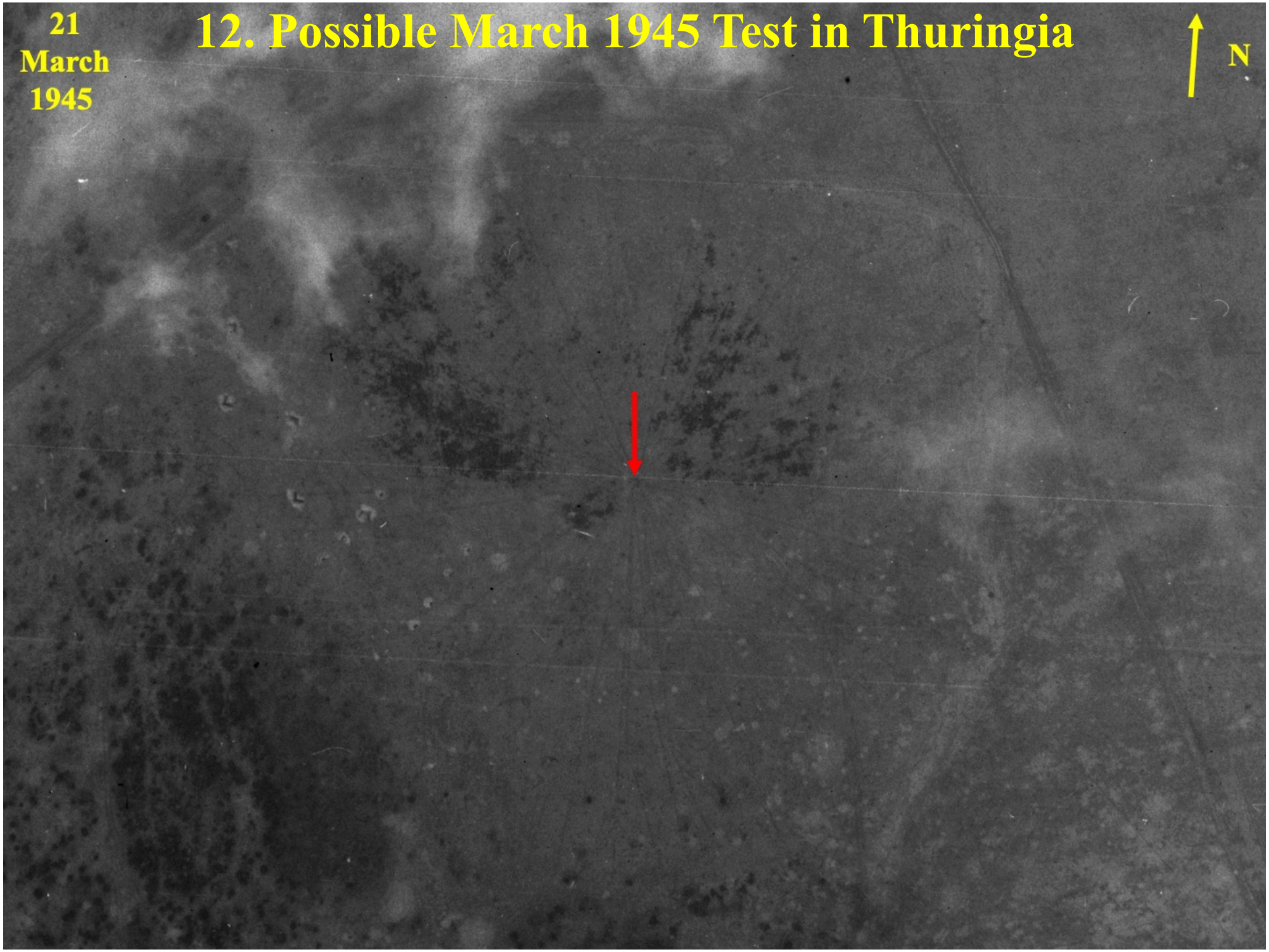

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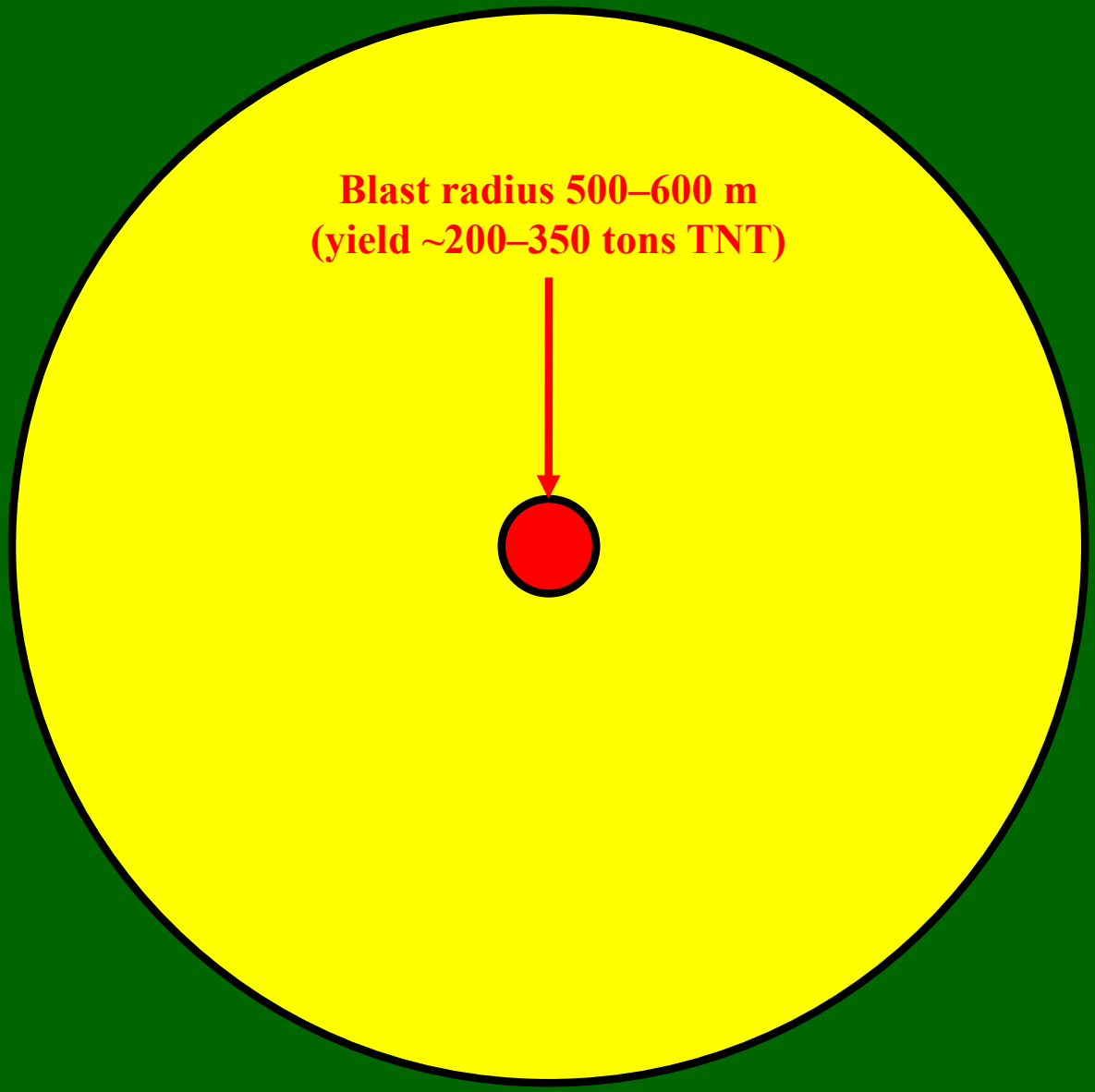

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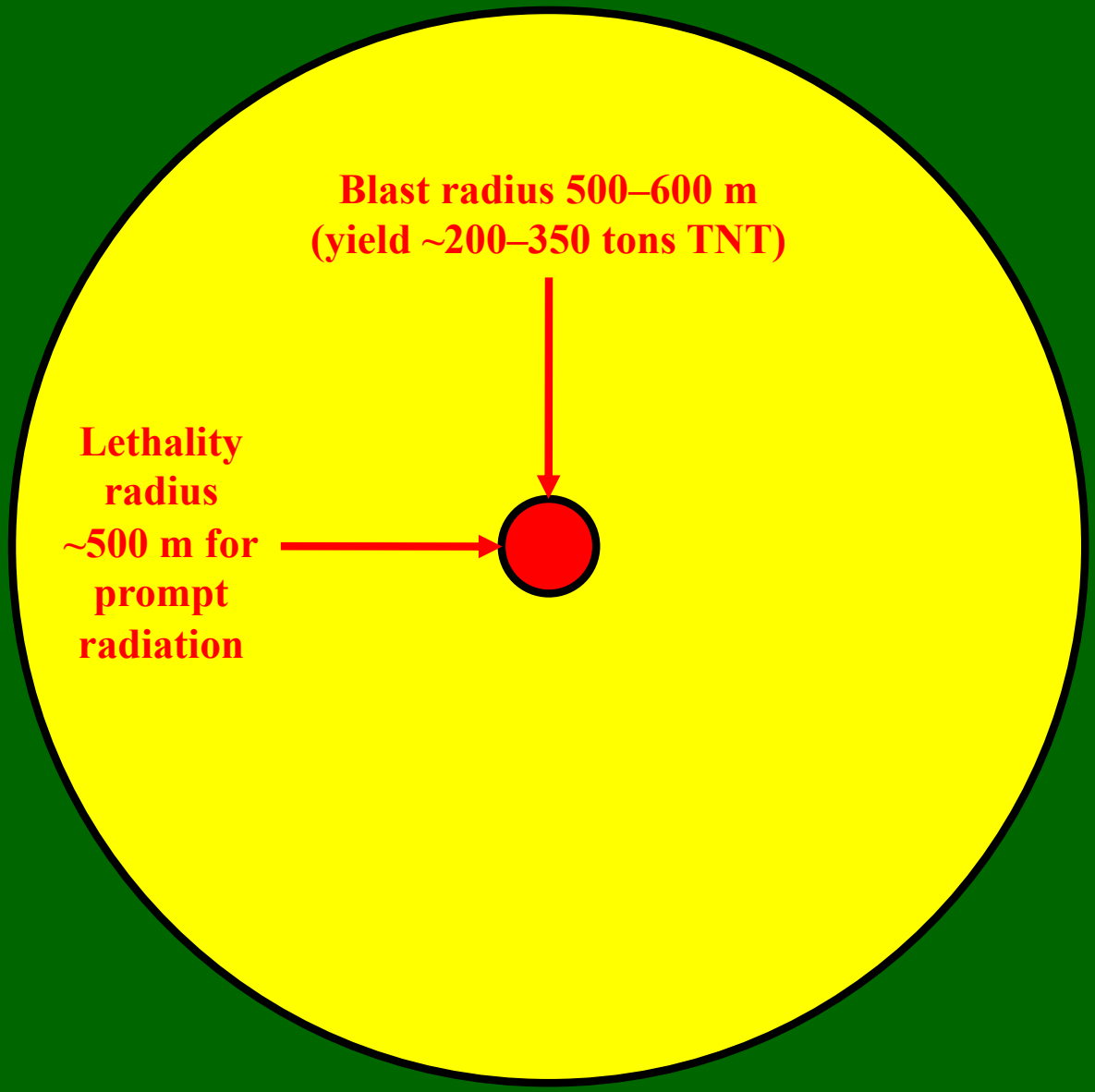

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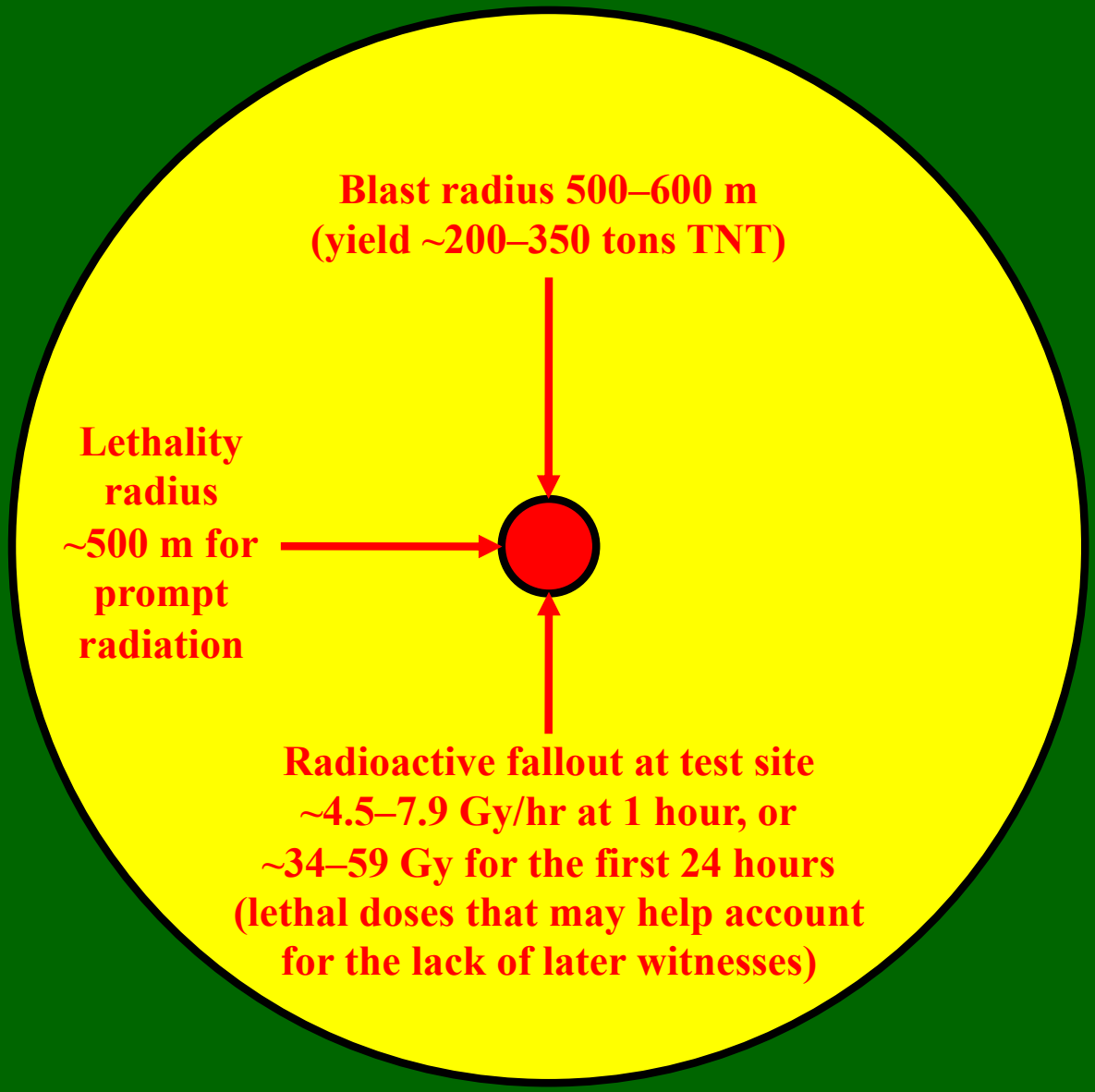

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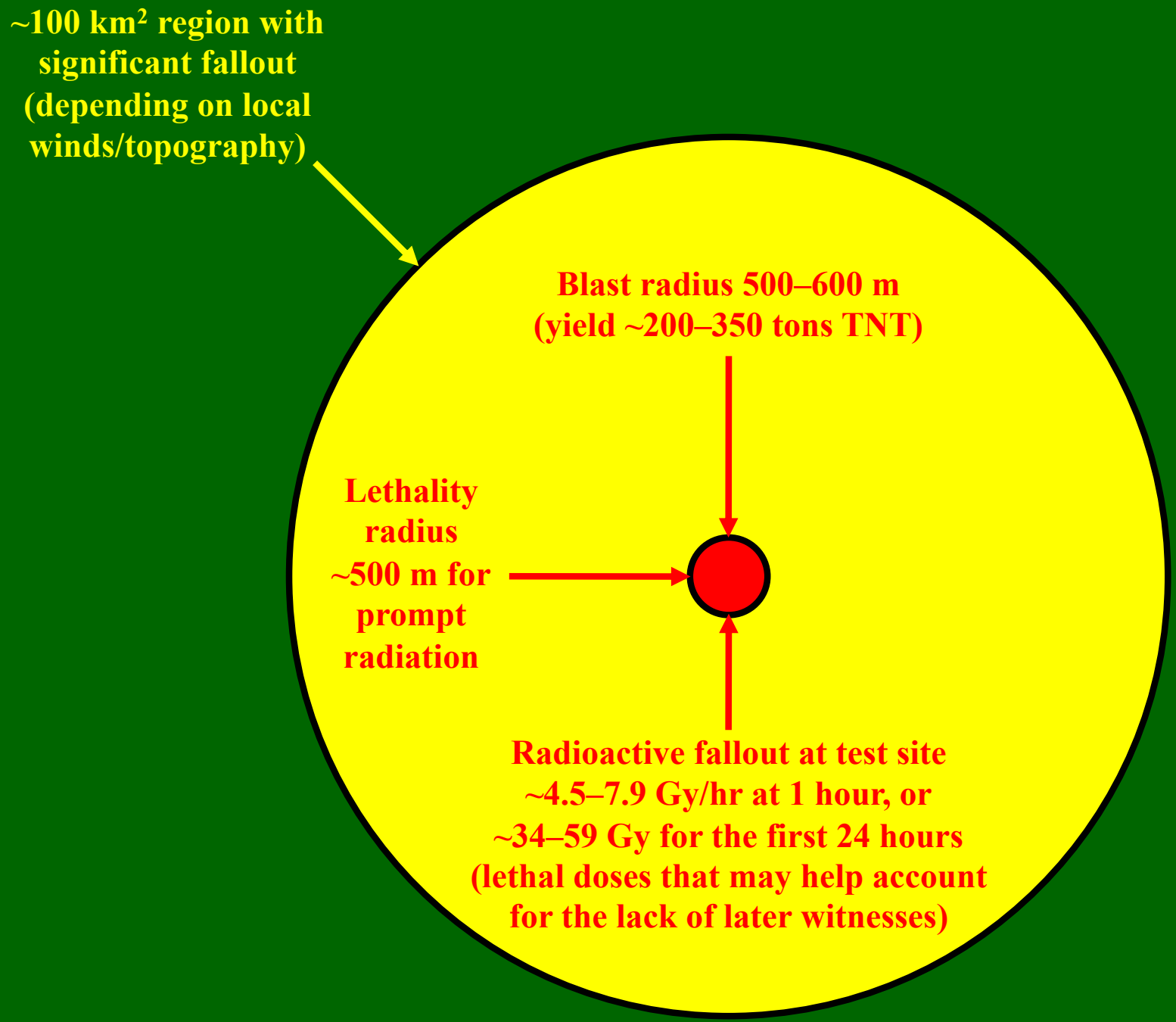

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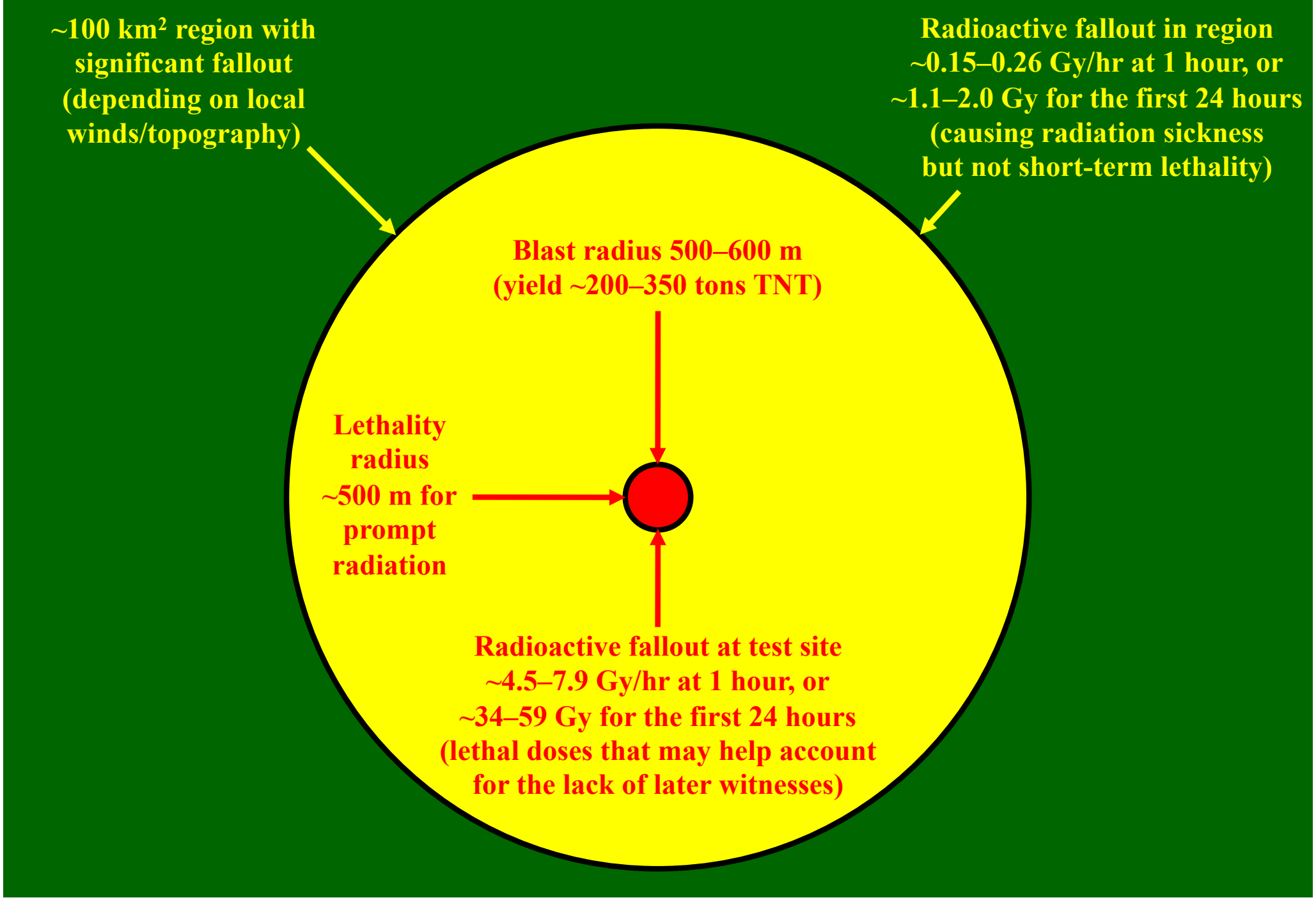

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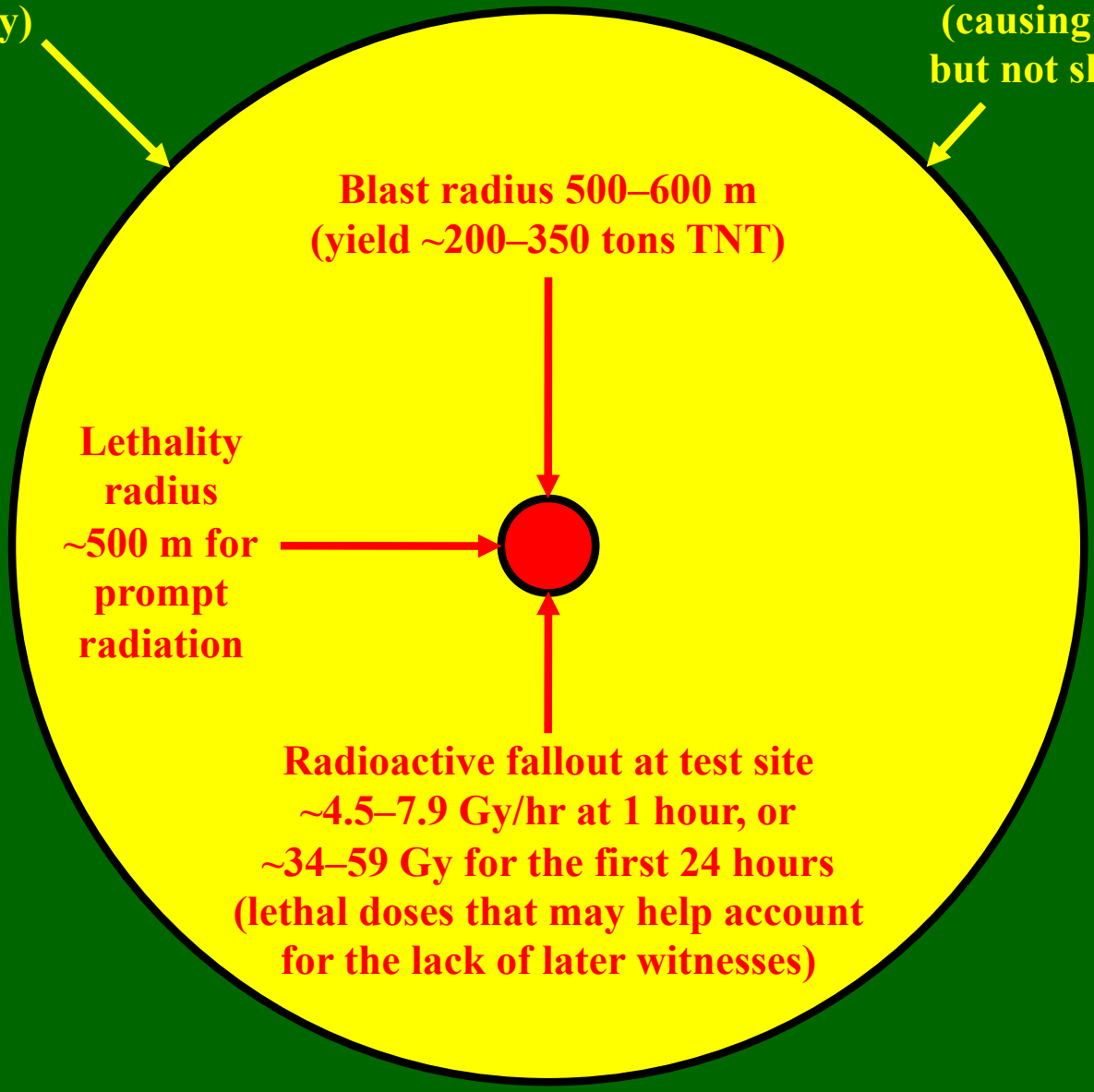
~100 km² region with significant fallout (depending on local winds/topography)

Radioactive fallout in region ~0.15–0.26 Gy/hr at 1 hour, or ~1.1–2.0 Gy for the first 24 hours (causing radiation sickness but not short-term lethality)



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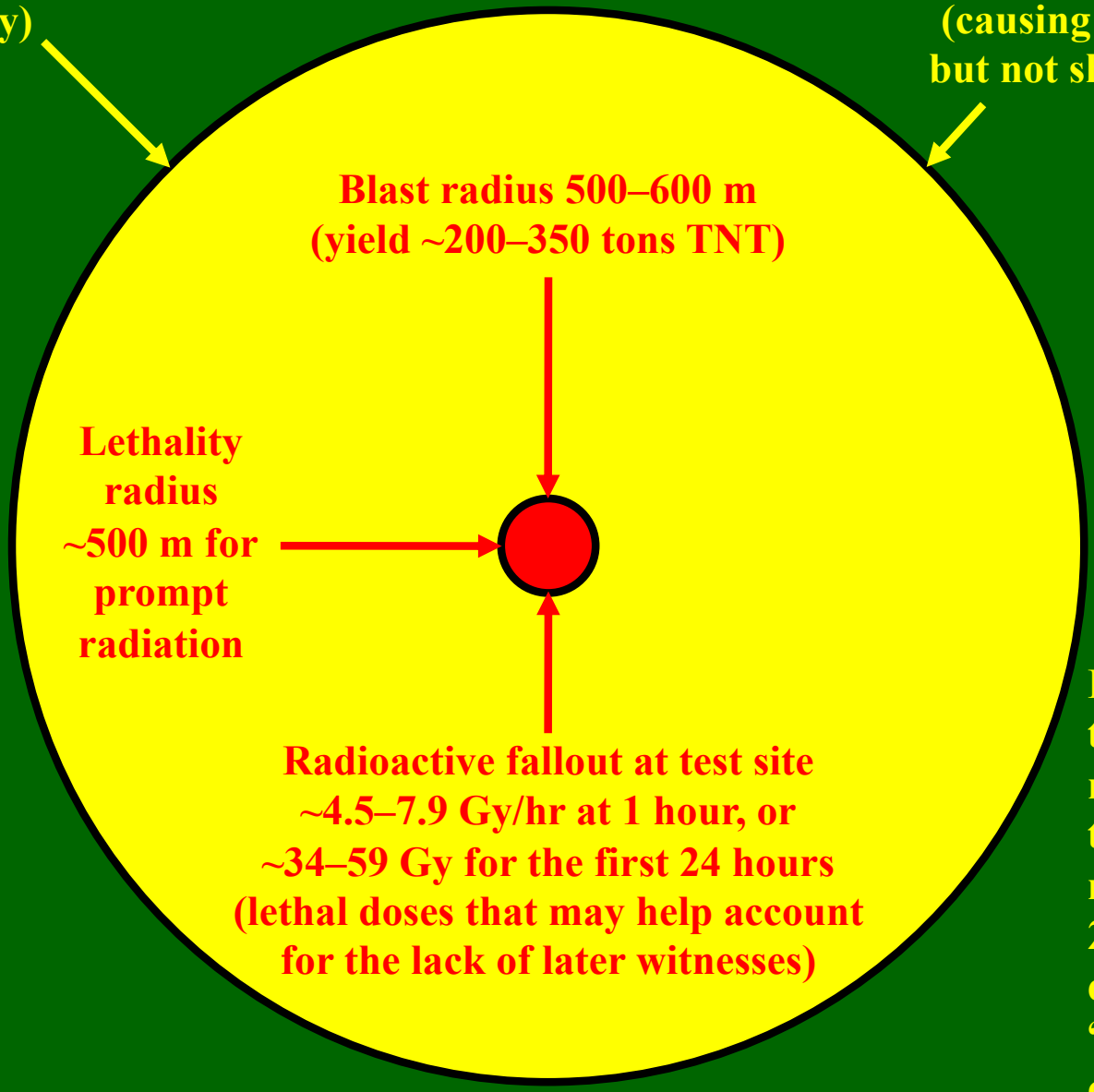

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Prompt radiation at the test site and the radioactive fallout at the test site and in nearby towns within 24 hours fit Ilyichev's description that a "massive radioactive effect was observed"

12. Possible March 1945 Test Explosions: Radioactivity Now

After 79+ years, the radioactivity of the fallout would have dropped to ~2×10^{-9} of its radioactivity 1 hour after the explosion [Glasstone and Dolan 1977, p. 393], or ~2.6–4.6×10^{-6} Gy/yr averaged over the region and ~7–14×10^{-5} Gy/year right at the test site.

