doc. A46p3

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Dr. E. U. Condon 26 March 1948

It may be well to note at this point that the National Bureau of Standards laboratory provides the only complete facility available to this office for the analysis of project materials. The flexibility of the arrangement has always been of particular value, since it has permitted routine or emergency analyses ranging from complete characterizations of the quality of materials to the precise determination of minute quantities of valuable constituents.

It is our hope that the foregoing information will permit you to make the necessary decisions as to the extent of the facilities to be devoted to the future work at this laboratory.

Very truly yours,

W. E. KELLEY,
Lt. Col., Corps of Engineers,
Area Engineer

cc: Dr. G. E. F. Lundell
Dr. C. J. Rodden
The District Engineer

SECRET

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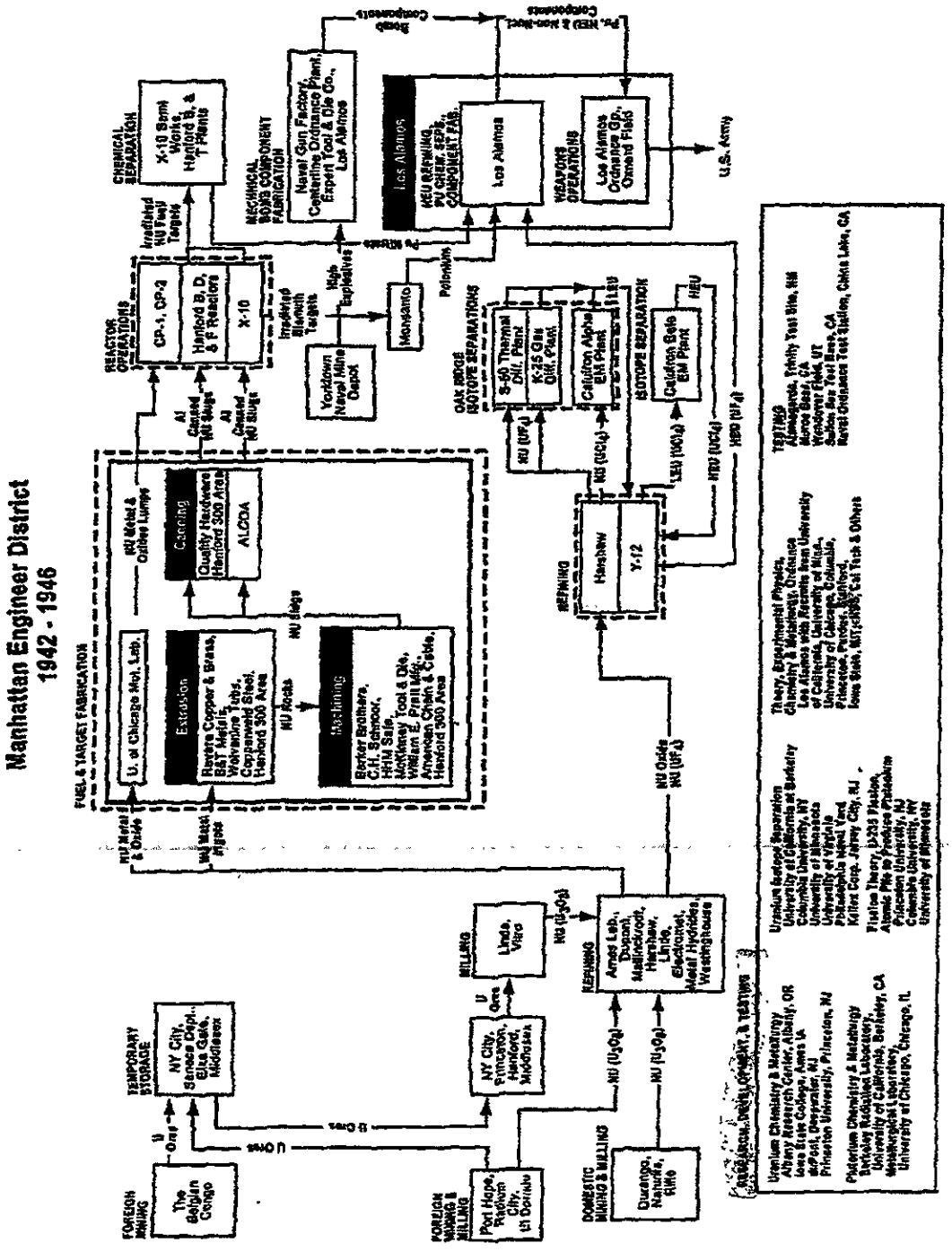