The residual radioactivity at the test site would be at least ~10–30 times smaller than the natural background radiation (~1–2×10^{-3} Gy/yr) and hence extremely difficult to detect.

After 79+ years of water, wind, and human activity, the fallout could easily have become scattered over a significantly larger area than the 100 km^2 assumed here, and/or become buried to varying depths in the ground, making it even harder to detect.

Therefore modern measurements of residual radioactivity cannot prove or disprove whether the March 1945 Thuringian nuclear tests (or other possible tests) occurred.

Other scientific methods may or may not be able to detect signs of the tests:

- **Using mass spectrometry, particle-induced X-ray emission, neutron activation analysis, or other highly sensitive methods.**
- **Looking for ^{238}U from the tamper.**
- **Comparing data at and away from the test sites to eliminate background signals.**

13. Axis Belief in the Reality of German Nuclear Weapons

Hitler visiting the Reichswerke Hermann Göring at Linz, Austria (near Gusen) on 4 April 1943, apparently surrounded by nuclear scientists

Bayerische Staatsbibliothek, Munich

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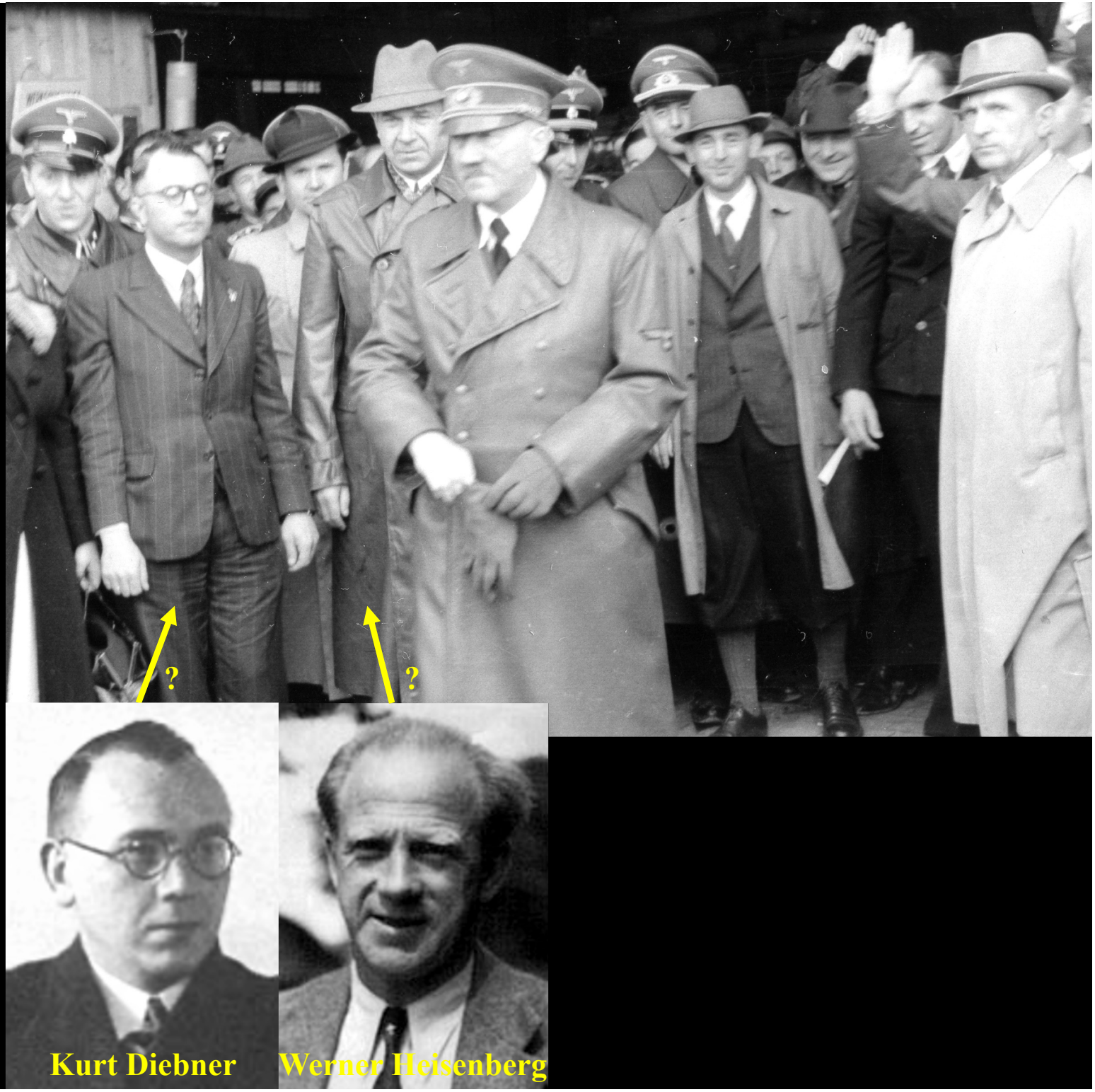

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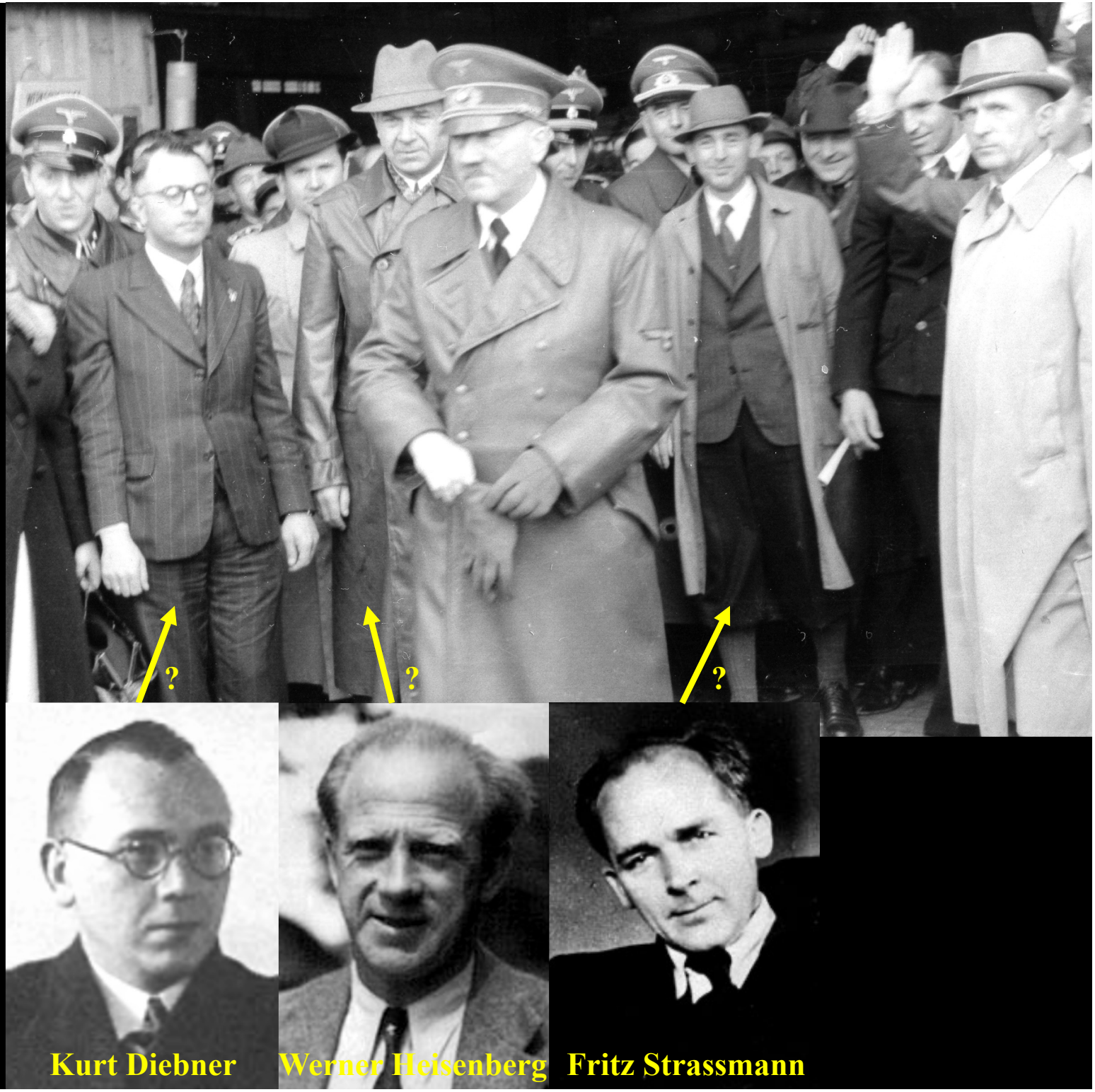

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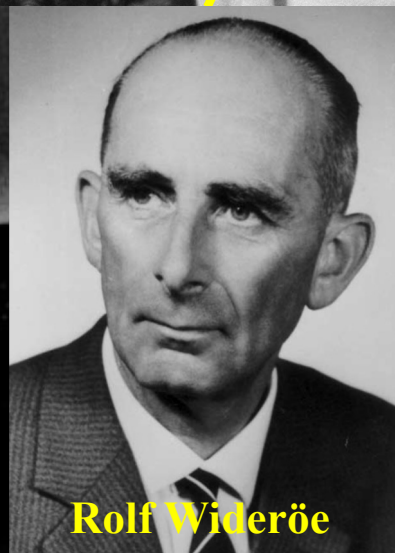
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Edmund Tilley. Brief Operational Report on [censored] and Other Germans and Italians Connected with Project Abstract. 19 August 1947. NARA RG 319, Entry A1-134A, Box 29, Folder Operation Oberjoch:

25. Prof. Dr. NIELS [Walter Nielsch?], now said to be in the United States, was, according to [censored,] concerned with chemical and atomic problems at TUCHELER HEIDE and produced a number of atomic bombs, weighing from 1 to 5 kilograms. NIELS should be traced and questioned in detail.

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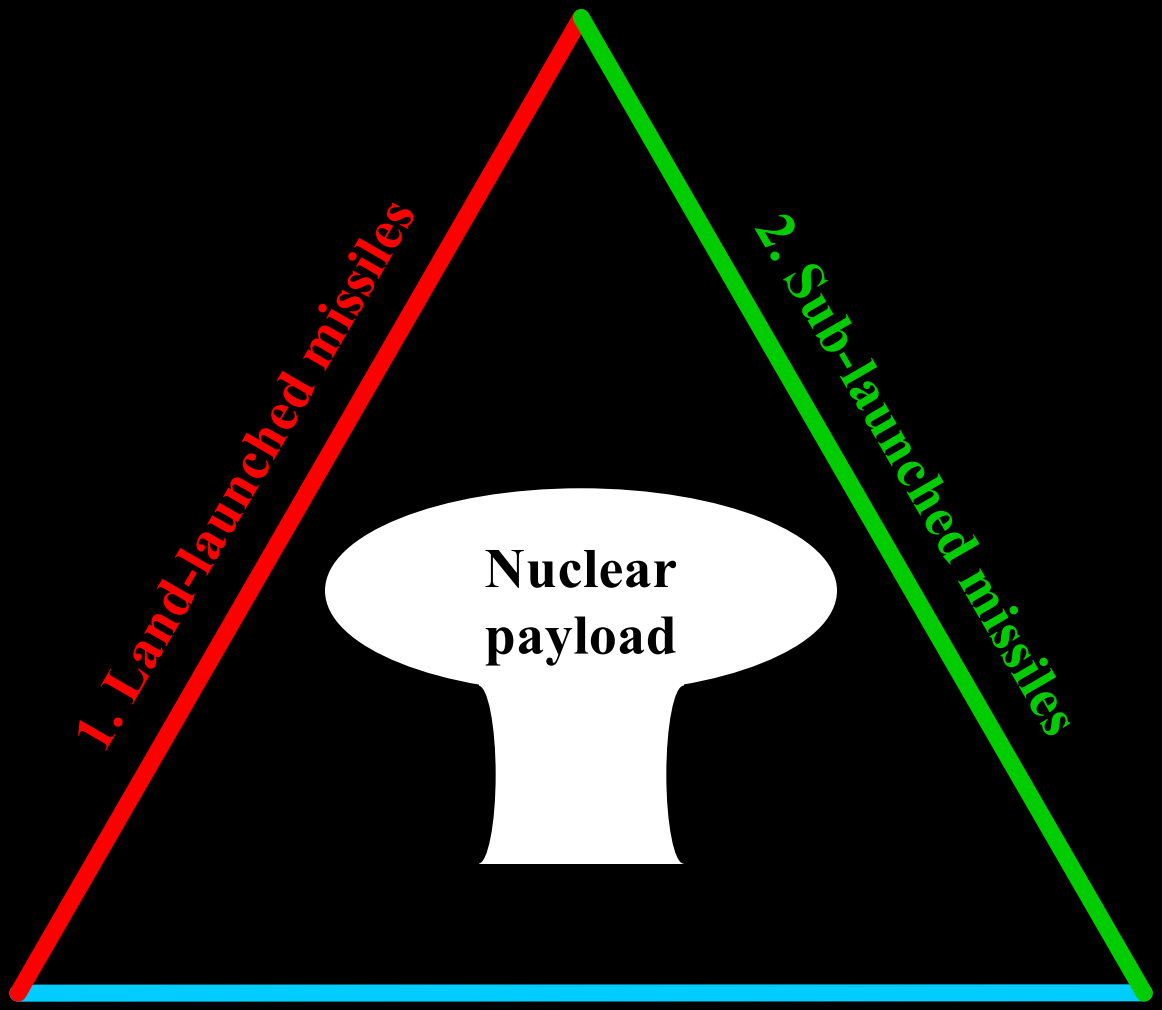
Werner Grothmann, 2002 interview, Jonastalverein Archive, pp. 31–32:

It is known to me that there were four atomic tests. The first still in 1943 in the autumn in the North Sea, which failed. Then two in 1944 in the autumn and the late autumn. One of them on the ground, that is on a small stand, the later one in the atmosphere on a parachute. That one in winter 1944 in the air was highly explosive and the charge [fuel] was also larger. That could have been in November. The last test was then again with a small charge in March 1945. […] I can definitely declare that I was told of six atomic bombs that came from three different research installations. All were prototypes. In addition, there were some very small devices that were intended for laboratory experiments.

Nuclear Triad: Delivery Vehicles for Nuclear Weapons



- **The nuclear triad was NOT originated by the U.S. and Soviet Union after World War II.**
- **The nuclear triad was originated by Germany during WWII, then the tech was transferred.**

For more information, see *Forgotten Creators* Appendix E.

13. Why Did Germany Not Use Its Nuclear Weapons?

C.S.D.I.C. (U.K.) S.R.G.G. 1118. Information received: 10 Jan 1945. AFHRA A5415 frames 284-285. Secret recording of German generals Heinrich Kittel and Wilhelm von Thoma as prisoners of war in U.K.]

KITTEL: (Re atom bomb). It's a perfectly horrible thing. […]

THOMA: Then he would have used it long ago.

KITTEL: No; he isn't using it, because the others have promised to retaliate with chemical warfare.

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In his conversation with Kesselring, latter said to Wolff our situation is desperate, nobody dares tell truth to Fuehrer who surrounded by small group of advisers who still believe in a last specific secret weapon which they call "Verzweiflunge" weapon [Verzweiflungswaffe: desperation weapon]. Kesselring believed this weapon can prolong war but not decide it, but might cause terrible blood bath on both sides. Kesselring said if Fuehrer gave him order to use weapon he would surrender his command.

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Franklin D. Roosevelt. 8 June 1943. Statement Warning the Axis.

From time to time since the present war began there have been reports that one or more of the Axis powers were seriously contemplating use of poisonous or noxious gases or other inhumane devices of warfare. […] I feel obliged now to warn the Axis armies and the Axis peoples, in Europe and in Asia, that the terrible consequences of any use of these inhumane methods on their part will be brought down swiftly and surely upon their own heads. Any use of gas by any Axis power, therefore, will immediately be followed by the fullest possible retaliation upon munition centers, seaports, and other military objectives throughout the whole extent of the territory of such Axis country.

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Dwight D. Eisenhower. 1948. *Crusade in Europe.* New York: Doubleday. Ch. 12.

On December 2, 1943, a most regrettable and disturbing incident took place at the port of Bari. […] One of the ships was loaded with a quantity of mustard gas, which we were always forced to carry with us because of uncertainty of German intentions in the use of this weapon. […W]e manufactured and carried this material only for reprisal purposes in case of surprise action on the part of the enemy.

13. Why Did Germany Not Use Its Nuclear Weapons?

C.S.D.I.C. (U.K.) S.R.G.G. 1118. Information received: 10 Jan 1945. AFHRA A5415 frames 284-285. Secret recording of German generals Heinrich Kittel and Wilhelm von Thoma as prisoners of war in U.K.]

KITTEL: (Re atom bomb). It's a perfectly horrible thing. […]

THOMA: Then he would have used it long ago.

KITTEL: No; he isn't using it, because the others have promised to retaliate with chemical warfare.

Allen Dulles, 1 April 1945, Cable IN 9061 from Bern, Switzerland to Office of Strategic Services, NARA RG 226, Entry UD-90, Box 6, Folder 64 SUNRISE:

In his conversation with Kesselring, latter said to Wolff our situation is desperate, nobody dares tell truth to Fuehrer who surrounded by small group of advisers who still believe in a last specific secret weapon which they call "Verzweiflunge" weapon [Verzweiflungswaffe: desperation weapon]. Kesselring believed this weapon can prolong war but not decide it, but might cause terrible blood bath on both sides. Kesselring said if Fuehrer gave him order to use weapon he would surrender his command.

Rochus Misch. 2014. *Hitler's Last Witness: The Memoirs of Hitler's Bodyguard.* Barnsley: Frontline Books. p. 60.

The Western Allies had threatened that, if Germany used the atom bomb, they would assemble 15,000 aircraft in North Africa and use them to drench all of Germany with poison gas.

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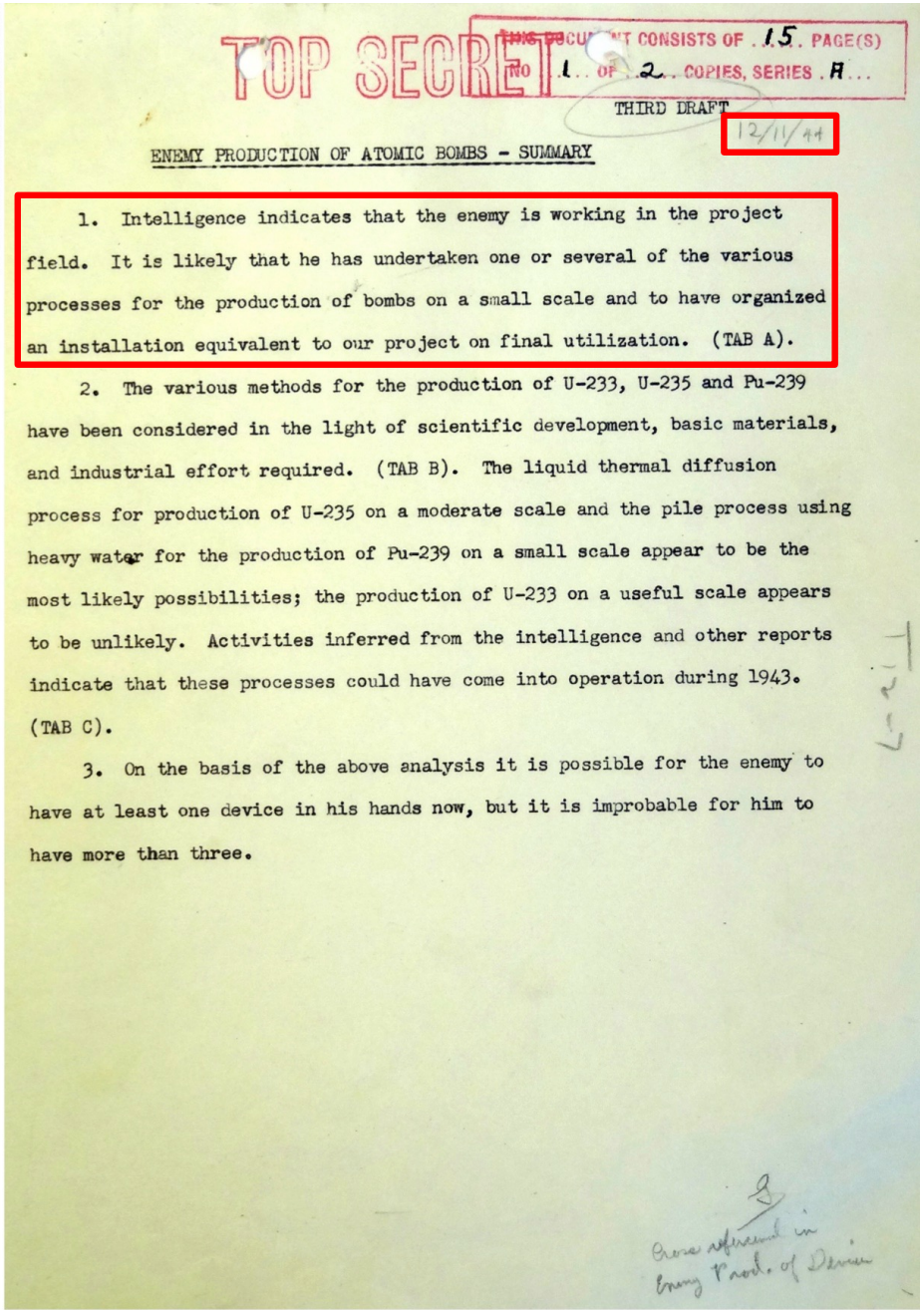
Winston S. Churchill to General Hastings Ismay. 6 July 1944.

I WANT you to think very seriously over this question of poison gas. I would not use it unless it could be shown either that (a) it was life or death for us, or (b) that it would shorten the war by a year. […] I want a cold-blooded calculation made as to how it would pay us to use poison gas, by which I mean principally mustard. […] If the bombardment of London really became a serious nuisance and great rockets with far-reaching and devastating effect fell on many centres of Government and labour, I should be prepared to do anything that would hit the enemy in a murderous place. […] We could drench the cities of the Ruhr and many other cities in Germany in such a way that most of the population would be requiring constant medical attention. […] I quite agree it may be several weeks or even months before I shall ask you to drench Germany with poison gas, and if we do it, let us do it 100%.

14. Allied Belief in German Nuclear Weapons: Wartime Intel



TOP SECRET

THIS DOCUMENT CONSISTS OF 15 PAGE(S)
NO 1 OF 2 COPIES, SERIES A

THIRD DRAFT

12/11/44

ENEMY PRODUCTION OF ATOMIC BOMBS - SUMMARY

1. Intelligence indicates that the enemy is working in the project field. It is likely that he has undertaken one or several of the various processes for the production of bombs on a small scale and to have organized an installation equivalent to our project on final utilization. (TAB A).

2. The various methods for the production of U-233, U-235 and Pu-239 have been considered in the light of scientific development, basic materials, and industrial effort required. (TAB B). The liquid thermal diffusion process for production of U-235 on a moderate scale and the pile process using heavy water for the production of Pu-239 on a small scale appear to be the most likely possibilities; the production of U-233 on a useful scale appears to be unlikely. Activities inferred from the intelligence and other reports indicate that these processes could have come into operation during 1943. (TAB C).

3. On the basis of the above analysis it is possible for the enemy to have at least one device in his hands now, but it is improbable for him to have more than three.

Area referred in Enemy Prod. of Device

14. Allied Belief in German Nuclear Weapons: Wartime Intel

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Gross referred in Enemy Prod. of Device

RG 77
Entry 22
Box 171

33
113/17

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation 32.60-2 Germany: Summary 1945-46
Tab A
Date 1944
From —
To —

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information

☐ Otherwise Restricted Information

NND 917017
Authority

4-8-91cc
Date

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

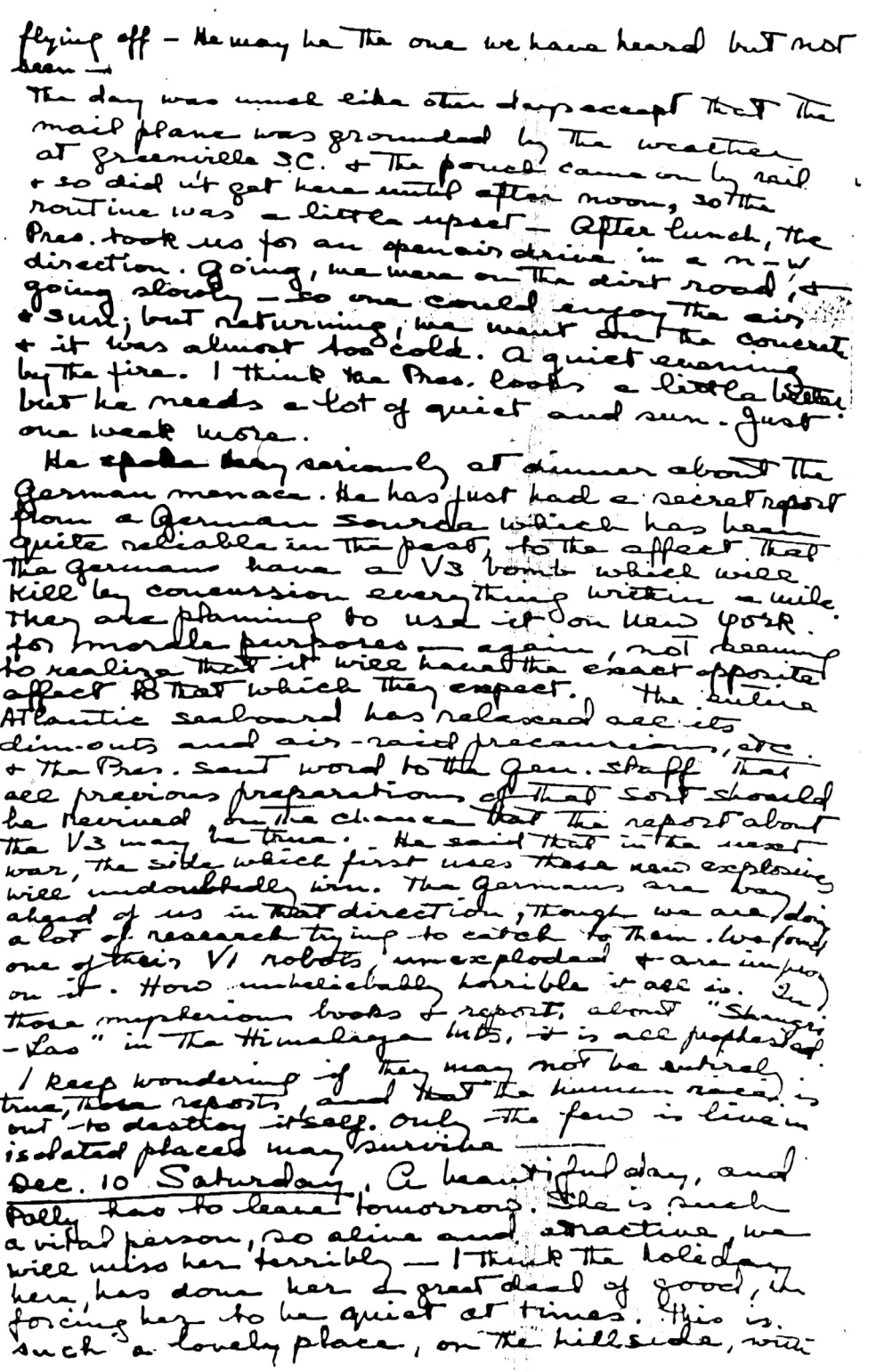
NA FORM 14000 (1-86)

WITHDRAWAL NOTICE

9 Dec. 1944 Diary of Margaret Suckley, Franklin Roosevelt's Secretary

He [FDR] spoke very seriously at dinner about the German menace. He has just had a secret report from a German source which has been quite reliable in the past, to the effect that the Germans have a V3 bomb which will kill by concussion everything within a mile. They are planning to use it on New York for morale purposes—again, not seeming to realize that it will have the exact opposite effect to that which they expect. The entire Atlantic seaboard has relaxed all its dim-outs and air-raid precautions, etc. & the Pres. sent word to the Gen. staff that all previous preparations of that sort should be reviewed on the chance that the report about the V3 may be true. He said that in the next war, the side which first uses these new explosives will undoubtedly win. The Germans are way ahead of us in that direction, though we are doing a lot of research trying to catch up to them.

FDR Library, Hyde Park, NY. Margaret L. Suckley Papers. Journal Group E. JE 208. 9 Dec. 1944.



flying off – He may be the one we have heard but not seen –

The day was much like other days except that the mail plane was grounded by the weather at Greenville S.C. & the pouch came on by rail & so did it get here until after noon, so the routine was a little upset – After lunch, the Pres. took us for an open air drive in a n – w direction. Going, we were on the dirt road, & going slowly – so one could enjoy the air & sun; but returning, we went on the concrete & it was almost too cold. A quiet evening by the fire. I think the Pres. looks a little better but he needs a lot of quiet and sun. Just one week more.

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Dec. 10 Saturday. A beautiful day, and Polly has to leave tomorrow. She is such a vital person, so alive and attractive, we will miss her terribly – I think the holiday here, has done her a great deal of good, in forcing her to be quiet at times. This is such a lovely place, on the hillside, with

14. Allied Belief in German Nuclear Weapons: Wartime Intel

L.A. Times 30 Sept. 1944 p. 3

Big Projectile Reported New Hitler Weapon

SOMEWHERE IN FRANCE, Sept. 23 (Delayed.) (AP)—American 3rd Army troops have obtained information indicating that a 14-ton projectile with an explosive radius of three kilometers—almost two miles—is scheduled as the third in Hitler's series of vengeance weapons.

Newsweek 13 Aug. '45 p. 30

Metal of the Millennium: German scientists nearly succeeded in solving it. Since the surrender of the Nazi armies, Allied officers have revealed that Germany would have been able to strike with atomic bombs by January 1945, if the invasion had not come six months before. The highest Allied officials knew that such explosives could have won the war for the Axis .

George C. Marshall, 1 Sept. 1945, p. 132.
history.army.mil/html/books/070/70-57/CMH_Pub_70-57.pdf

Victory in this global war depended on the successful execution of OVERLORD. That must not fail. Yet the Japanese could not be permitted meanwhile to entrench in their stolen empire, and China must not be allowed to fall victim to further Japanese assaults. Allied resources were searched through again and again, and strategy reconsidered in the light of the deficiencies. These conclusions seemed inescapable: France must be invaded in 1944, to shorten the war by facilitating the advance westward of the Soviet forces. At the same time German technological advances such as in the development of atomic explosives made it imperative that we attack before these terrible weapons could be turned against us. In addition, the pressure on the Japanese in the Pacific must not be relaxed. Communications with China must be reopened. Resources were allocated accordingly. The balance was extremely delicate but we had to go ahead.

Where are the official Allied reports???

Major Robert Furman to LTC John Lansdale, 22 May 1945

Alsos position here now is complex. I might write you what I see happening, but it all results in confirming our present policy of hands off and no participation in their re-organization. Boris left here for home to try to convince authorities that the Alsos job is over. But in this theater, Betts, Conrad and Bowles are not agreeing that the job for which Alsos was set up to do is in any way completed. More scientists have now arrived. ~~Precision~~ Proximity fuzes, BW and NACA investigations are now absorbing the energies of Tarryton equipment and personnel.

Boris = Boris Pash

A great many TA reports still remain in Germany, as you know. Therefore, reports on installations are received weekly about which we do very little. We always try to pick up papers that are reported to exist, to remove them from circulation but it is impossible to keep other agencies from finding out about the German effort. For instance, in Osenberg's files, was found some of the essential reports which you had taken back to the states.

TA = Tube Alloy (nuclear)

NARA RG 77, Entry UD-22A, Box 168, Folder 202.2 LONDON OFFICE: Combined Intell Disc.

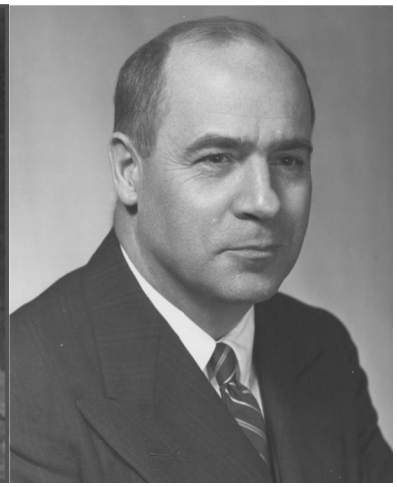
Betts and Linstead. 15 September 1945. *The Intelligence Exploitation of Germany. Report of Combined Intelligence Objectives Subcommittee.* AFHRA A5186, pp. 904–1026.

Of particular significance were the statements, made by German experts in the rocket and controlled missile field, that much of the priority accorded their work by the German High Command was in anticipation of the use of atomic explosives. These authorities stated that KWI had repeatedly assured Hitler that an atomic explosive would be available for use within a comparatively short time. During the last months of work by the Peenemunde staff, V-weapons were designed with much smaller war-heads. Quite possibly this trend was in anticipation of the successful development of a German atomic explosive.

General Thomas J. Betts, SHAEF G-2

General George Bryan Conrad, SHAEF G-2

MIT Professor Edward L. Bowles, Advisor for AAF Gen. Henry Arnold



Where Are the Reports???

NARA RG 77, Entry UD-22A, Box 160, Folder APR 45--Dec. '45

From: Supreme Headquarters, Allied Expeditionary Forces, Forward, Frankfurt, Germany
To: War Department
Nr: 422 31 May 1945

Multiple address. 3112000 May COSITINTREP nr 422, Part 1---Land, Section B. From HQ 12th Army Group from Bradley signed Eisenhower, ref nr QX 21736.

F. Uncovering of new or improved enemy weapons and equipment:

A laboratory containing equipment and documents related to experimental work on atomic bombs and AA rockets was located near Lofer, E 7399 by Third US Army.

Royal Army Ordnance Corps. October 1946. *R.A.O.C. Gazette* 28:5:150. U.K. Imperial War Museum LBY E. 14449. www.rlcarchive.org

Many interesting discoveries were made by Ordnance representatives *en route*. D.D.O.S. of 8 Corps found a factory engaged in production work for the German atomic bomb. The ammunition for Germany's largest gun was also located. Two of these massive guns had been captured by the Russians, but this was the first time their ammunition had been seen. At Belsen, the Ordnance service found itself faced with an unprecedented task.

AFHRA C5094 frames 0957-0958

HEADQUARTERS
UNITED STATES AIR FORCES IN EUROPE (MAIN)
Berlin Intelligence Party

APO 755, U.S. Army.
31 August 1945.

SUBJECT: German V-1 and V-2 Personnel.

TO : Lt.Col. W.F. Heimlich, Executive, G-2, Berlin District Command, APO 755, U.S. Army.

1. In view of the fact that the wants of USAFE on V-1 and V-2 personnel have been satisfied, I am inclosing information on those men whose evacuation we have recommended. My memory of the conversation which we had a few weeks ago is to the effect that USFET was still anxious to either exploit or to know the exact location of these individuals. The list follows:

g. Gerald Klein (Dr.), Dipl.-Eng., Manager of LGW.
Address: Berlin-Dahlem, Hohe Ahren 10b.
Specialty: Electrical flying control, V-2 control.
A very efficient electrical engineer. Developed V-2 control devices. Worked at Peenemunde and later became group director of atomic devices in RLM. At present being used by the British. Evacuated by "T" Force.

CHARLES A. CROWLEY,
Major, AC.

THIS PAGE IS UNCLASSIFIED

RLM = Reichsluftfahrtministerium
(Ministry of Aviation)

14. Allied Belief in German Nuclear Weapons: Postwar Intel

NARA RG 40, Entry UD-75, Box 3, Folder
Press Releases, The Chemical Problem in Germany

THE CHEMICAL PROBLEM IN GERMANY

The picture in scientific and chemical fields of development has long been very competitive and often retarded by the lack of financial assistance. Many of the industries of the United States while progressive on the production line have been quite willing to accept the benefit of the research and development of others, but not bothering to maintain research units of their own.

Many of the chemical achievements now in use are the result of the research and development accomplished in other countries. While the United States enjoys the privilege of a school system that can and does provide numbers of young scientists, well versed in their particular fields, few are employed by industry at salaries commensurate with their skill. Consequently, the young scientific mind resolves the problem as one of miss-selection, so therefore, seeks and obtains more remunerative positions outside of their field causing a complete dislocation of their academic achievements.

The German government and German industry had an entirely different attitude toward their scientifically trained men. The research and development work accomplished in the past decade will attest the value of subsidizing the scientists in the form of annuities and awards, not only for completed work but generous support of an idea from its embryonic imaginary state, through the laboratories, pilot plant, to the final production stage.

Spectacular accomplishment in uranium, nitrogen, oxygen recovery, plastics, nuclear physics and many other fields, have been uncovered in the investigation of the chemicals field alone.

Sulphonated oil fat liquors, comprising a complete range of oils: including animal, vegetable and synthetic were developed successfully. These

NARA RG 40,
Entry UD-75, Box 62

ADVANCE RELEASE — ADVANCE RELEASE

Franklin-2994 — NB-3297

OFFICE OF WAR INFORMATION

ADVANCE RELEASE:
Not for use by Press or Radio before
P.M., EWT, Sunday, August 26, 1945

Germany's inner war secrets ranged from experiments with the atomic bomb, anti-radar devices, and piloted rocket missiles that they expected to cross the Atlantic in 17 minutes, to butter made from coal, the Office of War Information reported today.

How these German war secrets began to be unlocked by American and British experts long before V-E Day was officially revealed today. The announcement included a statement on the scope and value of some of the secrets disclosed. Many of them were being adapted by United States and British technologists for use against the Japanese when the war ended, OWI reported. The thoroughness of the search for German war secrets foreshadows a similar probe for the secrets now locked in Japan, OWI added.

Some of the more startling of the secrets that may be disclosed at this time, show that not only had the Germans made significant progress in the development of an atomic bomb and in the production of "heavy water" but they:

1. Had contemplated a piloted missile with a possible range of 3,000 miles. The designer envisaged commercial applications for trans-Atlantic passenger crossing in 17 minutes.

2. Were working on a formula for new war gases that they hoped would prove more deadly than any chemical agent yet developed.

3. Had specifications and construction details for naval vessels of advanced design, including submarines with high underwater speeds and apparatus for sustained underwater operations.

4. Had developed a system of radar camouflage consisting of anti-radar coverings and coatings to be employed on submarines and other weapons.

5. Had highly advanced jet engine, rocket assisted take-off and aero-dynamics designs.

6. Had found new uses for many staples, as for example, coal. From coal the Germans were making a synthetic butter as well as alcohol of both beverage and industrial types, aviation lubricants, soap, and gasoline.

7. Had designs for various secret types of guns and gun sights, novel gear and transmission construction and air-cooled diesel engines.

Other German war secrets ranged from records on the location of German capital in neutral countries, and the status and composition of German cartels, to specifications of long-range rocket developments that scientists describe as "sensational". In addition to the missile that they expected to have a range of 3,000 miles, the Germans had plans for V-type weapons much more advanced than those which they directed against the British Isles last year.

Where are the reports???

14. Allied Belief in German Nuclear Weapons: Postwar Intel

Col. George Bryant Woods [Intelligence, Air Technical Services Command during WWII; Assistant to the Undersecretary of the Air Force 1947–1950], 1946, *The Aircraft Manufacturing Industry*, p. 32.

Germany's Plans for the "A-9" with Atomic Bomb

The range of the V-2 was only something over 200 miles but this was sufficient to reach all intended targets at that time. The German scientists, however, had not stopped with the V-2. During 1945 they had already built at Peenemunde (in the hands of the Russians since that time) several "A-9's". This was a winged V-2, either manned or unmanned, and intended for a range of around 3,000 miles with the aid of a large auxiliary launching rocket. Together the launching rocket and the A-9 weighed 110 tons, as compared with 13½ tons for the V-2. After the auxiliary launching rocket had accomplished its purpose and dropped off, the A-9 was designed to continue under its own power wholly outside the earth's atmosphere at an altitude of approximately 150 miles, and at an estimated speed of 5,800 miles per hour. This obviously would mean an Atlantic crossing in well under an hour's time, and a launching ramp had already been constructed in Normandy prior to the Allied invasion.

In captured scientific German documents there are diagrams of the city of New York showing anticipated areas of destruction to be expected after perfection of such a weapon to carry an atomic war head, and it is well known that the Germans originally had hoped to have their atomic bomb developments completed by the end of 1944. The Germans had many other advanced developments in guided missiles, but the V-2 was an actual accomplishment and its further development for long range was just a matter of time. Meanwhile all the allied nations have recourse to the captured German documents describing their future plans for these weapons and many of the former German scientists responsible for these developments are known to be continuing their work in each of the allied countries. Adequate defense against such weapons as the V-2 and the A-9 will require highly ingenious and supersonic defensive weapons, and no country can afford to forego the necessary expense for basic and applied reasearch to that end.

German Rocketeers: German Rockets and Guided Missiles Almost Won the War for the Nazis. *AAF Review* July 1946. Based heavily on information from Col. Donald Putt.

Also understandable now on the basis of our present knowledge is Germany's almost suicidal last-ditch stand after Allied forces had crossed the Rhine in overwhelming numbers. Assuming that the Nazis were completely whipped, the Allied populace could not understand why they would not give up and put an end to senseless, wholesale slaughter. But German commanders, it now appears, were aware that if they could hold out for just a short time longer they could very well effect at least a stalemate, if not a short-cut victory, on the European battlefront.

It is now also fairly generally known that the atomic bomb race was close—again, closer than we care to think about. And paralleling the Nazis' research on atomic explosives was their accelerated development of the V-2 program. Linking these two projects together makes credible another theory which is current among Allied guided missile groups: namely, that it was the intention of Nazi technicians to put some sort of atomic device in the warhead of the V-2.

This, they point out, would then have made the V-2s economical beyond question. One of the facts which has puzzled observers is that the V-2, with its small-sized warhead permitting only one ton of conventional explosives, did not justify the tremendous cost of each missile. The damage achieved—actually less than that of the V-1 which was many times cheaper and took only 800 man-hours to make—did not begin to compensate for the 12,950 man-hours required for the manufacture of every V-2. But if, as they now believe it had been originally planned, even a few of these supersonic V-2s could have carried atomic warheads, there is little doubt that they could have wiped our invasion ports off the map and reduced England to the shambles that are Nagasaki and Hiroshima.

Allied bombings of the Nazi heavy-water plants in Norway quite obviously retarded her atomic development, as did also the consistent sabotage on the part of many Norwegian scientists. But it is still a matter of scientific conjecture just how many weeks—or days—it might have taken Germany to be ready with her atomic devices for the V-2s.

Where are the reports???

Roy Fedden. German Plans to Revolutionise Air Warfare.
***Daily Telegraph & Morning Post*, 1 Oct. 1945, p. 4.**

In these respects they were not entirely lying. In the course of two recent visits to Germany, as leader of a technical mission for the Minister of Aircraft Production, I have seen enough of their designs and production plans to realise that if they had managed to prolong the war some months longer, we might have been confronted with a set of entirely new and deadly developments in air warfare.

Atomic Explosives

There is some reason to believe that Hitler had been promised atomic explosives by October of this year, and if Germany had been first to use them the idea of changing the whole course of the war from a small base in the South German mountains is by no means so far-fetched.

A new range of very high-speed German fighters and jet bombers was already flying, or within a few weeks of flying, when the war ended. Immense developments were under way with robot rocket weapons, some of which had already started in production. They were simple and cheap to make, and with atomic explosives even a few such devices could have placed air warfare on a new nightmare plane of impersonal long-distance annihilation such as we have not so far contemplated.

Where are the reports???

Reveal Nazis Planned Rocket To Blast N. Y. at 6000 MPH

A-9 Was Designed to Employ Booster Weighing 190,000 Pounds for Acceleration

By Science Service

WASHINGTON, Aug. 2.—The Germans planned a bomb to cross the Atlantic and blast New York. It was a rocket to be started on its long journey by another rocket which detached itself when its job was done.

This was revealed today by Brig. Gen. William L. Richardson of the U. S. army air forces.

Gen. Richardson, chief of the A. A. F. guided missiles and air defense division, spoke as a guest of Watson Davis, director of Science Service, on "Adventures in Science," heard over the Columbia network.

The Germans, he said, developed several rockets known as the "A" series. The V-2, used against London, was one of these. Although it was the only one of this series to be used operationally in the last war, it is not hard to visualize what might have been in store for the allies had the Germans been given sufficient time to complete developments.

Acid Used in Fuel

Each of the "A" series was developed primarily for research, with the exception of A-4, later known as the V-2. The A-10 was the end result toward which this whole program was directed. This is the weapon which the Germans expected to use in bombing New York.

The A-10 was described by him as a booster rocket placed behind the A-9, giving it two-step co-operation to secure ranges of 3000 miles. The A-9 was much like the A-4, more familiarly called the V-2, with wings added to give increased range and using acid as an oxidizer in its fuel.

The A-10 was never actually constructed. However, all design studies and computations had been completed. It appears that it could have been built and used if the Germans had been given another year of development and production.

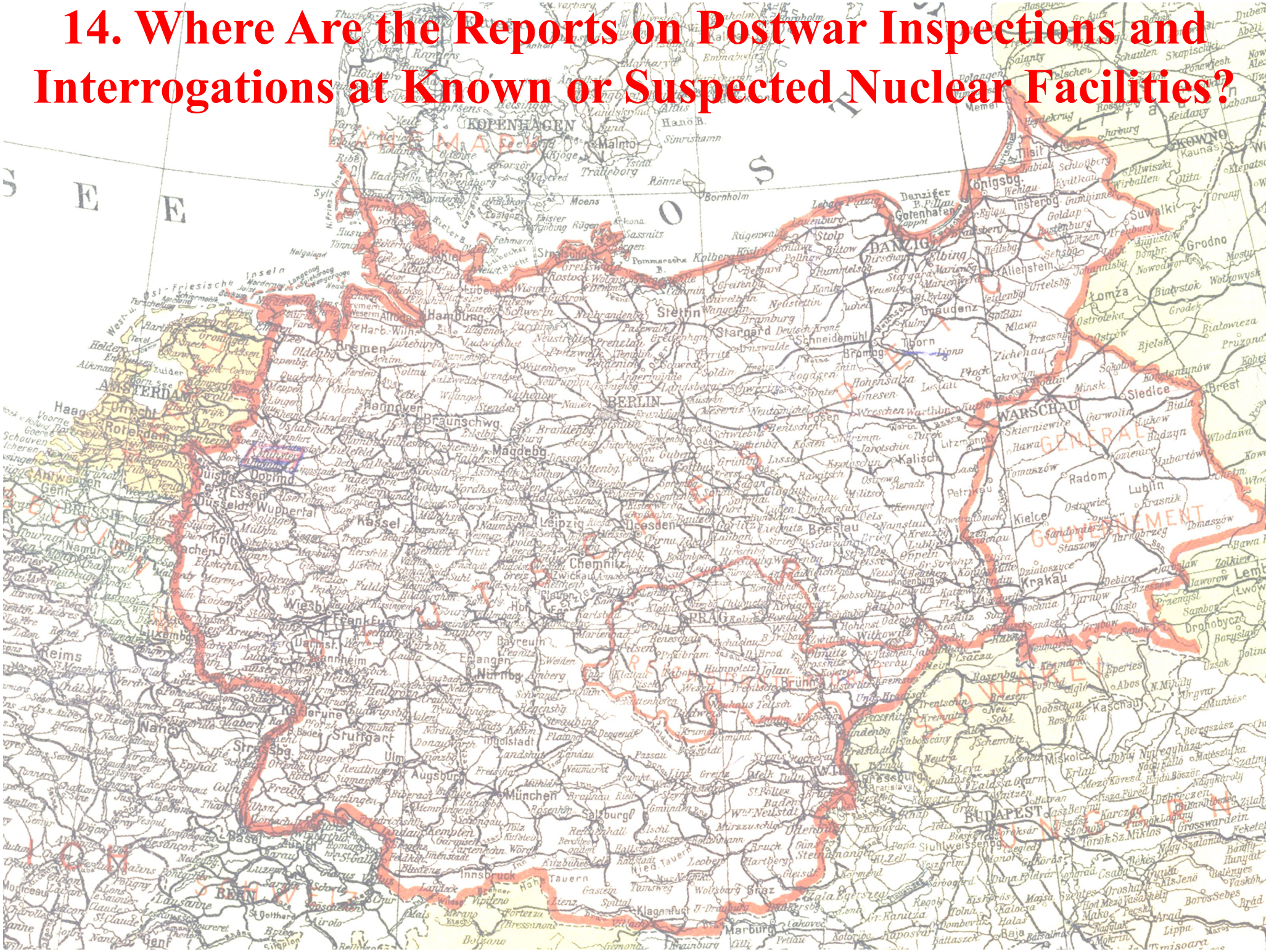
Speed Put at 6000 M. P. H.

The total weight of the A-10 was to have been 190,000 pounds. The weapon was nearly 12 feet in diameter and 25 feet long. The 29,000-pound A-9 was to have been accelerated to a speed of 2500 miles per hour by the use of the A-10 as a launching rocket, which detached itself and would drop free after serving its purpose.

It was the A-9 that would reach the target. Its rocket motor would be turned on when the A-10 dropped. This would increase its speed to about 6000 miles an hour. It would have carried a warhead of about 2000 pounds. This is a payload of only 1 per cent of the starting weight of the weapon, but there is evidence to believe, he stated, that the Germans intended to utilize an atomic warhead which would have made this weapon extremely deadly.

***Indianapolis Times*, 2 Aug. 1947, p. 4.**

14. Where Are the Reports on Postwar Inspections and Interrogations at Known or Suspected Nuclear Facilities?



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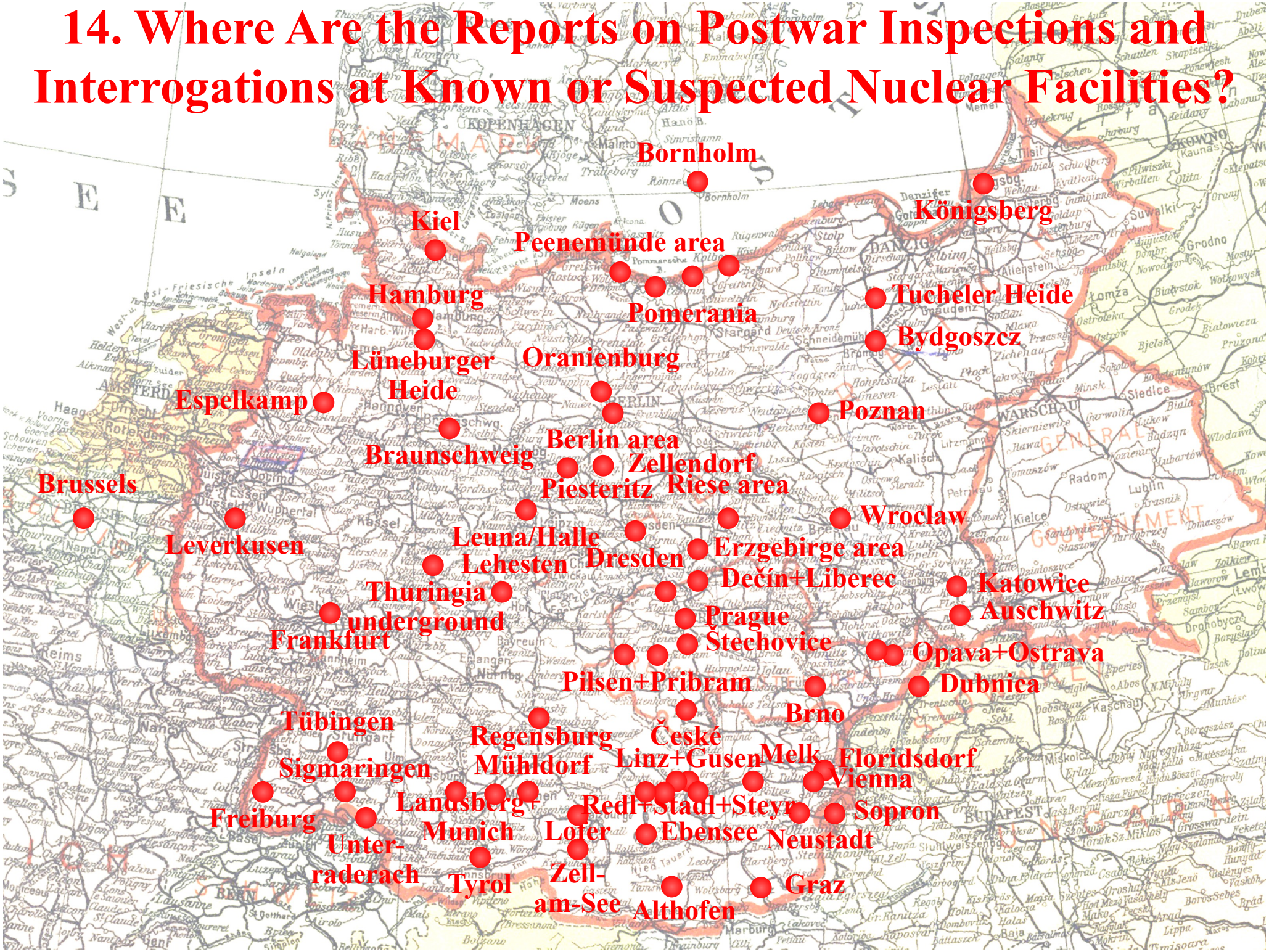

14. Allied Belief in German Nuclear Weapons: Inspections

Montgomery at Lüneburger Heide

Patton at Pilsen

Where are the reports on postwar inspections/interrogations at these suspected nuclear sites?

Eisenhower at Ohrdruf

U.S. troops at Gusen

About 50 to 60 tons of strongly radioactive "tarnsand" was delivered to the German Army, according to Mr. Futterkneck of the firm Geophysikalische Gerätebau. The "tarnsand" was used to activate artificially the soil covering non-metallic mines, so that presence of a mine could be indicated with a mine detector sensitive to radioactivity. The detector and its use has been reported on by Mr. C. A. Hachemeister, Civ., OCE, and therefore will not be discussed in this report, but the nature of the "tarnsand" is of interest. The "tarnsand" was said to have been supplied by Auergesellschaft, to be the residue from the extraction of radium from pitchblende ore, and to have the same radioactivity as ore containing about 10 percent pitchblende. Preliminary tests made by R. P. Fischer show that the "tarnsand" has the equivalent radioactivity of ore containing 5 to 10 percent uranium in equilibrium with its disintegration products, confirming the last part of the above statement. Until the "tarnsand" is analyzed chemically, its exact nature cannot be determined. It is unlikely, however, that the "tarnsand" is actually the residue from the extraction of radium from ore, as reported, for such material should be only slightly radioactive. It also seems unlikely that the "tarnsand" is prepared directly from St. Joachimsthal crude ore, even though its radioactivity is about the same as the ore, for it is believed that the German requirements for radium and uranium were too important to use and dissipate the ore in the form of "tarnsand". More likely the "tarnsand" was prepared from material in which the radioactivity has been artificially induced. On the other hand, it is possible that the radioactivity of the "tarnsand" is derived from the thorium series rather than from the uranium series or from artificially induced radioactivity, for it is reported that Auergesellschaft treated monazite sands for rare earths and thus would obtain thorium as a by-product. The problem is of interest mainly in attempting to account for quantity of radioactive materials available to Germany.

"Tarnsand"

Dr. Richard P. Fischer, a U.S. Geological Survey expert on radioactive minerals, wrote this report in June 1945.

If Fischer was correct, wartime Germany had a working fission reactor capable of irradiating at least 50-60 tons of "tarnsand."

Fischer's report was promptly confiscated by the office of General Leslie Groves and never published.

NARA RG 77, Entry UD-22A, Box 163, Folder Australia

The U.S. Army Discovered Some Very Special Uranium Oxide in Germany

TOP SECRET

COPY

HEADQUARTERS
THIRD UNITED STATES ARMY
Office of the Assistant Chief of Staff, G-2
APO 403

4 March 1946

Subject: Additional Supply of Uranium Oxide.

To: Assistant Chief of Staff, G-2, United States Forces European Theater (Main), APO 757, US Army.

1. Reference is made to your letter from US Military Attache, London, 14 December 1945, subject: "Materials in Laboratory of Dr. KIRCHENER, Garmisch", and letter your office same subject, dated 21 February 1945.

2. Additional quantities of Uranium Oxide have been located in the amount of approximately five and one-half tons at Bad Tolz and Munich. This material was found in the custody of Dr. Fritz REHBEIN, formerly part of the investigation group of the State Investigation Council (Reichsforchungsrat). It was inspected and left in his charge by Professor Charles P. SYMTHE, Princeton University in June, 1945. Professor SYMTHE also inspected the materials now located in Garmisch. This is the second occurrence in which like material was located in the custody of German scientific groups inspected by Professor SYMTHE at which inspection he told the custodians to hold the material for further instructions. In view of this, request that Professor SYMTHE be contacted to determine if other such material can be located or is in the custody of any other groups.

3. Dr. Fritz REHBEIN stated during investigation that the Uranium Oxide is very active and can be extremely injurious to personnel not qualified in its handling. This is contrary to instructions for shipping material at Garmisch to the United States as given in paragraph 3 of your letter of 21 February 1946. By reason of such danger, request that specialist personnel be provided to prepare and supervise shipment. Routine of actual movement will be handled by G-4 Section, this headquarters.

4. Request authority to ship all material now located at one time.

EDWARD M. FICKETT
Colonel, GSC
AC of S, G-2

EPD/sk

Manhattan Engineer District
Office of the M[illegible]tary Attache
American Embassy, London
1 April 1946

SUBJECT: Shipment of Uranium Compounds.

TO: Colonel W. R. Shuler, Room 4181, War Department Building, Washington, D. C.

1. Reference our cable 70400 of 28 March 1946. The following are the facts behind this shipment of uranium.

2. Early in the winter, we learned of the existence of 1½ tons of uranium compounds at Garmisch-Partenkirchen. G-2 USFET was alerted to move the stuff. Actually, G-2 moved very slowly and we had to prod them on three successive occasions.

3. On the other hand, G-2 moved extremely quickly re the five tons of uranium oxide recently discovered at Bad Tolz. (See letter this office "Professor Smyth and Uranium Oxide in Germany", dated 15 March 1946.)

4. The two lots were consolidated into one at Bremerhaven and put aboard the Hagerstown Victory. This ship sailed on 19 March and should arrive in New York about 6 April.

EDGAR P. DEAN
Lt. Colonel, AUS

Where are the detailed reports?

NARA RG 77, Entry UD-22A, Box 169, Folder 32.32. Germ. Incl. TA

14. Submarines—Where Are the Reports???

"OPERATION LUSTY"

At a mediæval inn near Thumersbach near Berchtesgaden, early in May 1945, the German General Air Staff patiently awaited the outcome of surrender negotiations taking place in the North. They had arrived by car and plane during the past weeks, when the fall of Berlin was imminent, and had kept in contact by radio with Admiral Doenitz at Flensburg. Through the interception of one of these messages, their location, which had previously been unknown, was discovered. Within twenty-four hours Lt Col. O'Brien and his small party, representing the Exploitation Division of the Directorate of Intelligence, USAFE, had arrived, located the party and conducted the first of a series of discussions with General Koller, who was then in command. All documents and records that had been brought by the High Command were immediately turned over, and the first unearthing of buried records and documents, in and around Berchtesgaden, as well as the initial interrogation of the staff officers present, took place.

A casual remark made by a technical engineer, who stated that he had recently been offered a position in Japan, led to his being thoroughly interrogated for significant technical information. As an aside, and what he probably considered a relatively unimportant incident, he stated that less than a month ago, about the middle of April, ten submarines heavily loaded with the latest German equipment relative to aerial warfare, were dispatched from Kiel to Japan. When Lt Col. O'Brien was thus informed he immediately advised the Directorate of Intelligence, USAFE, who in turn notified the Japanese Intelligence Section of SHAEF. A cable was then dispatched to all commands in every theater of war. All vessels in ports and at sea were notified, and one of the biggest searches ever undertaken during the war for submarines was initiated. What route they had taken, whether they had gone alone or together, no one knew. But so extensive was the search and so carefully was it executed by warships of all Allied nations, that by the end of June, six of these ten submarines had been captured intact, some a relatively short distance away from their bases, others perilously close to Japan.

In a mountain side near the camp of the German Staff officers, an air raid shelter had been blocked up and then carefully covered and concealed with dirt. Its presence was eventually revealed by the officer who had directed this concealment, but only after he had noticed that a hole, large enough for a man to crawl through, had appeared in one of the sides. Thinking that the cache had been discovered, he explained to the USAFE party the

Operation LUSTY. Jan 1946. -1-
AFHRA C5098 pdf p. 586

NARA Boston RG 181. 1st Naval District. Office of the Assistant Chief of Staff for Operations. Formerly Security Classified General Correspondence 1944--1945. Box 26. Folder U-Boats, Surrender of.

SECRET
262151 (P)

27 MAY

FROM: CNO

TO: NYPORT

INFO: COMONE

SUBJECT: MINE TUBES, UNLOADING OF

INTERROGATION LT PFAFF SECOND WATCH OFFICER U-234 DISCLOSES HE WAS IN CHARGE OF CARGO AND PERSONALLY SUPERVISED LOADING ALL MINE TUBES.

PFAFF PREPARED MANIFEST LIST AND KNOWS KIND DOCUMENTS AND CARGO IN EACH TUBE.

PFAFF STATES LONG CONTAINERS SHOULD BE UNPACKED IN HORIZONTAL POSITION AND SHORT CONTAINERS IN VERTICAL POSITION.

URANIUM OXIDE LOADED IN GOLD LINED CYLINDERS AND AS LONG AS CYLINDERS NOT OPENED CAN BE HANDLED LIKE CRUDE TNT.

THESE CONTAINERS SHOULD NOT BE OPENED AS SUBSTANCE WILL BECOME SENSITIVE AND DANGEROUS.

PFAFF IS AVAILABLE AND WILLING TO AID UNLOADING IF RNEDT DESIRES. ADVISE.

DISTRIBUTION
COMDT
C/S
DUTY OFF
ACO (A)
DIO
D ORD OFF

CTM

14. Allied Belief in German Nuclear Weapons: Personnel

Dr. Ing. Hans Kammler, the SS general in charge of almost all secret weapons by the end of the war

NARA RG 319, Entry NM3-82A, Box 5, Folder
Documents from which ALSOS reports were made

DECLASSIFIED
Authority NND 755001

Fernspruch - Fernschreiben - Funkspruch - Blinkspruch

Nacht-Stelle | Nr. 767 | Befördert an | Tag | Zeit | durch | Rolle

Vermerke:

Angenommen oder aufgenommen von | Tag | Zeit | durch

Abgang | Tag: | Zeit: | Dringlichkeits-Vermerk

An: Der Reichsführer-SS Adjutantur Dat. 11. MRZ 1944 Tagebuch-Nr.

Absendende Stelle | Fernsprech-Anschluß:

+ HR SWVS NR. 1060 11.3.44 1615 ===

AN DEN REICHSFUEHRER -SS- PERSOENLICHER STAB-
Z. HD. SS- STURMBANNFUEHRER GROTHMANN
B E R L I N SW 11 ~~PRINZ-ALBT NN~~ PRINZ-ALBRECHT-STR. 8

LIEBER GROTHMANN .

REICHSMINISTER OHNESORGE HAT MIR ABSCHRIFT SEINES
SCHREIBENS VOM 10. FEBRUAR 1944 AN DEN REICHSFUEHRER-SS
BETR. SS- OBERFUEHRER KNAPP UEBERMITTELT. ICH BITTE MIR
DIE ENTSCHEIDUNG DES REICHSH NN DES REICHSFUEHRERS -SS
IN DER ANGELEGENHEIT MITZUTEILEN.====

Fernspruch | Nr. | Von | An | Tag | Zeit | Annehmender Offz. (Uffz.) Name | Dienstgrad

HEIL HITLER. IHR DR. ING. KAMMLER
SS- GRUPPENFUEHRER UND GENERALLEUTNANT DER WAFFEN- SS +

Quittung

C/0872 50

Inspekt-Gurlitt 11

F e r n s c h r e i b e n 1944

W 10.7. 81 MÄRZ

Tgb.Nr. 1827/44

H-Gruppenführer Dr. K a m m l e r
H-Wirtschafts-Verwaltungshauptamt
B e r l i n

Betr.: Dortg.FS.v.21.3.1944 Nr. 1531
Schrb.v.Reichsminister Ohnesorge v. 10.2.1933.

Gruppenführer !

Habe versucht, Stand obiger Angelegenheit zu klären. Vorgang bei H-Obersturmbannführer Dr. B r a n d t . Schreiben des Reichsministers O h n e s o r g e vom 10.2.1933 zur Zeit durch Standortwechsel Hochwald - Bergwald nicht greifbar.

H e i l H i t l e r !
I h r
gez.: Grothmann
H-Sturmbannführer
und Adjutant RF-H

Befördert durch F.S.
Tag 1. Monat 4. Uhrzeit 1600
an SWVS Upp. durch

31.3.1944
Gro/Dr.

45

Hans Kammler in Charge of Nuclear Program

HQ CIC, USFET, Region Munich IV, Munich Sub-Regional Office, 25 April 1946. Subject: Wilhelm Voss. Declassified 2006. NARA RG 263, Entry ZZ-18, Box 133, File Voss, Friedrich Wilhelm.

1. Dr. Wilhelm VOSS reported to this office 24 April 1946. Subject was the director of the Skoda Works and Bruenner Waffenwerke in Prague, Czechoslovakia from 1939--1945. Subject claims that he has valuable information on atom bomb research in Germany. […]

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Wilhelm Voss. April 1946. NARA RG 319, Entry A1-134B, Folder XE065651 Voss, Wilhelm.

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Hans Kammler in Charge of Nuclear Program

Heinrich Klein. 1977. *Vom Geschoß zum Feuerpfeil: Der große Umbruch der Waffentechnik in Deutschland 1900-1970: Eine Dokumentation.* Stuttgart: Motorbuch. pp. 96-97.

In mid-May 1945, after the capitulation of Germany, the author was questioned by a mixed American-English-Australian technical commission at the Unterlüss firing range about the new weapons developments in Germany. […] The author did not know any details about the use of the "Rheinbote" on the western front, but it was obvious that its stages must have been prepared for [combat] use. It was clear from the commission's questions that the device was completely unknown to them. At first they did not want to believe that the stage principle for rockets had already been solved in Germany, but they were later convinced by some explanations. Several times during this questioning, the commission asked whether the "Rheinbote" would have been the missile to be fitted with a nuclear warhead. The author could not give an answer to this question, as he was not aware that the payload compartment of this missile was to be used for a special purpose. As became clear from a later conversation with the head of the Operations Department, Lieutenant Colonel Tröller, the idea of equipping the "Rheinbote" with a nuclear payload had indeed been considered. The author is not in a position to judge to what extent this would have been possible given the state of nuclear technology in Germany. Tröller's report was based on the fact that SS-Obergruppenführer Dr. Kammler had actually spoken to him about such a possible use.

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BIOS 142. Information Obtained from Targets of Opportunity in the Sonthofen Area. 1945.

Obergruppenführer Professor Kammler, one of the directors of the S.S. Hauptamt, was said to have great influence on Himmler and more influence on Hitler than Speer himself; and he was kept informed on all questions concerning armaments. The New Weapons section of the Waffenamt was apparently directed by a man called Bree. Standartenführer Klumm worked in this section and under him Lt. Kreutzfeld, who was interrogated. One of the functions of the S.S. was to control the work of politically unreliable scientists who were kept in concentration camps. One of these camps was at Oranienburg, and research was done here on new weapons. [...] Another such camp was located at Nordhausen in the Harz, and came under the direct control of Kammler. Here the prisoners worked in an underground factory engaged on production. [...] Ernst stated that he had been imprisoned at a concentration camp for politically unreliable scientists called "Camp Mecklenburg" in the Lüneburger Heide. This place was not known to Kreutzfeld, who was however acquainted with the Oranienburg camp. The possibility of bringing Ernst over to Oranienburg was also mentioned in Ernst's personal file[….] Ernst also stated that there was a similar camp at Mauthausen, near Vienna, but this was also unknown to Kreutzfeld. [...] Ernst also stated that […] trials on some kind of atomic bomb were made at or near the camp.

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Werner Grothmann, 2002 interview, Jonastalverein Archive, pp. 6-8, 18.

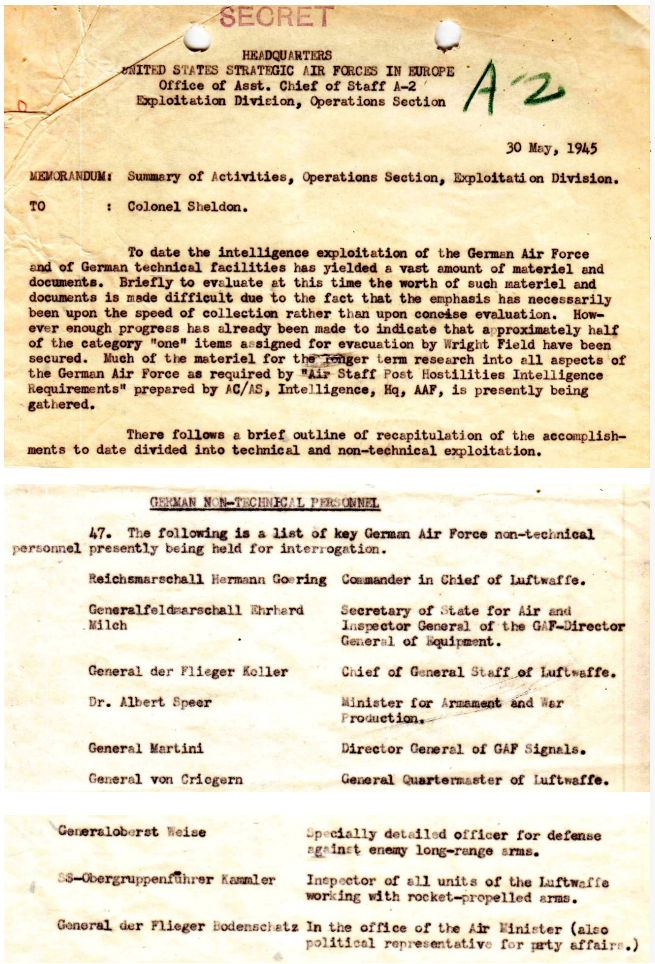
In the last years of the war, which may have been in the fall of 43, close coordination was decided between Ohnesorge and Himmler. I still don't know the details, but Kammler was in on it. […] Kammler at least had an overview of the projects that were supposed to turn our situation around in the medium term. But he was completely secretive. I still don't know whether he discussed this in detail with Himmler. I can tell you that none of us on the staff had comparable information. […] In addition, Kammler was responsible for almost all secret developments and special projects, and he was constantly on the move. He spread optimism almost until the end of March[….] To put it bluntly, we were not in a position to force the final victory in April 45 and I still hold the view today that a decisive strike on London at the end of April would not have brought about a turnaround […]

Postwar U.S. Interrogations of Hans Kammler

Loyd K. Pepple. 30 May 1945. Memorandum: Summary of Activities, Operations Section, Exploitation Division. AFHRA folder 570.605 1944-46, Misc. Documents G-2 Miscellaneous Data.

Louis D. Caplane and William G. Magee. Undated but apparently ca. August 1949. Subject: Source of certain funds held for Sammelkonto Accounts by the Austrian National Bank at Linz, Upper Austria. NARA RG 260, DN1929, Roll 0126, pp. 26 ff.

George C. McDonald to Ernst Englander. 2 November 1945. Subject: German Underground Installations. AFHRA folder 570.6501A 1945-46, Special Projects—Current.



SECRET

HEADQUARTERS
UNITED STATES STRATEGIC AIR FORCES IN EUROPE
Office of Asst. Chief of Staff A-2
Exploitation Division, Operations Section

A-2

30 May, 1945

MEMORANDUM: Summary of Activities, Operations Section, Exploitation Division.

TO : Colonel Sheldon.

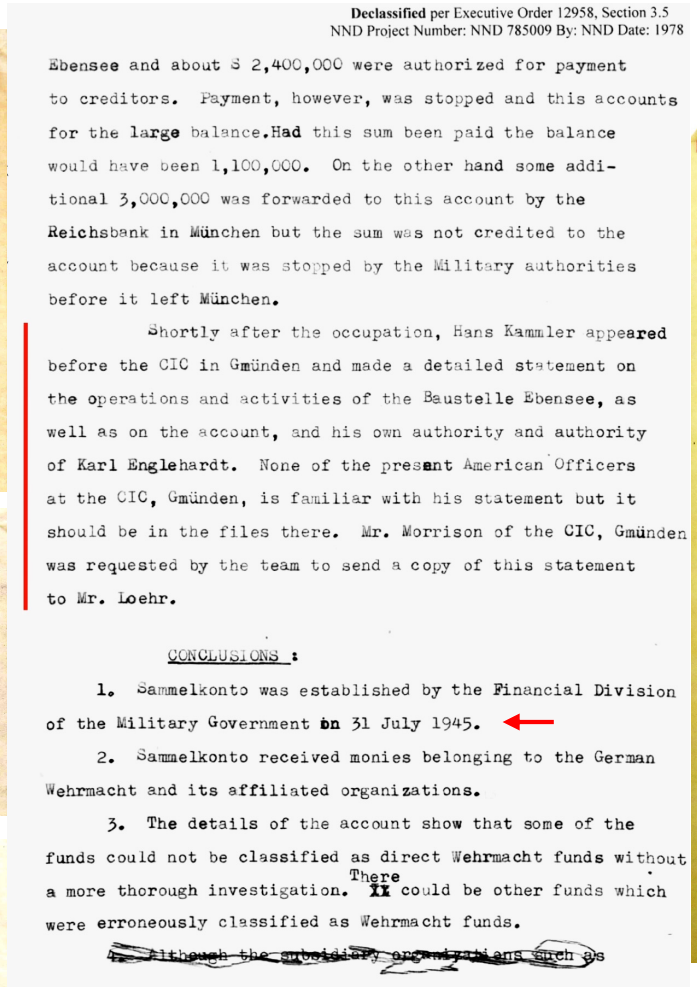
To date the intelligence exploitation of the German Air Force and of German technical facilities has yielded a vast amount of materiel and documents. Briefly to evaluate at this time the worth of such materiel and documents is made difficult due to the fact that the emphasis has necessarily been upon the speed of collection rather than upon concise evaluation. However enough progress has already been made to indicate that approximately half of the category "one" items assigned for evacuation by Wright Field have been secured. Much of the materiel for the longer term research into all aspects of the German Air Force as required by "Air Staff Post Hostilities Intelligence Requirements" prepared by AC/AS, Intelligence, Hq, AAF, is presently being gathered.

There follows a brief outline of recapitulation of the accomplishments to date divided into technical and non-technical exploitation.

GERMAN NON-TECHNICAL PERSONNEL

47. The following is a list of key German Air Force non-technical personnel presently being held for interrogation.

Reichsmarschall Hermann Goering	Commander in Chief of Luftwaffe.
Generalfeldmarschall Ehrhard Milch	Secretary of State for Air and Inspector General of the GAF-Director General of Equipment.
General der Flieger Koller	Chief of General Staff of Luftwaffe.
Dr. Albert Speer	Minister for Armament and War Production.
General Martini	Director General of GAF Signals.
General von Criegern	General Quartermaster of Luftwaffe.
Generaloberst Weise	Specially detailed officer for defense against enemy long-range arms.
SS-Obergruppenführer Kammler	Inspector of all units of the Luftwaffe working with rocket-propelled arms.
General der Flieger Bodenschatz	In the office of the Air Minister (also political representative for party affairs.)



Declassified per Executive Order 12958, Section 3.5
NND Project Number: NND 785009 By: NND Date: 1978

Ebensee and about S 2,400,000 were authorized for payment to creditors. Payment, however, was stopped and this accounts for the large balance. Had this sum been paid the balance would have been 1,100,000. On the other hand some additional 3,000,000 was forwarded to this account by the Reichsbank in München but the sum was not credited to the account because it was stopped by the Military authorities before it left München.

Shortly after the occupation, Hans Kammler appeared before the CIC in Gmünden and made a detailed statement on the operations and activities of the Baustelle Ebensee, as well as on the account, and his own authority and authority of Karl Englehardt. None of the present American Officers at the CIC, Gmünden, is familiar with his statement but it should be in the files there. Mr. Morrison of the CIC, Gmünden was requested by the team to send a copy of this statement to Mr. Loehr.

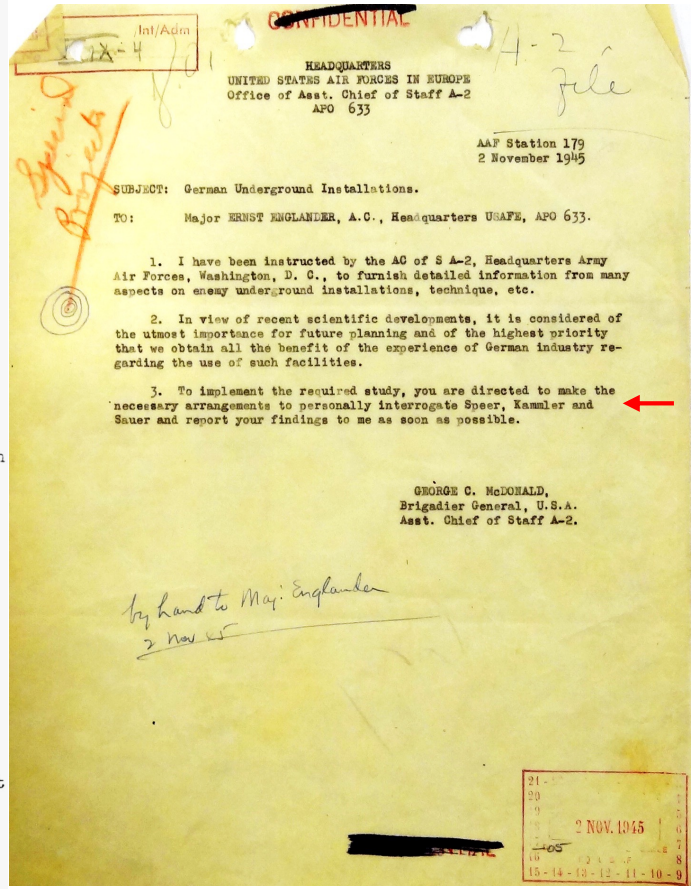
CONCLUSIONS :

1. Sammelkonto was established by the Financial Division of the Military Government on 31 July 1945.

2. Sammelkonto received monies belonging to the German Wehrmacht and its affiliated organizations.

3. The details of the account show that some of the funds could not be classified as direct Wehrmacht funds without a more thorough investigation. There could be other funds which were erroneously classified as Wehrmacht funds.

4. Although the subsidiary organizations such as



Int/Adm
IX-4

CONFIDENTIAL

HEADQUARTERS
UNITED STATES AIR FORCES IN EUROPE
Office of Asst. Chief of Staff A-2
APO 633

AAF Station 179
2 November 1945

SUBJECT: German Underground Installations.

TO: Major ERNST ENGLANDER, A.C., Headquarters USAFE, APO 633.

1. I have been instructed by the AC of S A-2, Headquarters Army Air Forces, Washington, D. C., to furnish detailed information from many aspects on enemy underground installations, technique, etc.

2. In view of recent scientific developments, it is considered of the utmost importance for future planning and of the highest priority that we obtain all the benefit of the experience of German industry regarding the use of such facilities.

3. To implement the required study, you are directed to make the necessary arrangements to personally interrogate Speer, Kammler and Sauer and report your findings to me as soon as possible.

GEORGE C. McDONALD,
Brigadier General, U.S.A.
Asst. Chief of Staff A-2.

by hand to Maj. Englander
2 Nov 45

2 NOV. 1945

- **Where are the transcripts of Kammler's interrogations?**
- **Where are the German documents he brought with him or directed investigators to?**
- **Where are the reports on his postwar work, life, and death?**

Siegfried Flügge appears to have been the top physicist of the German nuclear program. Edward Teller brought him to the U.S. to "be of marked assistance in carrying out" a "physics... program... of interest and importance to the national security." When not in the U.S., Flügge was placed on the Top Secret JIOA K "hot list" and constantly monitored/detained for at least a decade after the war, on the direct orders of CIC Lt. Col. George R. Eckman, formerly of Alsos. Where are the reports on Flügge's interrogations and on his postwar work?

NARA RG 330, Entry A1-1B, Box 43, Folder Flügge, Siegfried

EXOS:ONR:N421:UL:kcm C O P Y

Serial No. 14654

NAVY DEPARTMENT
Office of Naval Research
Washington 25, D.C.

July 18, 1947

From: Chief of Naval Research
To: Chief of Naval Intelligence

Subj: Foreign Scientists, Request for assistance on.

1. Professor Edward Teller, Physics Department, University of Chicago, is supervising under contract to this Office a research program on various phases of research in physics of the solid state. This program is of interest and importance to the national security. Professor Teller is very desirous to obtain the services of the German physicist, Dr. Siegfried Flugge, who can be of marked assistance in carrying out the aforementioned program.

2. Professor Teller has requested the Office of Technical Services, Department of Commerce, to obtain Dr. Flügge from Germany. It is requested that the Joint Intelligence Objectives Agency be informed of the Navy's interest in this case, and asked to provide such assistance as is possible to Professor Teller in aiding Dr. Flügge to come to this country.

/s/ C.M. Bolster
Capt., USN
Acting Chief of Naval Research

cc: Mr. Robert Frye, OTS, Dept. of Commerce
Professor Edward Teller, Physics Dept.
University of Chicago

NARA RG 319, Entry A1-134B, Box 202, Folder XE196681 Siegfried Fluegge

FLUEGGE, Siegfried Wilhelm (Dr.) 25 April 1952

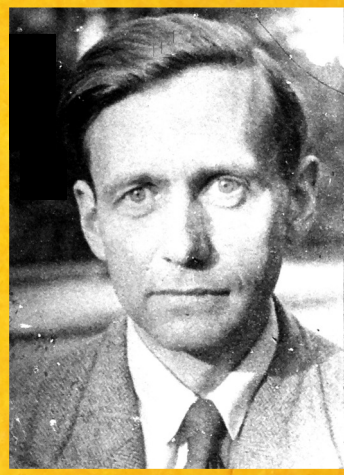
File D-196681

Res: MARBURG, Wilhelm Roserstrasse 33a

Priority 1, (JIOA Personality on the "K" List)

REF: D-137899 Secret ltr dtd 31 Jan 52 file X-272
SUB: Custodial Detention
cs

FLUEGGE, S. (Professor) 4 Nov 54



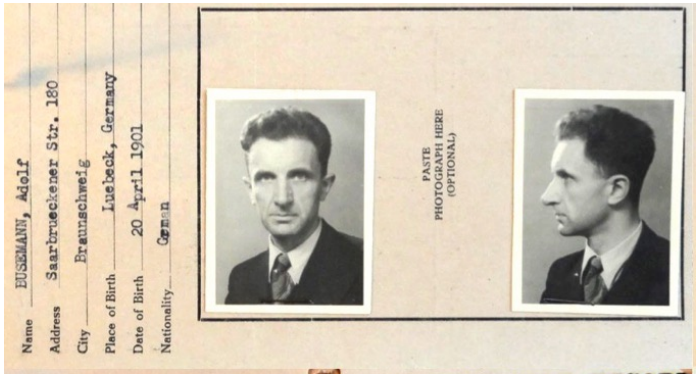
Employed by subject. Now in MARBURG.

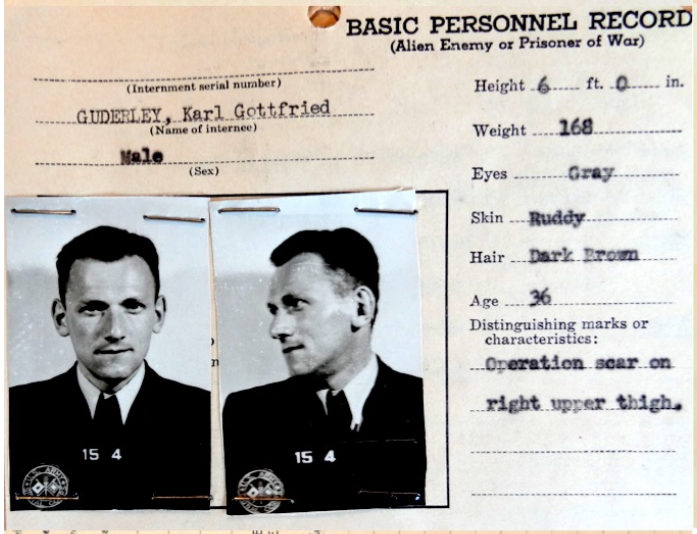
Ref: D-284237 BfV Report dtd 26 Aug 53 File: BR53-11-91
Sub:German Academy of Sciences of BERLIN F-3
Re: Nuclear Physics Institute
CS GERNAND

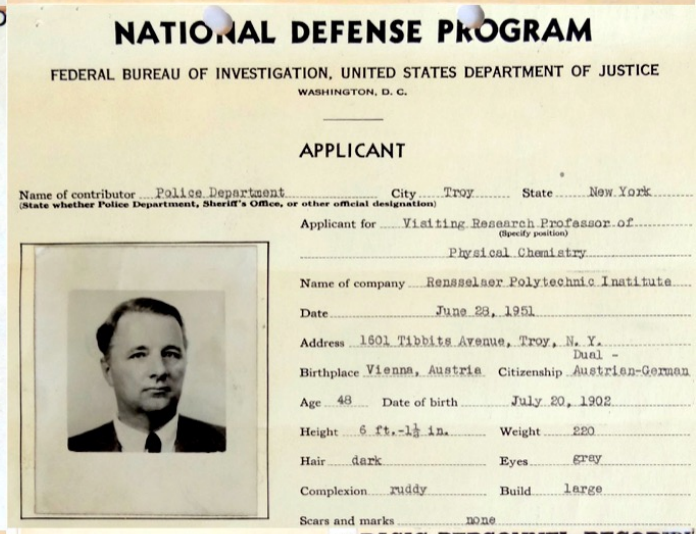
Dozens of experts with knowledge of German nuclear program (including H-bombs) were brought to U.S./U.K. after WWII

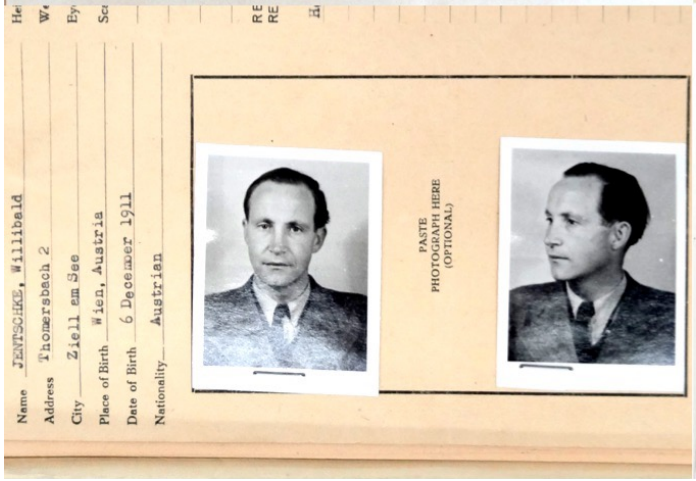
Where are the interrogation transcripts and reports???

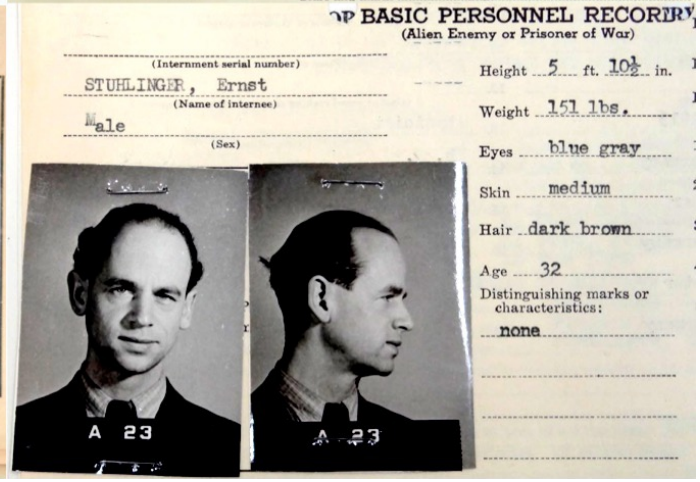
- Karl-Friedrich Bonhoeffer
- Wernher von Braun
- Rudolf Brill
- Adolf Busemann
- Walter Dornberger
- Rudolf Edse
- Krafft Ehricke
- Gerhard Falck
- Karl Fiebinger
- Wolfgang Finkelnburg
- Rudolf Fleischmann
- Siegfried Flügge
- Wilhelm Groth
- Gottfried Guderley
- Paul Harteck
- Otto Haxel
- Richard Herzog
- Johannes Hans Jensen
- Willibald Jentschke
- Ulrich Jetter
- Georg Joos
- Hartmut Kallmann
- Hans Kammler
- Gerald Klein
- Stanley Kronenberg
- Heinz Maier-Leibnitz
- Werner Maurer
- Walter Nielsch (?)
- Edgar Petersen
- Heinz Schlicke
- Erich Schumann
- Otto Schwede
- Edmung Sorg
- Kurt Starke
- Ernst Stuhlinger
- Hans Suess
- Herbert Wagner
- Wilhelm Westphal
- Friedwardt Winterberg
- Karl Wirtz
- Gernot Zippe
- Etc.







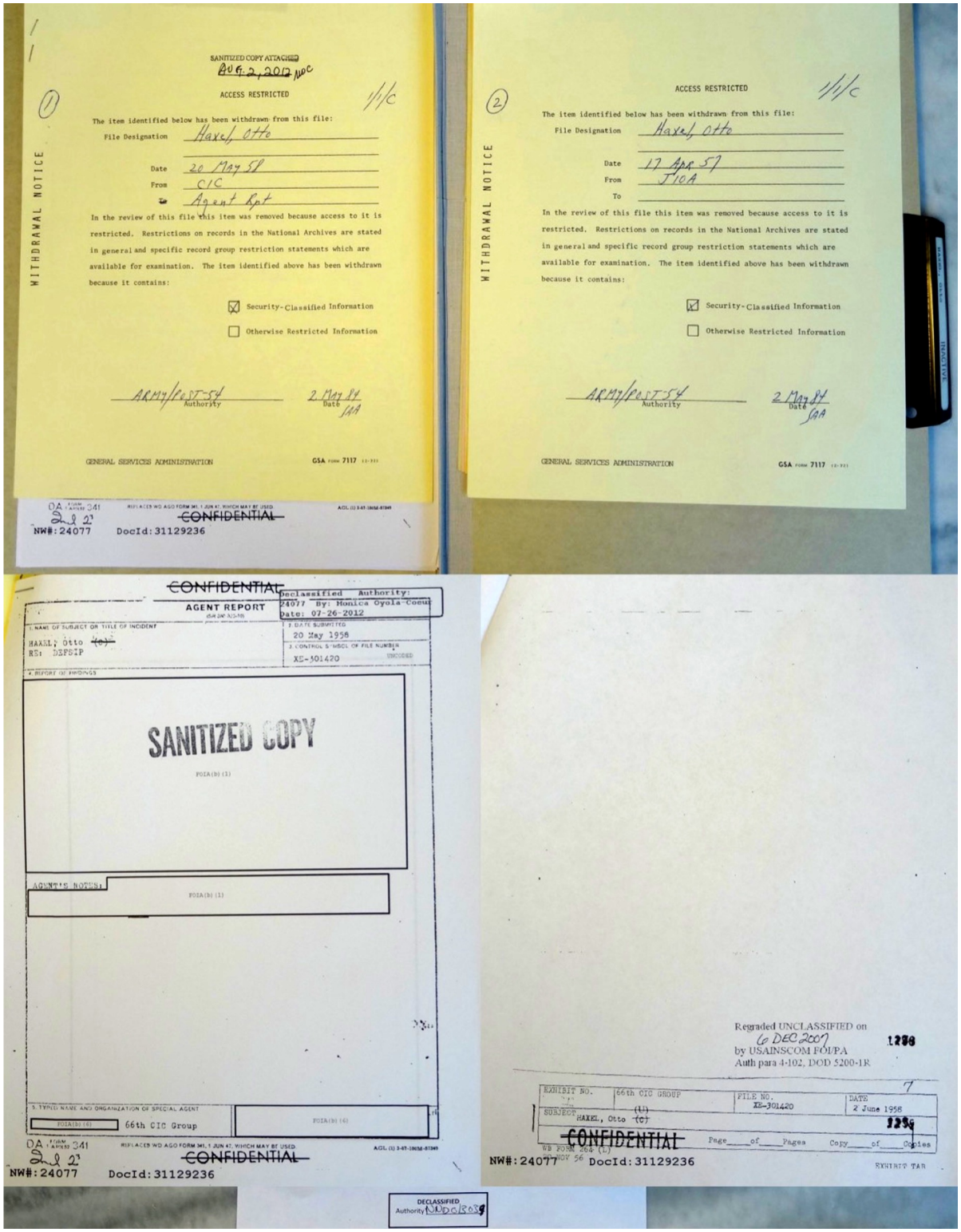




NARA RG 330, Entry A1-1B, Boxes 1—186.
JIOA Foreign Scientist Case Files [Paperclip].

Virtually the entire "Paperclip" file on German nuclear physicist Otto Haxel remains classified, with the documents removed or completely blanked out [NARA RG 330, Entry A1-1B, Box 66]

Photo of Otto Haxel from Wikipedia



SANITIZED COPY ATTACHED
AUG 2, 2012 NDC

ACCESS RESTRICTED

WITHDRAWAL NOTICE

The item identified below has been withdrawn from this file:

File Designation: Haxel, Otto

Date: 20 May 58
From: CIC
Agent Rpt

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

ARMY/RESTR-54 Authority
2 May 84 Date

GENERAL SERVICES ADMINISTRATION GSA FORM 7117

NW#:24077 DocId:31129236

ACCESS RESTRICTED

WITHDRAWAL NOTICE

The item identified below has been withdrawn from this file:

File Designation: Haxel, Otto

Date: 17 Apr 57
From: JIOA
To:

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

ARMY/RESTR-54 Authority
2 May 84 Date

GENERAL SERVICES ADMINISTRATION GSA FORM 7117

NW#:24077 DocId:31129236

~~CONFIDENTIAL~~ Declassified Authority: 24077 By: Monica Oyola-Coeur Date: 07-26-2012

AGENT REPORT

1. NAME OF SUBJECT OR TITLE OF INCIDENT: HAXEL, Otto (C) RS: DEFSIP
2. DATE SUBMITTED: 20 May 1958
3. CONTROL SYMBOL OF FILE NUMBER: XE-301420

4. REPORT OF FINDINGS

SANITIZED COPY

FOIA(b) (1)

AGENT'S NOTES:

5. TYPED NAME AND ORGANIZATION OF SPECIAL AGENT: 66th CIC Group

~~CONFIDENTIAL~~

NW#:24077 DocId:31129236

Regraded UNCLASSIFIED on 6 DEC 2007 by USAINSCOM FOI/PA Auth para 4-102, DOD 5200-1R

EXHIBIT NO. 7 | 66th CIC GROUP (U) | FILE NO. XE-301420 | DATE 2 June 1958

SUBJECT: HAXEL, Otto (C)

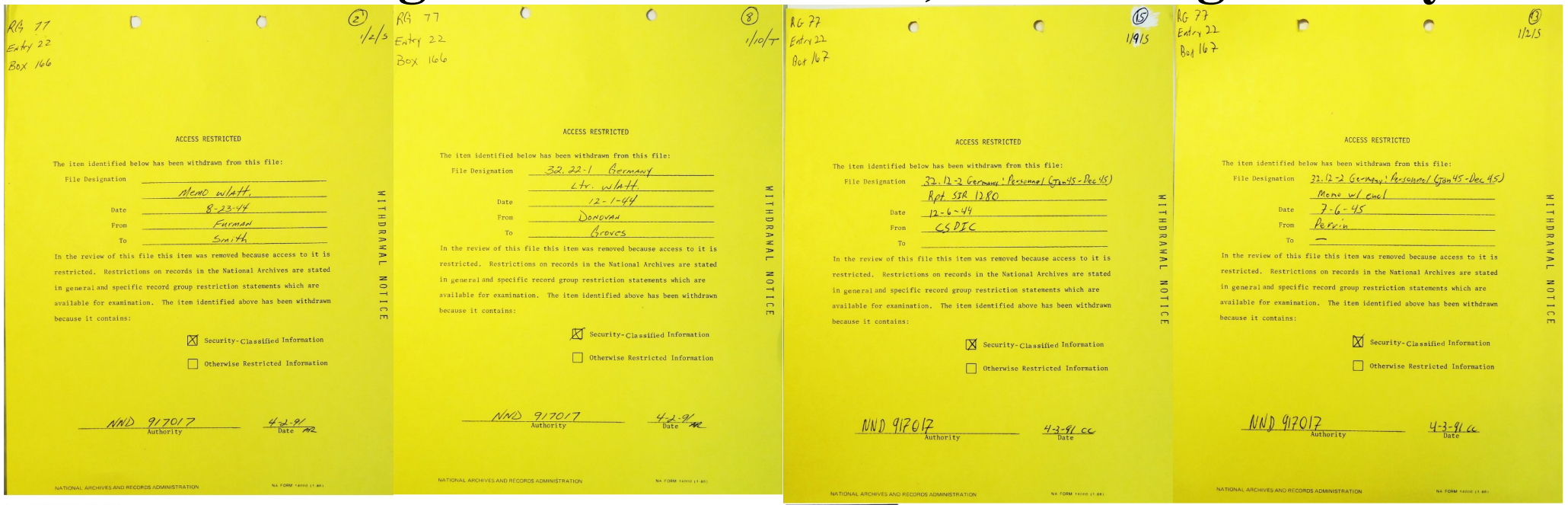
~~CONFIDENTIAL~~

Page ___ of ___ Pages Copy ___ of ___ Copies

NW#:24077 DocId:31129236

DECLASSIFIED Authority NND618039

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?


RG 77
Entry 22
Box 166

(2) 1/2/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Memo w/att.
Date: 8-23-44
From: Furman
To: Smith

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-2-91 Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77
Entry 22
Box 166

(8) 1/10/T

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.22-1 Germany
Ltr. w/att.
Date: 12-1-44
From: Donovan
To: Groves

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

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NND 917017 Authority — 4-2-91 Date

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NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77
Entry 22
Box 167

(15) 1/9/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.12-2 Germany: Personnel (Jan 45-Dec 45)
Rpt SSR 1280
Date: 12-6-44
From: CSDIC
To:

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-3-91 cc Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77
Entry 22
Box 167

(13) 1/2/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.12-2 Germany: Personnel (Jan 45-Dec 45)
Memo w/ encl
Date: 7-6-45
From: Perrin
To: —

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-3-91 cc Date

WITHDRAWAL NOTICE

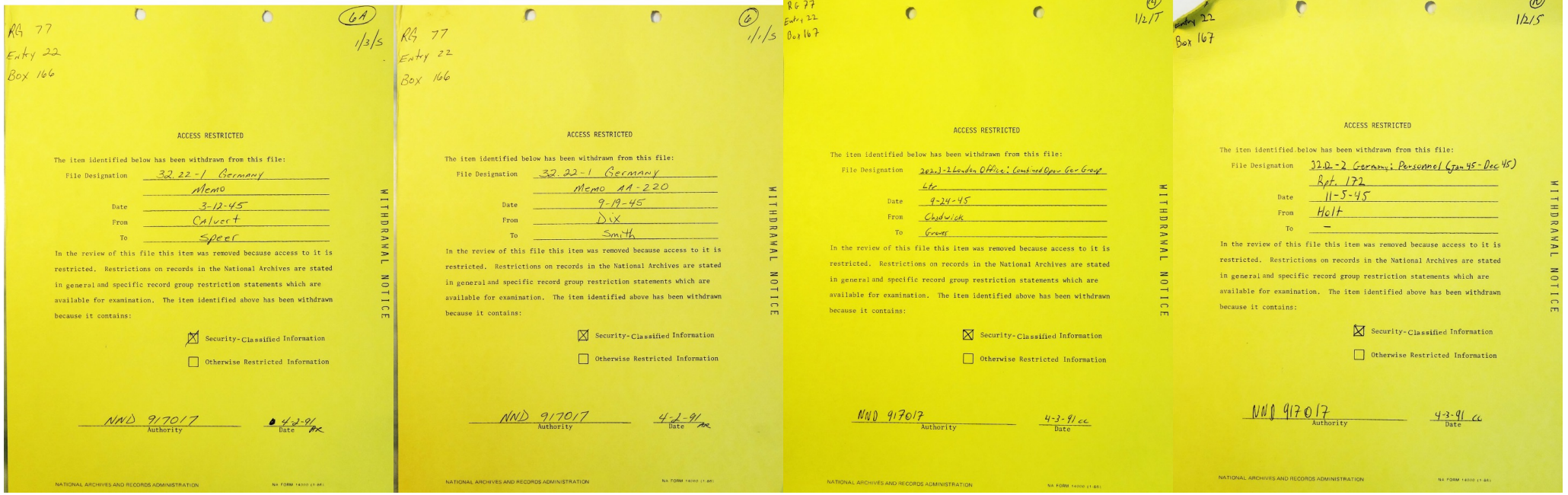
NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

DECLASSIFIED
Authority NND 917017

NARA RG 77, Entry UD-22A, Box 166

DECLASSIFIED
Authority NND 917017

NARA RG 77, Entry UD-22A, Box 167


RG 77
Entry 22
Box 166

(6A) 1/3/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.22-1 Germany
Memo
Date: 3-12-45
From: Calvert
To: Speer

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
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NND 917017 Authority — 4-2-91 Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77
Entry 22
Box 166

(6) 1/1/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.22-1 Germany
Memo AA-220
Date: 9-19-45
From: Dux
To: Smith

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

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NND 917017 Authority — 4-2-91 Date

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NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77
Entry 22
Box 167

(14) 1/2/T

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 202.3-2 London Office: Combined Oper. Gen Group
Ltr.
Date: 9-24-45
From: Chadwick
To: Groves

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☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-3-91 cc Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

Entry 22
Box 167

(10) 1/2/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.12-2 Germany: Personnel (Jan 45-Dec 45)
Rpt. 172
Date: 11-5-45
From: Holt
To: —

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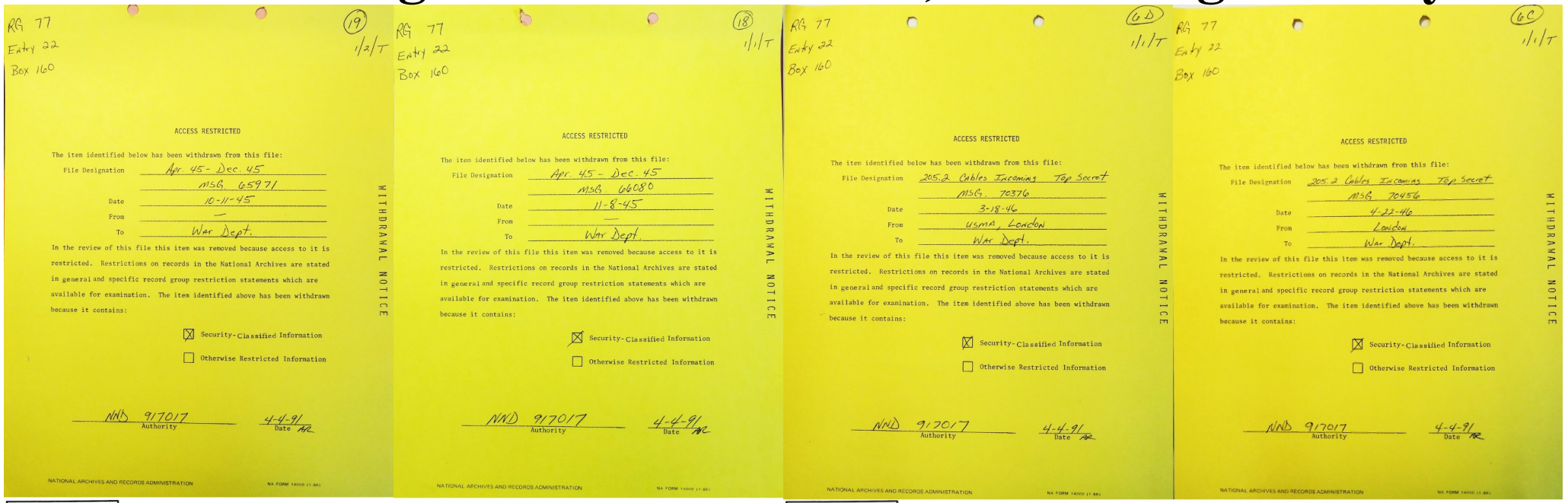
☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-3-91 cc Date

WITHDRAWAL NOTICE

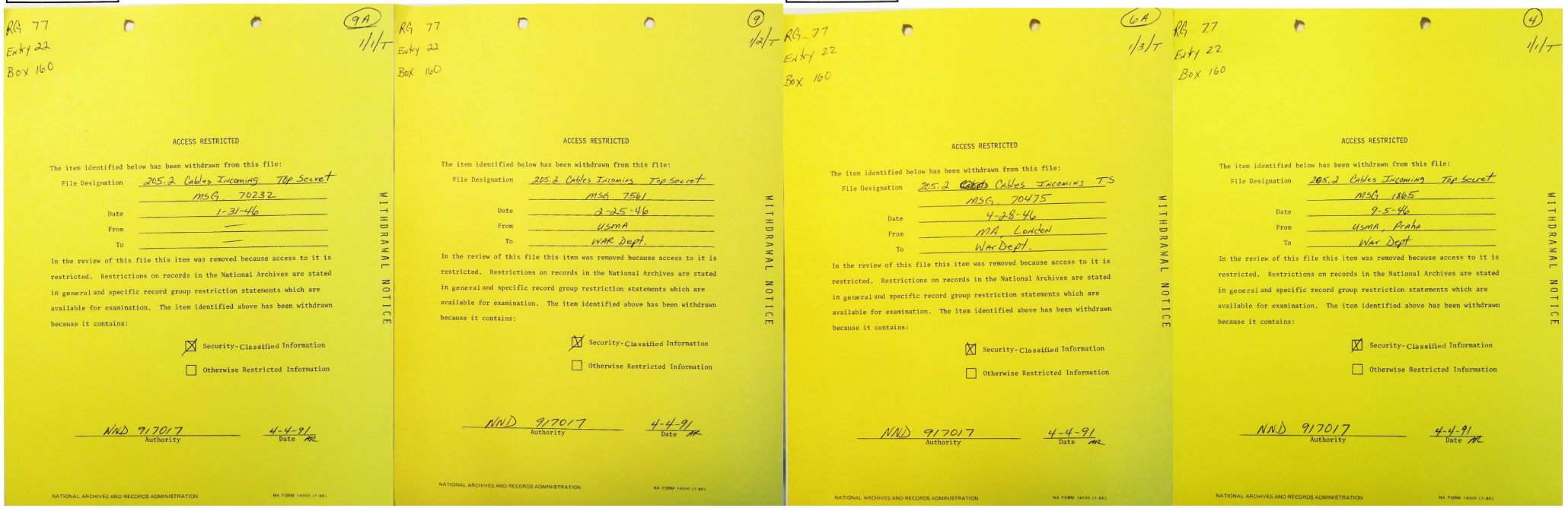
NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?



DECLASSIFIED Authority NND 917017

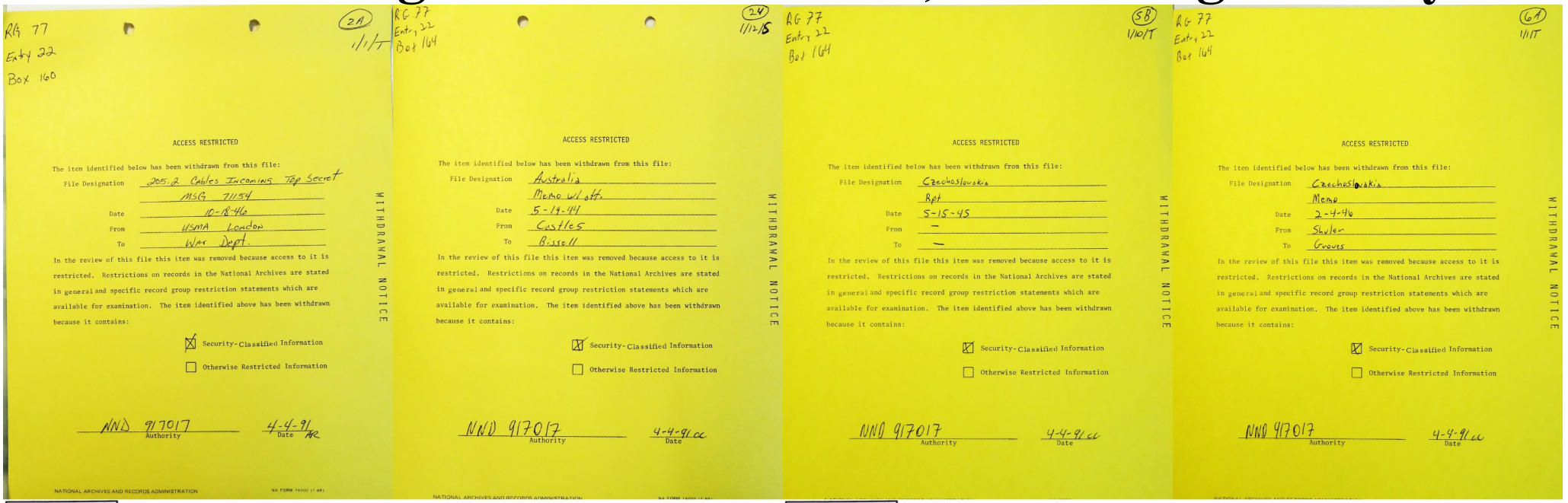
NARA RG 77, Entry UD-22A, Box 160



DECLASSIFIED Authority NND 917017

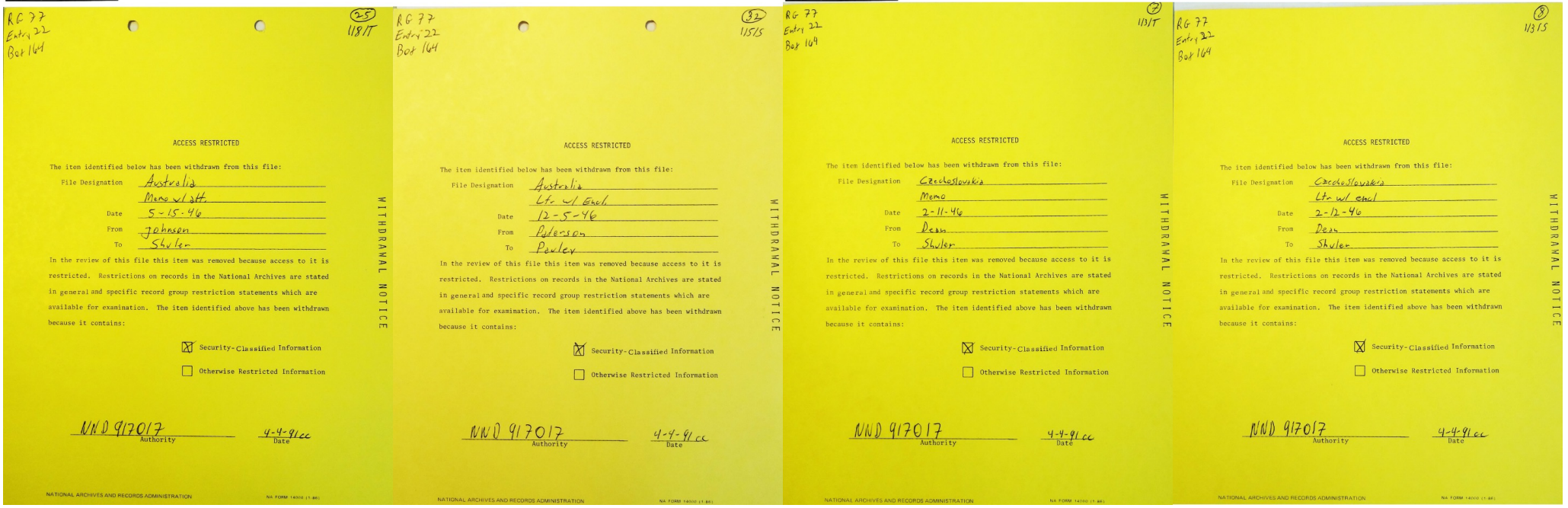
NARA RG 77, Entry UD-22A, Box 160

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?



DECLASSIFIED Authority NND 917017

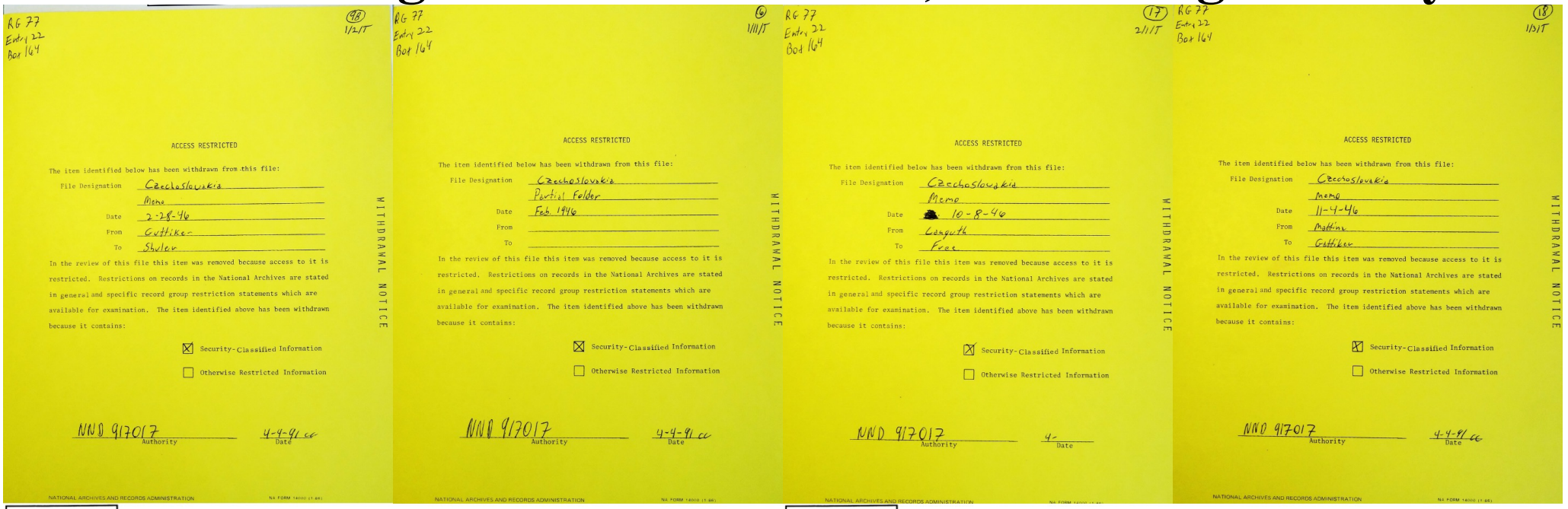
NARA RG 77, Entry UD-22A, Boxes 160 & 164



DECLASSIFIED Authority NND 917017

NARA RG 77, Entry UD-22A, Box 164

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?

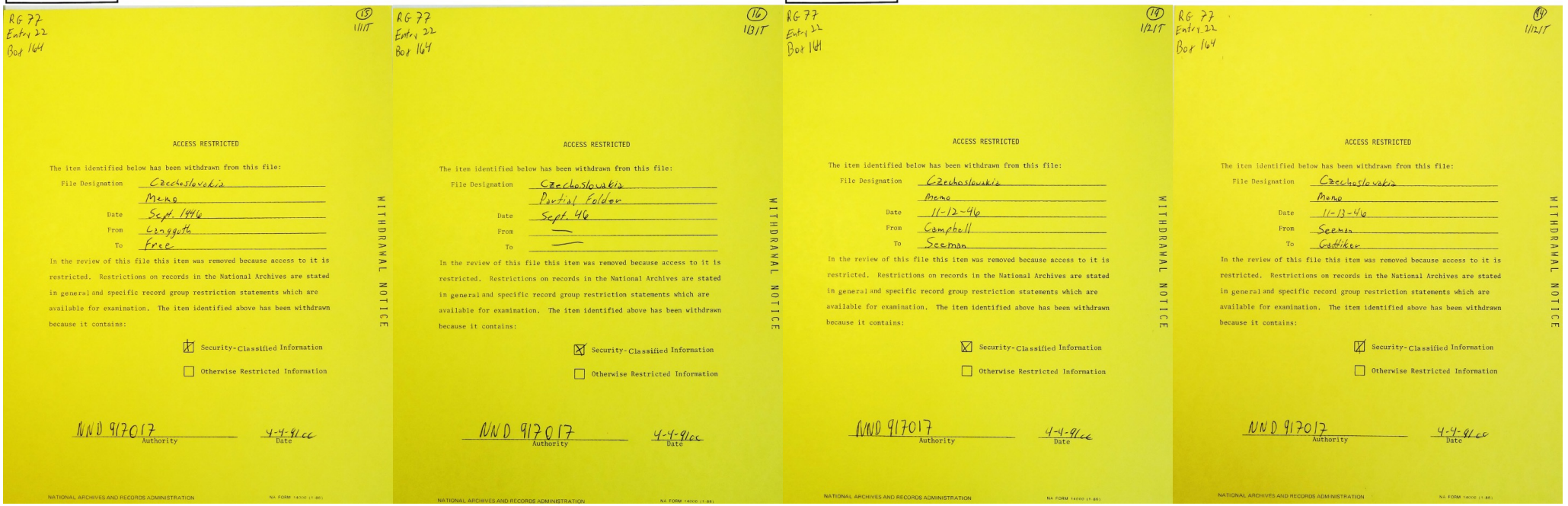


DECLASSIFIED
Authority NND 917017

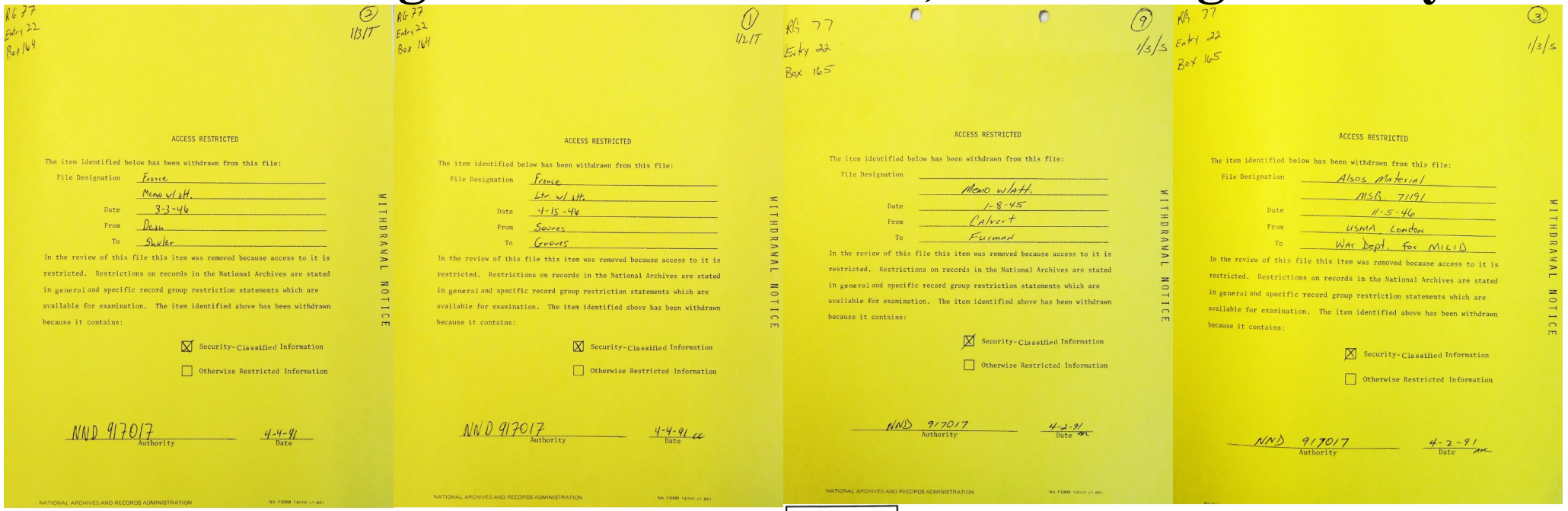
NARA RG 77, Entry UD-22A, Box 164

DECLASSIFIED
Authority NND 917017

NARA RG 77, Entry UD-22A, Box 164



14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?



RG 77 Entry 22 Box 164 — (2) 1/3/T

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: France
Memo w/att.
Date: 3-3-46
From: Dean
To: Shuler

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

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NND 917017 Authority — 4-4-91 Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77 Entry 22 Box 164 — (1) 1/2/T

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: France
Ltr. w/att.
Date: 4-15-46
From: Soures
To: Groves

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☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-4-91 cc Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77 Entry 22 Box 165 — (9) 1/3/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation:
Memo w/att.
Date: 1-8-45
From: Calvert
To: Furman

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

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NND 917017 Authority — 4-2-91 Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77 Entry 22 Box 165 — (3) 1/3/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Alsos Material
MSB 71191
Date: 11-5-46
From: USMA, London
To: War Dept. for MILID

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
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NND 917017 Authority — 4-2-91 Date

WITHDRAWAL NOTICE

DECLASSIFIED Authority NND 917017

NARA RG 77, Entry UD-22A, Boxes 164 & 165

DECLASSIFIED Authority NND 917017

NARA RG 77, Entry UD-22A, Box 165

RG 77 Entry 22 Box 165 — (11) 1/3/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation:
Partial Folder
1944
Date:
From: —
To: —

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
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NND 917017 Authority — 4-2-91 Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77 Entry 22 Box 165 — (13) 1/2/S

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation:
Memo w/att.
Date: 4-24-44
From: Jarver
To: —

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-2-91 Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77 Entry 22 Box 165 — (10) 1/1/C

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation:
Rpt. A-4436
Date: 11-7-46
~~From~~ Subj: Enemy Secret Weapons
~~To~~

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-2-91 Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

RG 77 Entry 22 Box 165 — (4) 1/9/T

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Alsos Material
Rpt. A-5542-46
Date: 12-19-46
From: MA, London
To:

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

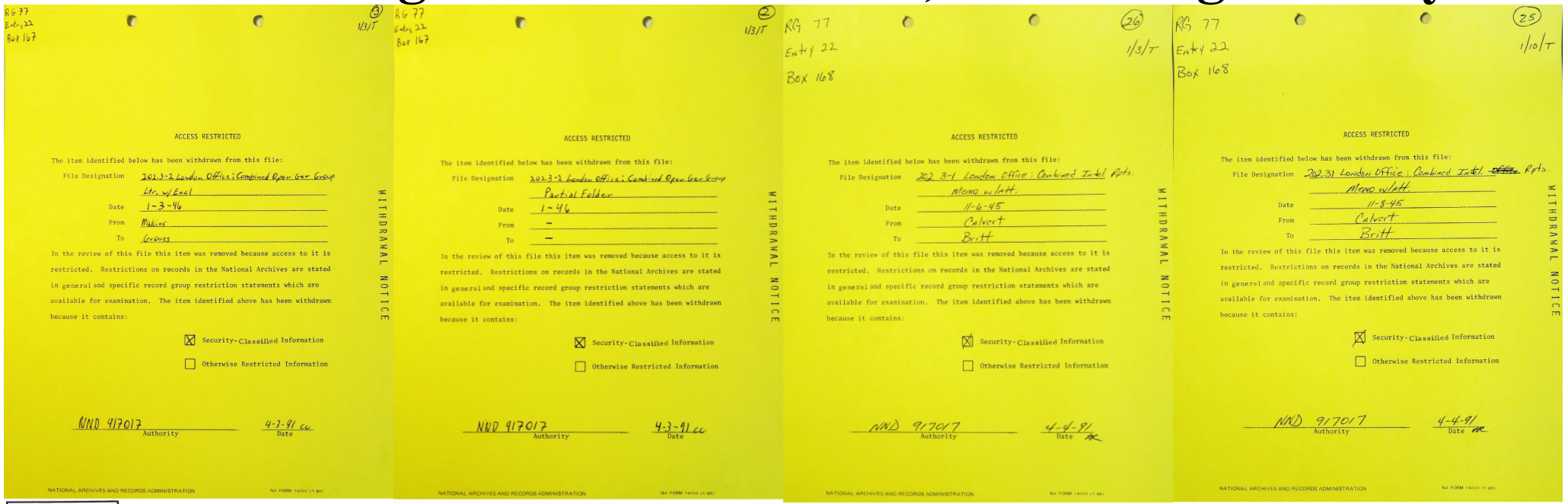
☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-2-91 Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?

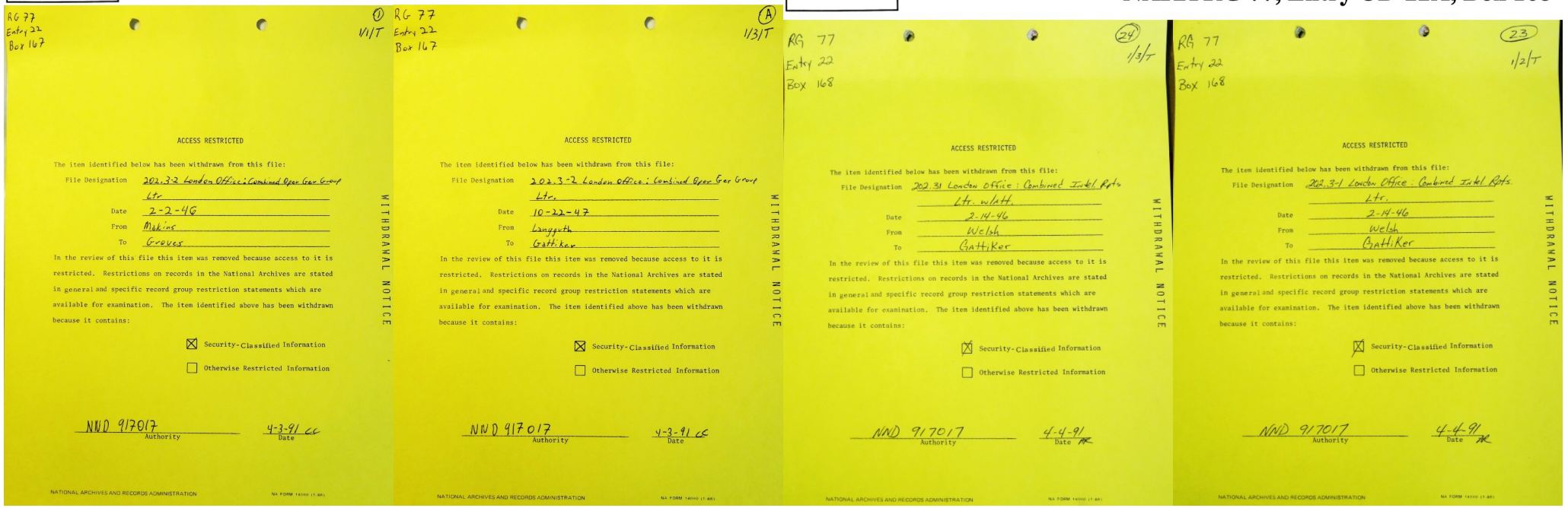


DECLASSIFIED
Authority NND 917017

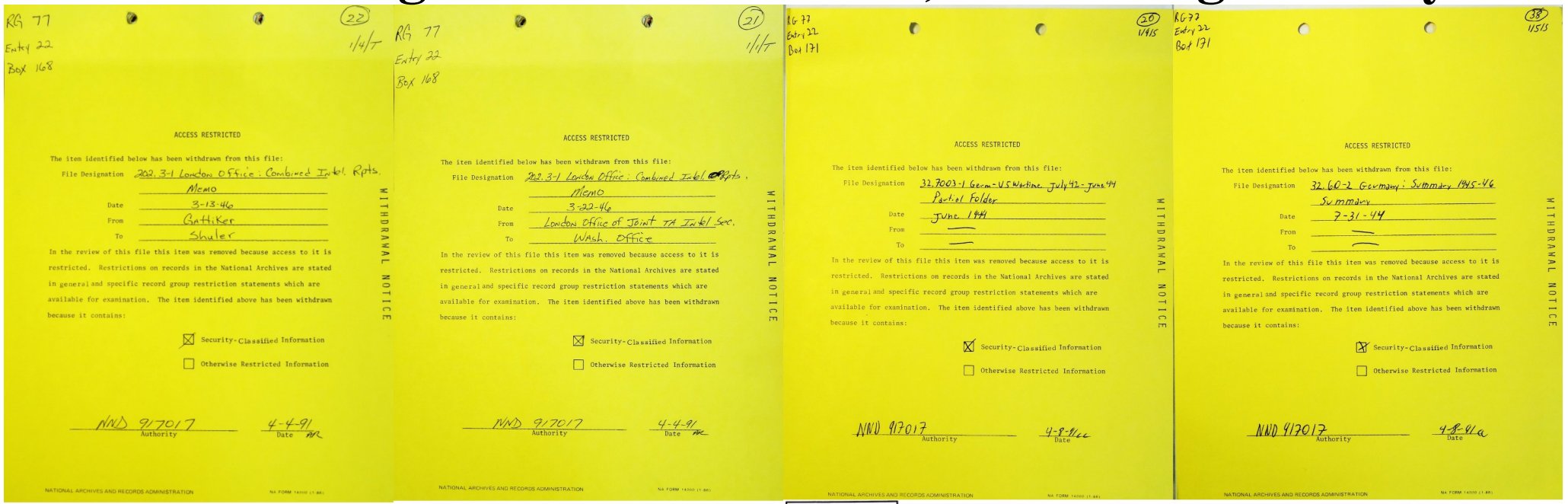
NARA RG 77, Entry UD-22A, Box 167

DECLASSIFIED
Authority NND 917017

NARA RG 77, Entry UD-22A, Box 168



14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?

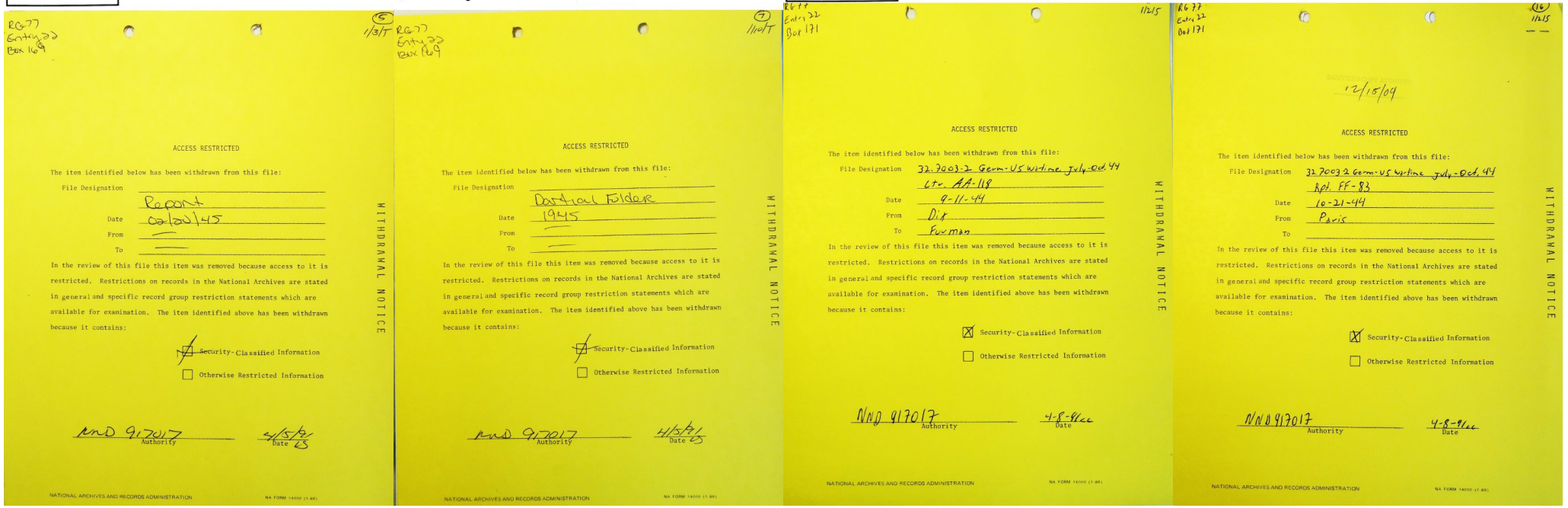


DECLASSIFIED Authority NND 917017

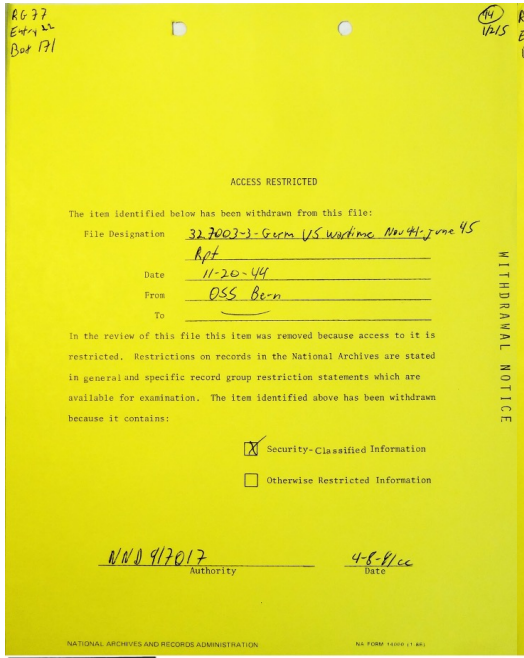
NARA RG 77, Entry UD-22A, Boxes 168 & 169

DECLASSIFIED Authority NND 917017

NARA RG 77, Entry UD-22A, Box 171



14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?


RG 77
Entry 22
Box 171

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.7003-3-Germ US wartime Nov 44-June 45 Rpt
Date: 11-20-44
From: OSS Bern
To: —

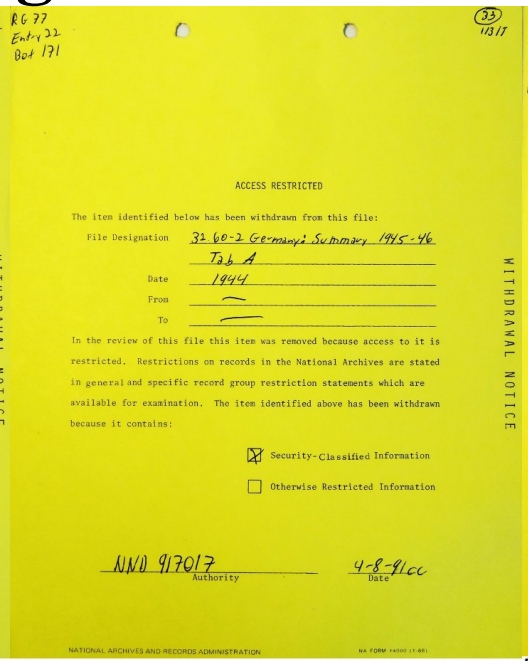
In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-8-91 cc Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION


RG 77
Entry 22
Box 171

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.60-2 Germany Summary 1945-46 Tab A
Date: 1944
From: —
To: —

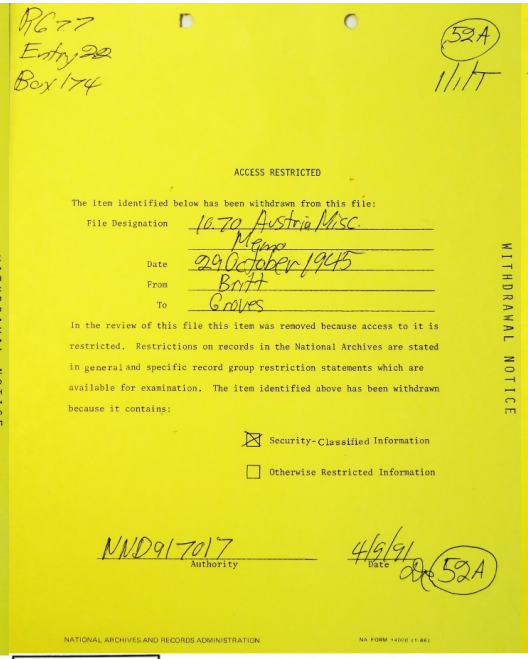
In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-8-91 cc Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION


RG 77
Entry 22
Box 174

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 10.70 Austria/Misc. Memo
Date: 29 October 1945
From: Britt
To: Groves

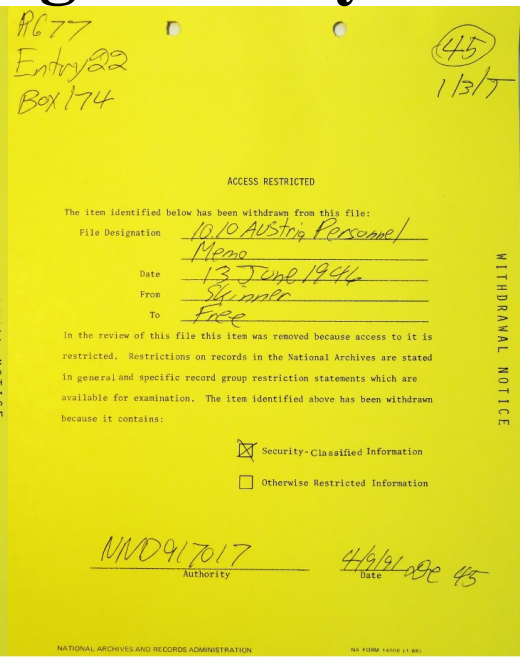
In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND917017 Authority — 4/9/91 Date — 52A

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION


RG 77
Entry 22
Box 174

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 10.10 Austria Personnel Memo
Date: 13 June 1946
From: Skinner
To: Free

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

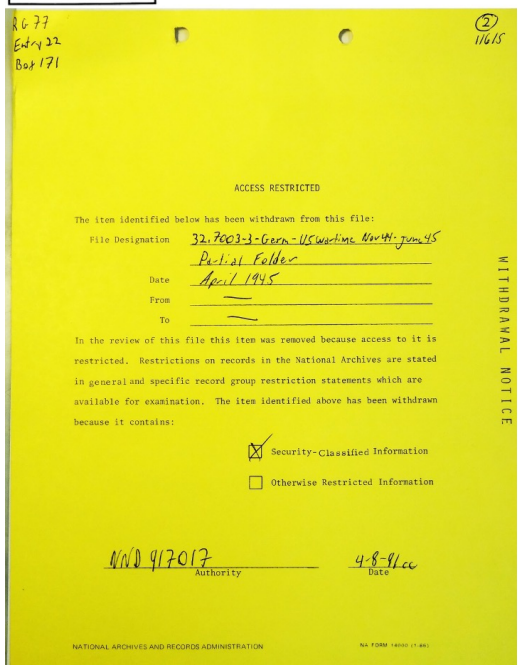
NND917017 Authority — 4/9/91 Date — 45

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

DECLASSIFIED Authority NNS 917017

NARA RG 77, Entry UD-22A, Box 171


RG 77
Entry 22
Box 171

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 32.7003-3-Germ-US wartime Nov 44-June 45 Pol. Sit. Folder
Date: April 1945
From: —
To: —

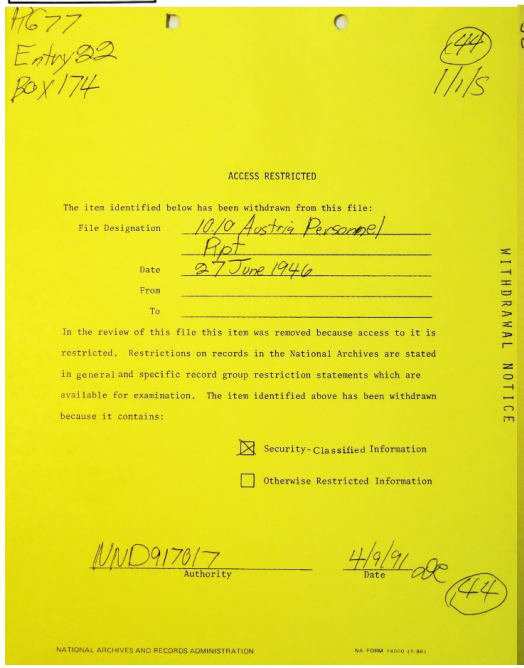
In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4-8-91 cc Date

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION


RG 77
Entry 22
Box 174

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: 10.10 Austria Personnel Rpt
Date: 27 June 1946
From: —
To: —

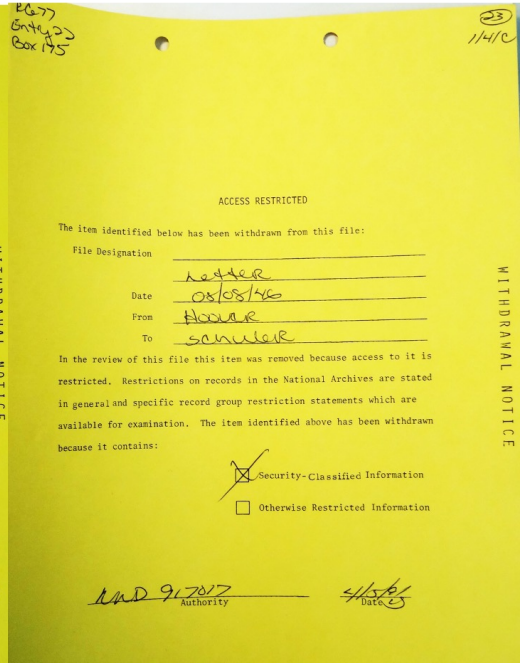
In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND917017 Authority — 4/9/91 Date — 44

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION


RG 77
Entry 22
Box 175

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Letter
Date: 08/05/46
From: Hoover
To: Schuller

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 917017 Authority — 4/15/91 Date

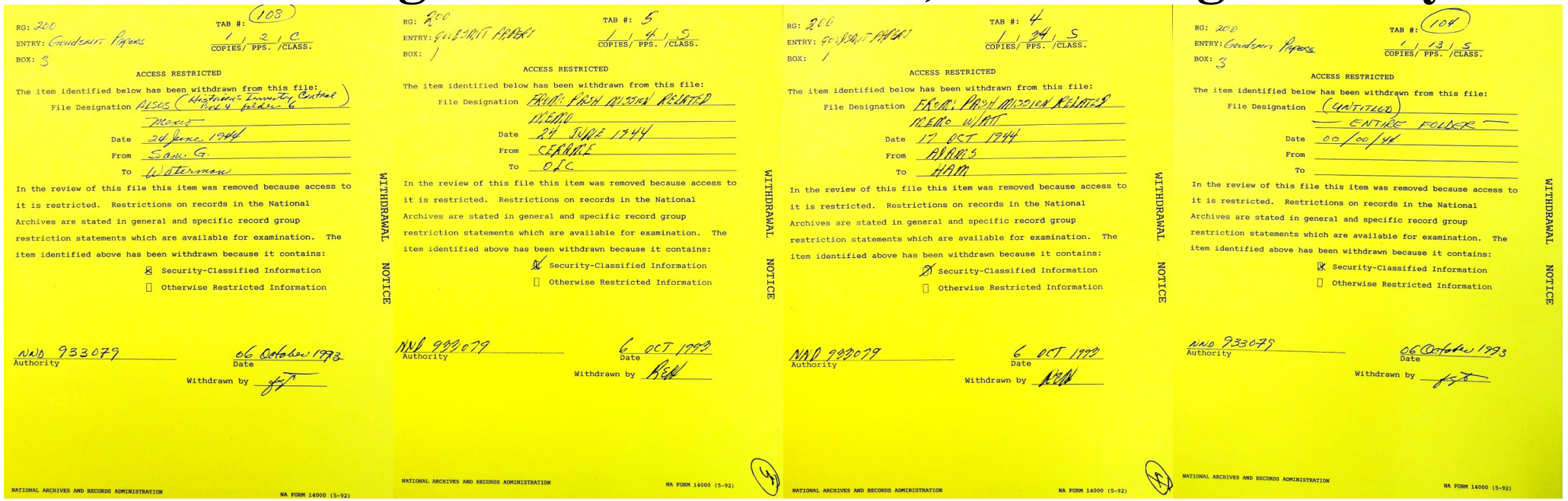
WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION

DECLASSIFIED Authority NNS 917017

NARA RG 77, Entry UD-22A, Boxes 174 & 175

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?



RG: 200 ENTRY: Goudsmit Papers BOX: 3 TAB #: (108) 1 / 2 / C COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation ALSOS (Hoffman's Inventory Control Card 4 folder 6)
Memo
Date 24 June 1944
From Sam G.
To Waterman

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NWD 933079 Authority
06 October 1993 Date
Withdrawn by

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200 ENTRY: GOUDSMIT PAPERS BOX: 1 TAB #: 5 1 / 4 / S COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation FROM: PASH MISSION RELATED
MEMO W/ATT
Date 24 JUNE 1944
From GERARDE
To OIC

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NWD 933079 Authority
6 OCT 1993 Date
Withdrawn by

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200 ENTRY: GOUDSMIT PAPERS BOX: 1 TAB #: 4 1 / 24 / S COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation FROM: PASH MISSION RELATED
MEMO W/ATT
Date 17 OCT 1944
From ADAMS
To HAM

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NWD 933079 Authority
6 OCT 1993 Date
Withdrawn by

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200 ENTRY: Goudsmit Papers BOX: 3 TAB #: (104) 1 / 13 / S COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation (UNTITLED)
— ENTIRE FOLDER —
Date 00/00/44
From
To

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

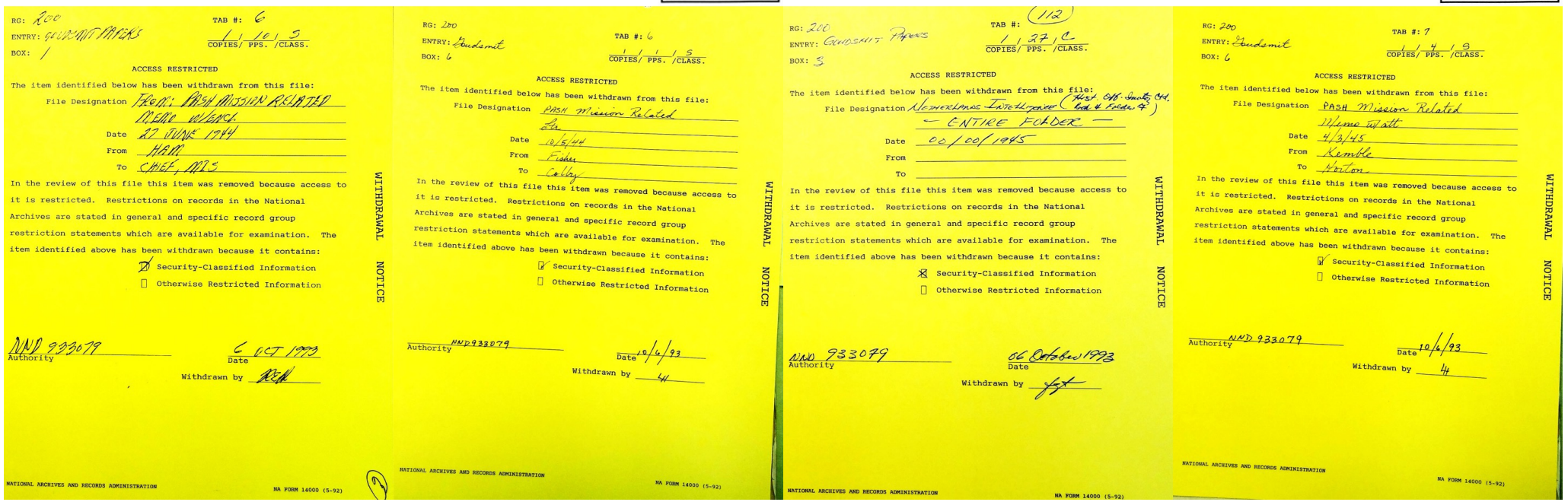
NWD 933079 Authority
06 October 1993 Date
Withdrawn by

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

NARA RG GOUDS, Entry UD-7420, Boxes 1–9

DECLASSIFIED Authority NND933079



RG: 200 ENTRY: GOUDSMIT PAPERS BOX: 1 TAB #: 6 1 / 10 / S COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation FROM: PASH MISSION RELATED
MEMO W/ATT
Date 22 JUNE 1944
From HAM
To CHIEF, MTS

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NWD 933079 Authority
6 OCT 1993 Date
Withdrawn by

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200 ENTRY: Goudsmit BOX: 6 TAB #: 6 1 / 1 / S COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation PASH Mission Related
Ltr
Date 10/6/44
From Fisher
To Colby

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

Authority NND933079
Date 10/6/93
Withdrawn by

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200 ENTRY: GOUDSMIT PAPERS BOX: 3 TAB #: (112) 1 / 37 / C COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation NEWSPAPER INTELLIGENCE (Hist. Off. Smyth Ctl. Card 4 Folder 4)
— ENTIRE FOLDER —
Date 00/00/1945
From
To

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NWD 933079 Authority
06 October 1993 Date
Withdrawn by

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200 ENTRY: Goudsmit BOX: 6 TAB #: 7 1 / 4 / S COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation PASH Mission Related
Memo w/att
Date 4/3/45
From Kemble
To Horton

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

Authority NND933079
Date 10/6/93
Withdrawn by

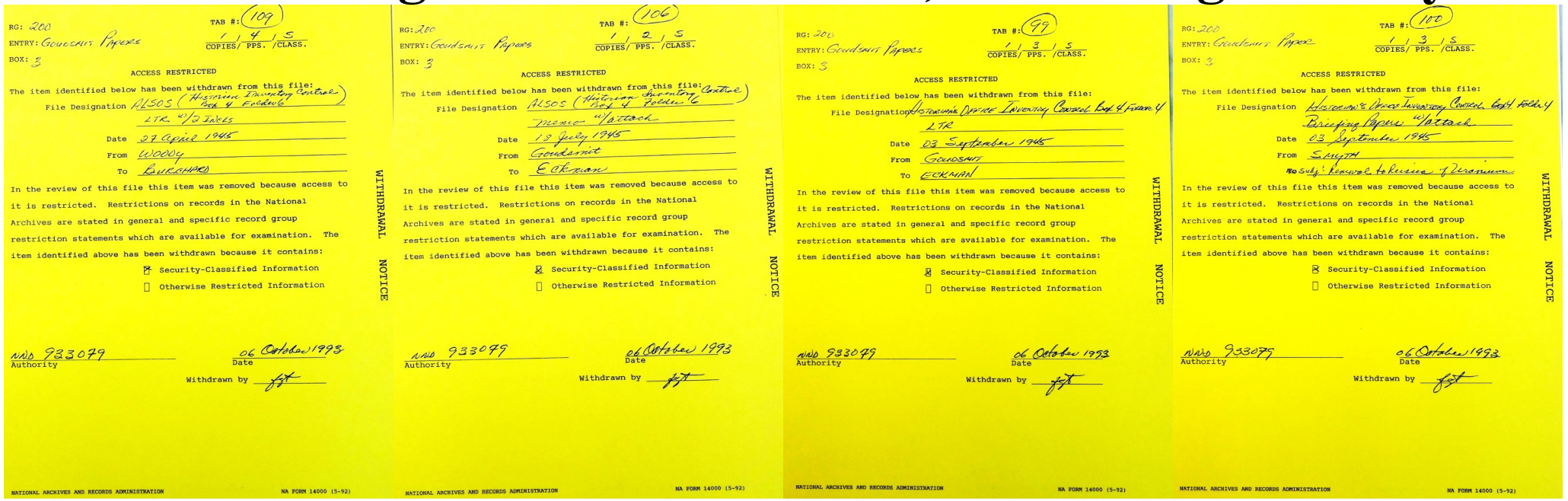
WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

NARA RG GOUDS, Entry UD-7420, Boxes 1–9

DECLASSIFIED Authority NND933079

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?



RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (109)
1 / 4 / 5
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation ALSOS (Historian Inventory Control Box 4 Folder 6)
LTR. 4/2 Incls
Date 27 April 1945
From WOODY
To BURKHARDT

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (106)
1 / 2 / 5
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation ALSOS (Historian Inventory Control Box 4 Folder 6)
memo 4/attach
Date 13 July 1945
From Goudsmit
To Eckman

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (99)
1 / 3 / 5
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation Historian's Office Inventory Control Box 4 Folder 4
LTR
Date 03 September 1945
From GOUDSMIT
To ECKMAN

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (100)
1 / 3 / 5
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation Historian's Office Inventory Control Box 4 Folder 4
Briefing Papers 4/attach
Date 03 September 1945
From SMYTH
To Subj: Removal to Russia of Uranium

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

NARA RG GOUDS, Entry UD-7420, Boxes 1–9

DECLASSIFIED Authority NND 933079

NARA RG GOUDS, Entry UD-7420, Boxes 1–9

DECLASSIFIED Authority NND 933079

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (107)
1 / 3 / 5
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation ALSOS (Historian's Inventory Control Box 4 Folder 6)
Memo
Date 07 August 1945
From Goudsmit
To Subj: Dissemination of Energy Scientific

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (105)
1 / 3 / 5
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation ALSOS (Historian Inventory Control Box 4 Folder 6)
Memo
Date 10 August 1945
From Goudsmit
To HAM

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (110)
1 / 1 / 5
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation ALSOS (Historian's Inventory Control Box 4 Folder 6)
Memo
Date 03 September 1945
From GOUDSMIT
To ECKMAN

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (111)
1 / 7 / 5
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation ALSOS (Historian's Inventory Control Box 4 Folder 6)
Memo 4/attachs
Date 10 September 1945
From GOUDSMIT
To ECKMAN

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

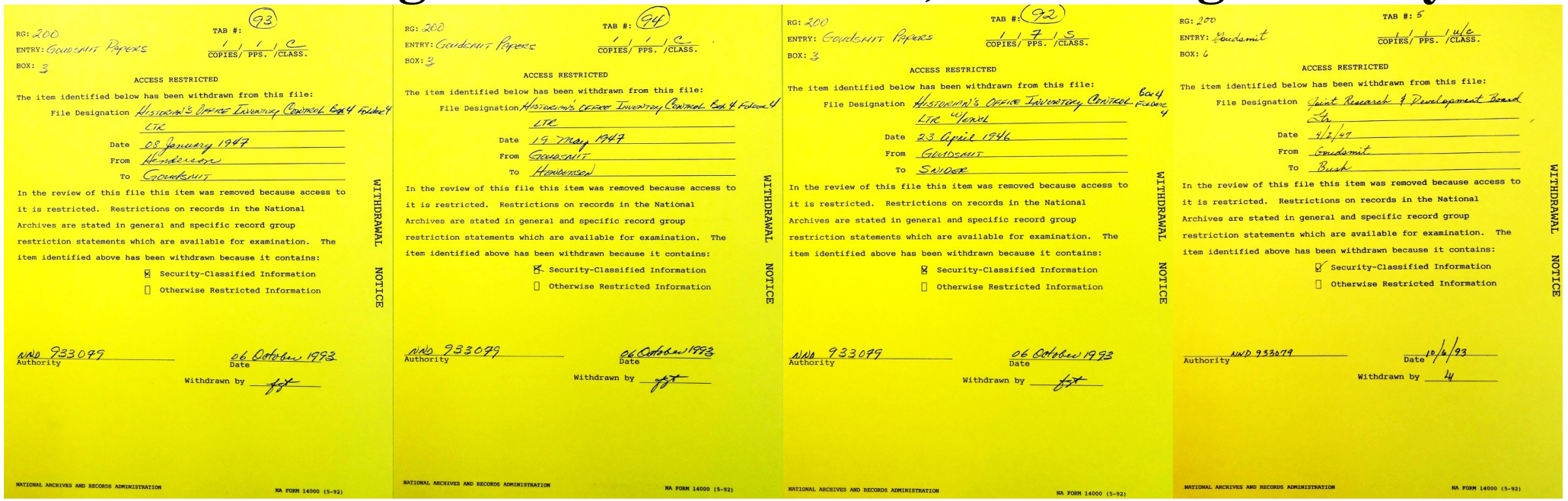
☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

WITHDRAWAL NOTICE

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?



RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (93)
1 / 1 / C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Historian's Office Inventory Control Box 4 Folder 4
LTR
Date: 08 January 1947
From: Henderson
To: Goudsmit

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

WITHDRAWAL NOTICE

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (94)
1 / 1 / C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Historian's Office Inventory Control Box 4 Folder 4
LTR
Date: 19 May 1947
From: Goudsmit
To: Henderson

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

WITHDRAWAL NOTICE

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (92)
1 / 7 / S
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Historian's Office Inventory Control Box 4 Folder 4
LTR "Yeoman"
Date: 23 April 1946
From: Goudsmit
To: Snyder

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

WITHDRAWAL NOTICE

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit
BOX: 6
TAB #: 5
1 / 1 / U/C
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ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Joint Research & Development Board
Ltr
Date: 4/2/47
From: Goudsmit
To: Bush

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☑ Security-Classified Information
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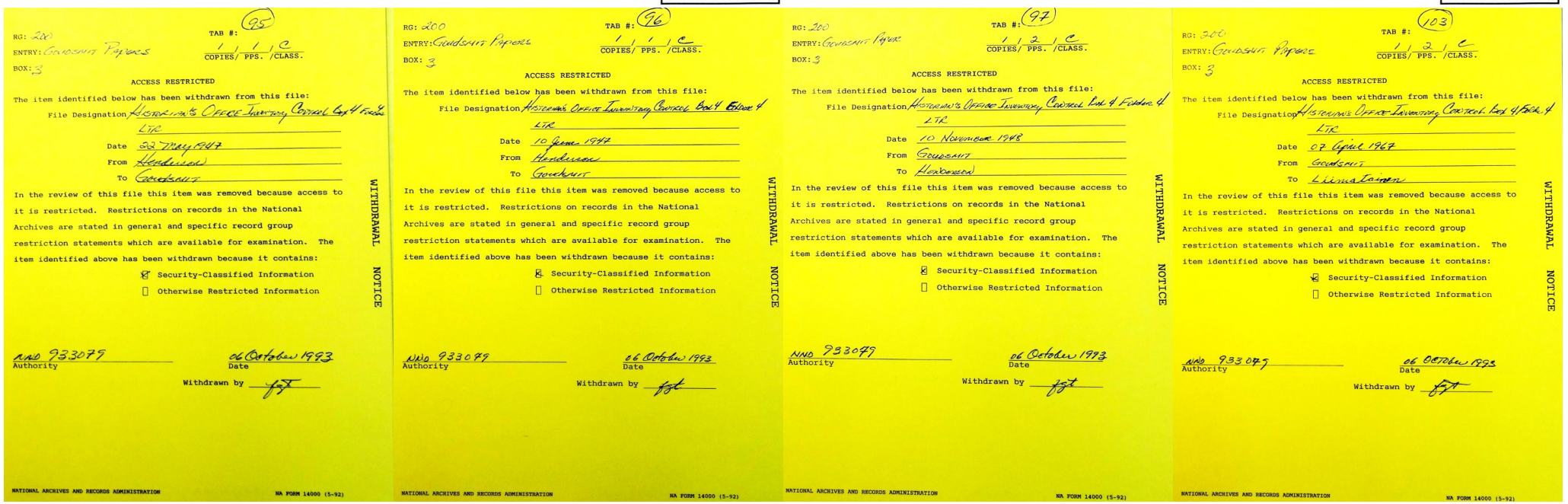
WITHDRAWAL NOTICE

NND 933079 Authority
10/6/93 Date
Withdrawn by 4

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

NARA RG GOUDS, Entry UD-7420, Boxes 1–9

DECLASSIFIED Authority NND 933079



RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (95)
1 / 1 / C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Historian's Office Inventory Control Box 4 Folder 4
LTR
Date: 22 May 1947
From: Henderson
To: Goudsmit

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☒ Security-Classified Information
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WITHDRAWAL NOTICE

NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (96)
1 / 1 / C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Historian's Office Inventory Control Box 4 Folder 4
LTR
Date: 10 June 1947
From: Henderson
To: Goudsmit

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NND 933079 Authority
06 October 1993 Date
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NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (97)
1 / 2 / C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Historian's Office Inventory Control Box 4 Folder 4
LTR
Date: 10 November 1948
From: Goudsmit
To: Henderson

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☒ Security-Classified Information
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06 October 1993 Date
Withdrawn by fgt

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

RG: 200
ENTRY: Goudsmit Papers
BOX: 3
TAB #: (103)
1 / 2 / C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Historian's Office Inventory Control Box 4 Folder 4
LTR
Date: 07 April 1967
From: Goudsmit
To: Lisma Laimen

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☒ Security-Classified Information
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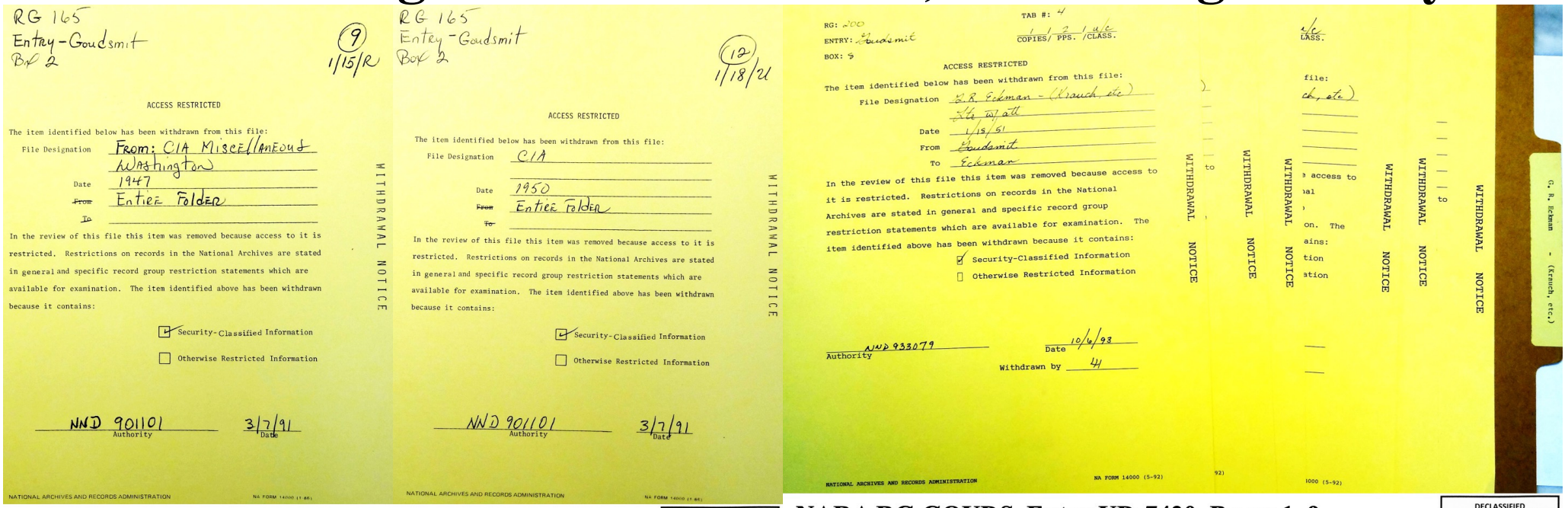
NND 933079 Authority
06 October 1993 Date
Withdrawn by fgt

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION NA FORM 14000 (5-92)

NARA RG GOUDS, Entry UD-7420, Boxes 1–9

DECLASSIFIED Authority NND 933079

14. Why Are So Many Archival Files on the German Nuclear Program Still Classified, or Missing Entirely?



RG 165
Entry - Goudsmit
Box 2

(9)
1/15/R

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: From: CIA Miscellaneous Washington
Date: 1947
~~From~~: Entire Folder
~~To~~:

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☑ Security-Classified Information
☐ Otherwise Restricted Information

NND 901101 (Authority) 3/7/91 (Date)

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION — NA FORM 14000 (1-86)

WITHDRAWAL NOTICE

RG 165
Entry - Goudsmit
Box 2

(12)
1/18/R

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: CIA
Date: 1950
~~From~~: Entire Folder
~~To~~:

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☑ Security-Classified Information
☐ Otherwise Restricted Information

NND 901101 (Authority) 3/7/91 (Date)

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION — NA FORM 14000 (1-86)

WITHDRAWAL NOTICE

RG: 200
ENTRY: Goudsmit
BOX: 5

TAB #: 4
1 / 3 / U/C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: E.R. Eckman - (Branch etc)
Ltr to all
Date: 1/15/51
From: Goudsmit
To: Eckman

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☑ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 (Authority) 10/6/93 (Date)

Withdrawn by 44

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION — NA FORM 14000 (5-92)

WITHDRAWAL NOTICE

G. R. Eckman - (Branch, etc.)

NARA RG GOUDS, Entry UD-7420, Boxes 1–9

DECLASSIFIED
Authority NND933079

RG: 200
ENTRY: Goudsmit Papers
BOX: 3

TAB #: (113)
1 / 92 / C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: C.I.A. (Historical Inventory Central Col 4 Folder 10)
— ENTIRE FOLDER —
Date: 1954
From:
To:

In the review of this file this item was removed because access to it is restricted. Restrictions on records in the National Archives are stated in general and specific record group restriction statements which are available for examination. The item identified above has been withdrawn because it contains:

☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 (Authority) 06 October 1993 (Date)

Withdrawn by jpt

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION — NA FORM 14000 (5-92)

WITHDRAWAL NOTICE

RG: 200
ENTRY: Goudsmit Papers
BOX: 3

TAB #: 27
1 / 9 / S
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Folder #2 Secret Documents Nuclear Aircraft...
Entire Folder
Date: 1955
From: —
To: —

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☐ Otherwise Restricted Information

NND 933079 (Authority) 5 October 93 (Date)

Withdrawn by jbl

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION — NA FORM 14000 (5-92)

WITHDRAWAL NOTICE

NARA RG GOUDS, Entry UD-7420, Boxes 1–9

DECLASSIFIED
Authority NND933079

RG: 200
ENTRY: Goudsmit
BOX: 5

TAB #: 8
1 / 71 / C
COPIES/ PPS. /CLASS.

ACCESS RESTRICTED

The item identified below has been withdrawn from this file:

File Designation: Ltr (O'Connor)
Memo w/Attys, G-460
Date: 15 May 1963
From: Goudsmit
To:

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☒ Security-Classified Information
☐ Otherwise Restricted Information

NND 933079 (Authority) 10-7-93 (Date)

Withdrawn by JMK

NATIONAL ARCHIVES AND RECORDS ADMINISTRATION — NA FORM 14000 (5-92)

WITHDRAWAL NOTICE

TAB #: 22
1 / 1 / C
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RESTRICTED

been withdrawn from this file:
Ltr (O'Connor)
Memo G-361
25 June 1956
Goudsmit

item was removed because access to
on records in the National
and specific record group
e available for examination. The
withdrawn because it contains:
curity-Classified Information
herwise Restricted Information

10-7-93 (Date)

Withdrawn by JMK

NA FORM 14000 (5-92)

WITHDRAWAL NOTICE

REPORTS (O'Connor) - [illegible]

14. Allied Belief in German Nuclear Weapons: Postwar Intel

NARA RG 226, Entry A1-134, Box 219,
Folder 1371: OUT AZUSA Nov. '43 Sept. '45

"Azusa" = OSS code word for German nuclear

OFFICE OF STRATEGIC SERVICES

OFFICIAL DISPATCH

DATE 14 SEPTEMBER 1945 REC'D 1041 15 SEPT 45

TO BERLIN VIA AMZON 1945 SEP 17 8 59

PRIORITY
ROUTINE
DEFERRED

FROM OFFICE OF STRATEGIC SERVICES

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SECRET

WASH 6437. AZUSA. TO 110 BERLIN FROM 154 AND DIX.
INFORMATION: WISNER AMZON.

RE BERL 1059 (IN 23766). PLEASE SEE WASH 3567 TO WISNER. OUR WORK ON THIS SUBJECT IS TO CORRELATE AND COOPERATE WITH SPECIALLY APPOINTED GENERAL WHO HAS CHARGE OF THE WHOLE AZUSA SITUATION AND HAS OVERALL RESPONSIBILITY.

IN ORDER THAT HE MAY MAKE DECISIONS WE PASS OUR INFORMATION TO HIM, AND THEREAFTER PROCEED AS HE MAY DIRECT.

ON PRESENT SUB FEATURE OF AZUSA ABOUT ASSISTING LOCATING GERMAN SCIENTISTS, SPECIAL GENERAL ASKED TO HAVE THE INFORMATION SENT ONLY TO CALVERT, LONDON EMBASSY, OR TO WASHINGTON.

RE YOUR AMZO 4437 (IN 24037); OUR WASH 1167 AND WASH 3567 WERE SPECIAL GENERAL'S INSTRUCTIONS UNTIL HE COULD TALK WITH SIBERT HERE. THIS NOW DONE AND ALL AZUSA INFORMATION OBTAINED BY OSS IN ETO AND APPLICABLE IN ETO SITUATIONS NOW TO BE COORDINATED ONLY BETWEEN YOU OR WISNER SIBERT AND CALVERT AND ADVISING OSS WASHINGTON OF RESULTING DECISIONS OR INFORMATION. THIS INSURES DESIRED MAXIMUM SECURITY WITH FEWEST NUMBER PERSONS INVOLVED. COPIES OF ANY REPORTS TO BE SENT OSS WASHINGTON WITHOUT DELAY AND SHOWING ACTION TAKEN.

THIS SUBJECT SO TIGHT AT THIS TIME WE ARE PLAYING VERY CLOSE WITH SPECIAL GENERAL.

PHRASE "OTHER FIELDS" FROM YOUR BERL #2417 INTERPRETED HERE AS WITHIN SCOPE AZUSA MATTERS ONLY AND NOT APPLICABLE TO ALL TECHNICAL MATTERS. WASH 3567 REPEATED THE WORDS "OTHER FIELDS" THEREBY TRYING TO ELIMINATE MISUNDERSTANDING. THIS ANSWERS AMZO 3917.

TOD: 1218 15 SEPT 45 WHS/HWD, HWD JDW

INITIALS OF "RELEASING" OFFICER

SECRET

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TOD: 1218 15 SEPT 45 WHS/HWD, HWD JDW

INITIALS OF "RELEASING" OFFICER

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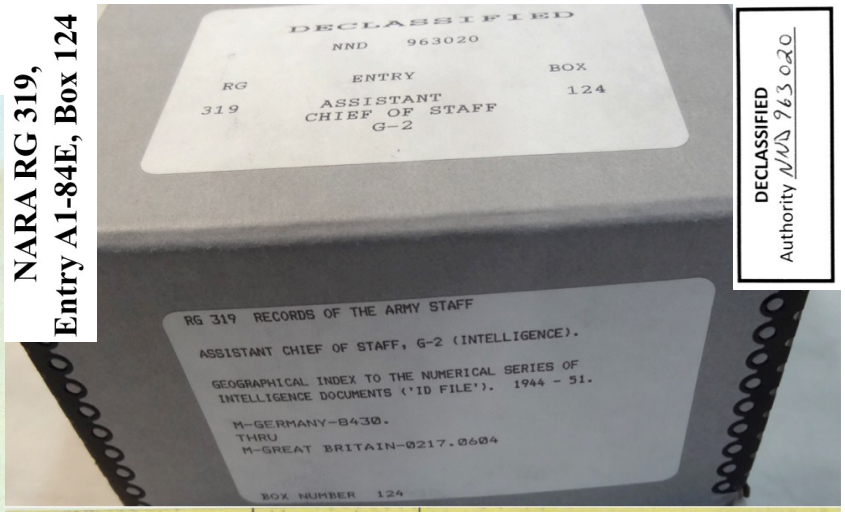
DECLASSIFIED Authority NND 857134

Where are the reports???

NARA RG 319, Entry A1-84E, Box 124



DECLASSIFIED Authority NND 963020

M-GERMANY (COUNTRY OR AREA) | 8600.0811 (BID NUMBER) | Nuclear Physics and Atomic Energy-Miscellaneous-Research

NEW BID-NEW NUMBER

DATE	SOURCE	COMMENTS	SPEC. NO.	M.I.S. NO.
28 Mar 46	ONI	(T)OP-23-F25-1/46 "Atom Bomb-Research in Germany & Influence on Developments in Soviet Russia		SD 3249
5 Aug 46	FN	[illegible] Bifaini & devel. atomic Bombs		293192
25 Jul 46	State	C-Estimate of German atomic Research in Spain		293402
15 Aug 46	487a	8-application of Atomic energy		300164
24 Aug 46	487a	C-Interrogation of Franz Fochs		301522
19 Aug 46	R-187-46 OB	8-Researchers of atomic Energy		304481
23 Aug 46	State	4-Manuf. of arms and armament-Soviet Zone		303387

INTELLIGENCE LIBRARY

M-GERMANY (COUNTRY OR AREA) | 8600.0800 S.I.B.C. (BID NUMBER) | Nuclear Physics and Atomic Energy-Miscellaneous.

NEW BID-NEW NUMBER

DATE	SOURCE	COMMENTS	SPEC. NO.	M.I.S. NO.
23 Oct 45	Navy	S-Unusual Developments		226512
2 Jan 46	2nd IC	C-Blueprints of Atomic Bomb		229196

M-GERMANY (COUNTRY OR AREA) | 8600.0713 (BID NUMBER) | Nuclear Physics and Atomic(2 Energy Uses - Bombs.

1947 NEW BID-NEW NUMBER

DATE	SOURCE	COMMENTS	M.I.S. NO.
4 June 47	EM-246	C - Atomic Bomb	373409
25 Jul 47	TS-7-47 3a	C Atomic Bomb detonating Plans by German Investigator	S.D.5817

Some Allied Officials Whose Files May Hold Insights

Commander Herbert Agar (1897-1980), assistant to U.S. ambassador to U.K.
Jack H. Alberti (??-??), U.S. Navy intelligence civilian investigator
Col. Robert S. Allen (1900-1981), U.S. Army
Dr. Luis Walter Alvarez (1911-1988), Manhattan
Gen. Henry H. Arnold (1886-1950), U.S. Army Air Forces
Col. Peter Beasley (1884-1957), U.S. Army Air Force, Strategic Bombing Survey
Dr. Hans Bethe (1906-2005), Manhattan
Gen. Clayton L. Bissell (1896-1972), U.S. Army Air Forces intelligence
A. E. Britt (??-??), affiliation?
Dr. Vannevar Bush (1890-1974), Director of OSRD/NDRC
Maj. Horace K. Calvert (1915-2006), U.S. Army/Manhattan intelligence
Dr. Karl P. Cohen (1913-2012), Manhattan
Dr. James B. Conant (1893-1978), Assistant Director of OSRD/NDRC
Captain George C. Davis (??-??), U.S. Army/Manhattan intelligence
Col. Howard W. Dix (??-??), Office of Strategic Services
Gen. William Donovan (1883-1959), Office of Strategic Services Director
Allen Dulles (1893-1969), Office of Strategic Services, later CIA Director
Col. George R. Eckman (??-1971), U.S. Army Counter Intelligence Corps, Alsos
G. Verner Edlund (??-??), U.S. Army Counter Intelligence Corps
Maj. Ernst Englander (??-??), U.S. Army Air Forces
Dr. Richard Fischer (1910--1991), U.S. Geological Survey
Dr. Victor H. Fraenckel (1908-1998), Scientific Intelligence Advisory Section (SIAS) for Supreme Headquarters Allied Expeditionary Force (SHAEF)
Maj. Robert R. Furman (1915-2008), U.S. Army/Manhattan intelligence
Col. Dale M. Garvey (1914-2002), U.S. Army Counter Intelligence Corps
David Gattiker (??-1993), U.K. Atomic Energy Office
Dr. Samuel Goudsmit (1902-1978), Alsos scientific head
Gen. Leslie Groves (1896-1970), U.S. Army/Manhattan commanding officer
Caperton Horsley (1903--1988) , CIOS
Gen. John Edwin Hull (1895-1975), U.S. Army
Justice Robert H. Jackson (1892-1954), U.S. Prosecutor, Nuremberg trials
Dr. Theodore von Kármán (1881-1963), chief scientific advisor for Henry Arnold
Col. John A. Keck (??-??), U.S. Army Ordnance
Col. Oscar Koch (1897-1970), U.S. Army intelligence
Gen. Egmont F. Koenig (1892-1974), U.S. military attaché in Czechoslovakia
Dr. Gerard P. Kuiper (1905-1973), Alsos
Col. John Lansdale, Jr. (1912-2003), U.S. Army/Manhattan intelligence
Gen. John Magruder (1887-1958), Office of Strategic Services Deputy Director
Gen. George C. McDonald (1892-1969), U.S. Army Air Forces intelligence
Gen. Joseph T. McNarney (1893-1972), U.S. Army Air Forces
Dr. Philip Morrison (1915-2005), Manhattan
Dr. John von Neumann (1903-1957), Manhattan
Dr. Todos M. Odarenko (1900-1975), AT&T Bell Laboratories
Lt. Col. John A. O'Mara (19??-19??), U.S. Strategic Air Forces in Europe, Office of the Director of Intelligence
Dr. J. Robert Oppenheimer (1904-1967), Manhattan
Dr. Richard W. Porter (1913-1996), General Electric rocket programs
Gen. Donald Putt (1905-1988), U.S. (Army) Air Force
Gen. William L. Richardson (1901-1973), U.S. (Army) Air Force
Dr. Howard P. Robertson (1903-1961), Chief of the Scientific Intelligence Advisory Section (SIAS), SHAEF; Eisenhower's highest-level science advisor
Lt. Vladimir L. Rychly (1909-1992), U.S. Navy attaché in Czechoslovakia
A. J. Saxon (??-??), Manhattan
Whitney Shepardson (1890-1966), Office of Strategic Services
Col. W. R. Shuler (??-??), U.S. Army/Manhattan intelligence
Gen. Edwin L. Sibert (1897-1977), U.S. Army intell, Central Intelligence Group
Col. Leslie E. Simon (1900-1983), U.S. Army
Maj. Francis J. Smith (??-??), U.S. Army/Manhattan intelligence
Dr. Charles P. Smyth (1895-1990), Alsos
Gen. George Strong (1880-1946), U.S. Army, Military Intelligence Corps head
Dr. Edward Teller (1908-2003), Manhattan
Maj. Edmund Tilley (1892-1966), U.K. military intelligence
Dr. Richard C. Tolman (1881-1948), Manhattan
Maj. H. S. Traynor (??-??), Manhattan
Dr. Maj. John E. Vance (1905-1975), U.S. Army/Manhattan
Joseph Volpe, Jr. (1914-2002), U.S. Army/Manhattan
Frederic A. C. Wardenburg III (1905-1997), Alsos
Col. Lowell P. Weicker (1903-1978), U.S. Strategic Air Forces in Europe, Office of the Director of Intelligence
Maj. P. M. Wilson (??-??), Dustbin interrogation center
Col. George Bryant Woods (1896-1954), U.S. Air Technical Services Command (ATSC)/Air Materiel Command (AMC) intelligence

15. Conclusions

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- **Manufacturing uranium gas centrifuges in factories in Switzerland, Kiel, Freiburg, Göttingen, Munich, Breslau, etc.**

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- **Building numerous dedicated power plants to provide electricity to those facilities.**
- **Producing heavy water at at least ~21 sites all over German-controlled Europe.**
- **Producing enormous quantities of many other materials (beryllium, fluorine, calcium, zirconium, cadmium, etc.) that are vital for a nuclear weapons program, in some cases all at the same site.**

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- **Processing uranium ore to uranium oxide, uranium metal, UF_6, and other products at at least ~11 other sites.**
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- **Employing tens of thousands of workers in multiple plants to enrich uranium.**
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- **Producing heavy water at at least ~21 sites all over German-controlled Europe.**
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If you saw some random modern country that suddenly started doing all of those things, would you conclude that that country clearly had no significant nuclear weapons program, or would you decide that all of that evidence raises real concerns and warrants a more detailed investigation?

15. Further Work

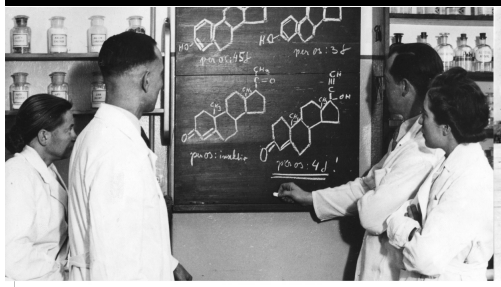
The true, detailed, complete history of the German nuclear program has not yet been publicly written by anyone (including me).

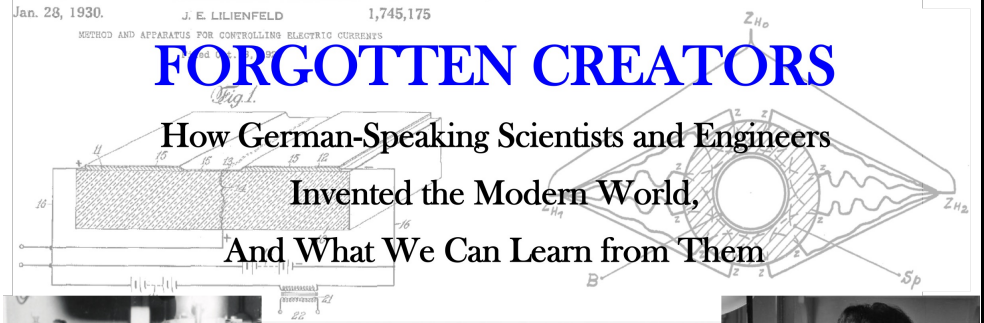
To do that, we must first:

- **Search for relevant documents in archives and personal collections around the world, and lobby to have all files declassified and released.**

- **Conduct industrial archaeology digs (carefully!) and laboratory analyses at sites suspected to have been involved in the German nuclear program.**

Modern society runs on revolutionary innovations from the predominantly German-speaking scientific world ~1800–1945

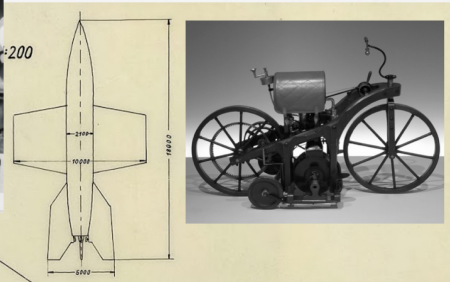


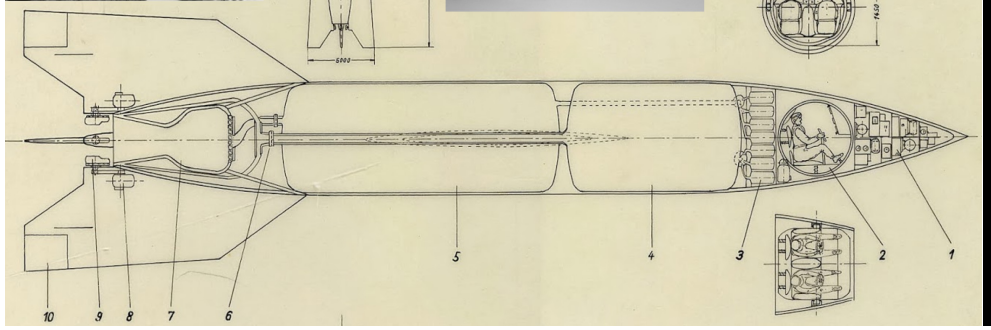


FORGOTTEN CREATORS

How German-Speaking Scientists and Engineers Invented the Modern World, And What We Can Learn from Them

Todd H. Rider





Available for free at:
riderinstitute.org/revolutionary-innovation

Over 5000 pages covering:

- Major innovators and innovations produced by the predominantly German-speaking scientific world ~1800–1945
- Systemic factors that promoted so much innovation in that place and time
- Technology transfer out of the German-speaking world
- What we can learn that could improve innovation in the modern world
- >1000 pages of primary sources/analysis on the WWII German nuclear program
- >400 pages of bibliography

Reviewed by European and American historians and scientists

Updated as new information is found

Short version—but click the links!

8.8 Nuclear Engineering in the Third Reich

This section presents evidence which suggests that the World War II German nuclear program was much larger and much more advanced than has previously been generally understood. While this claim may seem controversial, much of the relevant archival evidence has only been declassified and discovered in recent years, and was not publicly available when earlier historical assessments were made. The evidence presented here covers:

For a far more detailed presentation of the currently available evidence, see Appendix D. As explained in Section 8.8.15, much more work is needed to uncover and evaluate evidence regarding the true history and extent of the wartime nuclear program.

8.8.1 Flaws in the Conventional Historical View of the German Program

The conventional historical view that has been held from 1945 to the present is that the World War II German nuclear program was very small and poorly funded, that Germany was still trying to complete its first prototype fission reactor when the war ended, and that Germany never even made a serious attempt to develop nuclear weapons.[6] This view is based on three categories of evidence, although each category has its own limitations as summarized below and in Section D.1:

[6] E.g., Goudsmit 1945; Goudsmit 1947; Groves 1962; Hentschel and Hentschel 1996; Hoffmann 2023; Irving 1967; Pash 1969; Popp 2016; 2021; Powers 1993; Rhodes 1986; Rose 1998; Walker 1989; 1995; 2020; 2024.

Long version of nuclear program

Available for free at:
riderinstitute.org/revolutionary-innovation

Appendix D

Advanced Creations in Nuclear Engineering

Der Welt Erbe gewänne zu eigen,
wer aus dem Rheingold schüfe den Ring,
der maßlose Macht ihm verlieh'.

The whole world can be possessed by one
who from the Rhinegold forges the Ring,
which can bestow immeasurable power.

Richard Wagner. 1854. *Das Rheingold.* Scene I. Wellgunde.

As discussed in Chapter 8, contributions by the German-speaking research world to fundamental nuclear science are very well documented.[1] Wilhelm Röntgen discovered X-rays in 1895, and Ludwig Zehnder was making detailed whole-body X-ray photos of humans by 1896. Hans Geiger and Walther Müller developed accurate radiation meter designs (Geiger counters or Geiger-Müller tubes) during the period 1908–1928 that are still in use today. Nuclear fission reactions were first proposed by Ida Noddack in 1934, and discovered and explained by Otto Hahn, Fritz Strassmann, Lise Meitner, and Otto Frisch in 1938–1939. Nuclear fusion reactions were proposed by Fritz Houtermans and his student Robert Atkinson in 1928–1929, and refined by Carl Friedrich von Weizsäcker and Hans Bethe in 1938. Detailed mathematical models of the nucleus, essential for accurately predicting nuclear decays and reactions, were first developed by von Weizsäcker in 1935 and ultimately finalized by Otto Haxel, Johannes Hans Jensen, Maria Goeppert Mayer, Hans Suess, and Eugene Wigner by 1949.

[1] See for example: Bethe 1991; 1997; Blatt and Weisskopf 1952; Brown and Lee 2006; Otto Hahn 1968; Irving 1967; L'Annunziata 2016; Nachmansohn 1979; Rife 1999; Schweber 2012; Sime 1996; Szanton 1992; Wigner 1967.

Some Reviewers' Comments on *Forgotten Creators*

"Todd H. Rider's *Forgotten Creators* is an encyclopedic consideration of Germany's central place in the advancement of science and technology between 1800 and 1945. Drawing upon a wide range of sources, Rider has summarized that effort in a survey that will impress the reader just as much for the breadth of German intellectual achievement as for the influence that achievement has had upon the modern world."

George W. Cully, retired Director, Office of History at Air University, Maxwell Air Force Base, Alabama

"Todd H. Rider's *Forgotten Creators* is a monumental treatise about and an exciting intellectual journey through the contributions of scientists and technologists in Germany and other Central European countries and German-speaking areas to universal progress. It is thoroughly researched, meticulously documented, and presented in an easy-to-perceive way. The pre-war and pre-Nazi German system of science support has lessons that would be difficult to emulate but worthy to ponder about even today. The long-range tragic consequences in science caused by National Socialism are well demonstrated as are the benefits in the West and in the East from the exodus of Jewish scientists before and the importation of others from Germany following World War II. The book is a virtually bottomless well for mining reliable information in the history of science and technology. The 'forgotten creators' are no longer forgotten. Todd is to be congratulated for his accomplishment and thanked for sharing it so generously with the international community."

István Hargittai, Professor Emeritus of Chemistry, Budapest University of Technology and Economics, author of *Buried Glory, Candid Science, Drive and Curiosity, Great Minds, Judging Edward Teller, Martians of Science,* and *The Road to Stockholm*

"The book *Forgotten Creators* is a really impressive book, as Todd H. Rider tries to mention all relevant German-speaking scientists and engineers and their scientific fields up to 1945 in this mammoth project. In this form, nobody has dared to do this before. The author deserves my full respect for this. I am pleased that we were able to support him in his research."

Thomas Köhler, Peenemünde Historical-Technical Museum historian and head of the archive

"*Forgotten Creators* is an examination of mid-twentieth-century German science and technology, studying the question of how this era came to be so productive. Using extensive reproduction of original materials and source accounts, the author is not only able to provide an overview of what is known about wartime activities, but is also able to indicate avenues for future historical research. The careful and comprehensive referencing permits the materials presented to be used in academic studies. A notable feature of this work is the fluid format provided by online publication, allowing revisions and new materials to be added. An especially important emphasis of the book is what can be learned from both the German-speaking scientists and the World War II era in general that could improve scientific productivity and creativity now."

Thomas Kunkle, Los Alamos National Laboratory, retired

"With his work, based on very comprehensive, thoroughly researched sources, Todd Rider has presented an astonishing study of the history of German science, especially in the first half of the twentieth century, which also reveals many connections that have been unjustly forgotten or little noticed. This also applies to numerous persons whose achievements are hardly known."

Günter Nagel, author of *Wissenschaft für den Krieg, Himmlers Waffenforscher, Atomversuche in Deutschland,* and *Das geheime deutsche Uranprojekt 1939-1945*

"A very valuable part of the book is devoted to the development of nuclear weapons in Germany during WWII, 1939-1945. While the histories of both the US/British Manhattan Project and the Soviet atomic project have been to a large extent declassified, little is actually known about the German work. Rider has done historians a favor by marshalling all of the evidence he could find in US, German, and Russian archives regarding the German atomic project. The inescapable conclusion is that the Germans were much farther advanced in nuclear weapons development than is generally thought."

Lee Pondrom, Professor Emeritus of Physics, University of Wisconsin-Madison, author of *The Soviet Atomic Project: How the Soviet Union Obtained the Atomic Bomb*

"*Forgotten Creators* by Todd Rider is an extraordinary work of detailed research and new insights into the technological advances contributed by German-speaking scientists. His lengthy and in-depth study of history often overlooked or not even seen in more cursory reviews is a refreshing read. His attempt to create the fullest account possible has resulted in a fine reference book that also serves to introduce new research for the reader. Rider's contention, right up front in the Executive Summary—that inventions and discoveries had their highest concentration of revolutionary innovations from scientists and engineers from the German-speaking central European research world in the nineteenth and early twentieth centuries—demands the reader's attention. He then fills an enormous amount of over 4,000 pages with supporting details. Amazing subject matter and new revolutionary insights dug up through meticulous research make *Forgotten Creators* a 'must read' for serious historians and curious researchers alike."

D. Ray Smith, Oak Ridge National Lab Historian, retired

"This truly voluminous study provides an in-depth overview of techno-scientific achievements and innovations which originated from the German-speaking world. It is a rich and fascinating history of the transnational circulation of knowledge over a period of no less than two centuries."

Helmuth Trischler, Head of Research, Deutsches Museum, Munich

"A most important and deserving book. Todd Rider's research on the German rocket and nuclear programs in World War II is especially impressive because of the number and depth of the sources cited and the meticulousness of their evaluation. Really pioneering work has been done here!"

Matthias Uhl, Deutsches Historisches Institut, Moscow, author of *Stalins V-2: Der Technologietransfer der deutschen Fernlenkwaffentechnik* and *Die Organisation des Terrors: Der Dienstkalender Heinrich Himmlers 1943-1945*

"Todd Rider has produced a meticulously researched and cogently argued *tour de force* on the men and the circumstances that drove the modern German Renaissance in science and technology. Brought out of the long shadow of the Third Reich, the story of this Golden Age of human enquiry is convincingly shown to have as much relevance to our present times as it did then. A remarkable achievement."

Stephen Walton, Senior Curator, U.K. Imperial War Museum

Dr. Todd H. Rider   riderinstitute.org

Fundamental Limitations on Plasma Fusion Systems Not in Thermodynamic Equilibrium

by

Todd Harrison Rider

S.M., Nuclear Engineering, MIT, 1994
S.M., Electrical Engineering and Computer Science, MIT, 1991
S.B., Electrical Engineering, MIT, 1991

Submitted to the Department of Electrical Engineering and Computer Science in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

at the

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

June 1995

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Signature of Author ____ Department of Electrical Engineering and Computer Science May 19, 1995

Certified by ____ Lawrence M. Lidsky, Professor of Nuclear Engineering, Thesis Supervisor

Accepted by ____ Frederic R. Morgenthaler, Chairman, Department Committee on Graduate Students

Fundamental Constraints on Large-Scale Antimatter Rocket Propulsion

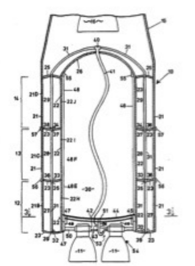
Broad-Spectrum Antiviral Therapeutics

A B Cell–Based Sensor for Rapid Identification of Pathogens

Fundamental limitations on plasma fusion systems not in thermodynamic equilibrium

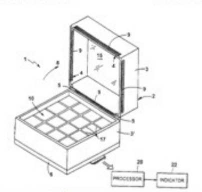
United States Patent — Rider — Patent Number: 4,723,736 — Date of Patent: Feb. 9, 1988

ROCKET STAGING SYSTEM



United States Patent — Rider — Patent Number: 6,087,114 — Date of Patent: Jul. 11, 2000

OPTOELECTRONIC SENSOR



United States Patent — Rider — Patent No.: US 7,566,694 B2 — Date of Patent: *Jul. 28, 2009

ANTI-PATHOGEN TREATMENTS

Relativistic Quantum Field Theory

Todd H. Rider   thor@riderinstitute.org   13 November 2019

Any suggestions for improvements would be greatly appreciated.

Three quarks for Muster Mark!
—James Joyce, *Finnegans Wake* (1939)

I think I can safely say that nobody understands quantum mechanics.
—Richard Feynman, *The Character of Physical Law* (1965)

Overview

Relativistic quantum field theory (or field theory, for short) combines special relativity, which describes very fast things, and quantum mechanics, which describes very small things. The resulting theory correctly predicts the behavior of fundamental particles, which are small and often move at high speeds (or are in bound states with relativistic energies). A "toy theory" of spinless particles will be used to first introduce some of the basic techniques and results of field theory, since the spin of real particles makes calculations more complicated. Field theory will then be applied in succession to each of the four fundamental forces. Quantum electrodynamics is a field theory describing the electromagnetic force; it is relevant to phenomena such as Compton scattering and electron-positron annihilation. The field theory of the weak nuclear force describes phenomena such as the decay of neutrons (beta decay) and muons. Quantum chromodynamics describes the strong nuclear force and thus is relevant to the behavior of the quarks that compose particles like protons, neutrons, and pions. Finally, it will be shown that general relativity is equivalent to applying field theory to gravitation, although there remain obstacles to developing a complete quantum theory of gravity.

Biochemistry

Todd H. Rider   thor@riderinstitute.org   13 November 2019

Any suggestions for improvements would be greatly appreciated.

"Dr. Watson, Mr. Sherlock Holmes," said Stamford, introducing us.
—Arthur Conan Doyle, *A Study in Scarlet* (1887)

—Griffin, in H. G. Wells' *The Invisible Man* (1897)

Overview

Biochemistry covers the chemical molecules and reactions that are important in biology. Most biological molecules fall into five categories: (1) nucleic acids such as deoxyribonucleic acid (DNA), ribonucleic acid (RNA), and their component nucleotides; (2) proteins and their component amino acids; (3) lipids such as fatty acids, triglycerides, and cholesterol; (4) carbohydrates such as simple sugars and various polymers composed of them; and (5) iron- or magnesium-containing porphyrins in hemoglobin, chlorophyll, etc.

Fluid Mechanics and Aerodynamics

Todd H. Rider   thor@riderinstitute.org   13 November 2019

Any suggestions for improvements would be greatly appreciated.

On aircraft:

"There is as much pressure exerted by a substance against the air as by the air against the substance."

On parachutes:

On helicopters:

Advice for test pilots:

—Leonardo da Vinci, *The Notebooks* (ca. 1500)

Overview

Fluid mechanics and aerodynamics concerns the motion of liquids and gases or their interactions with objects such as pipes or aircraft.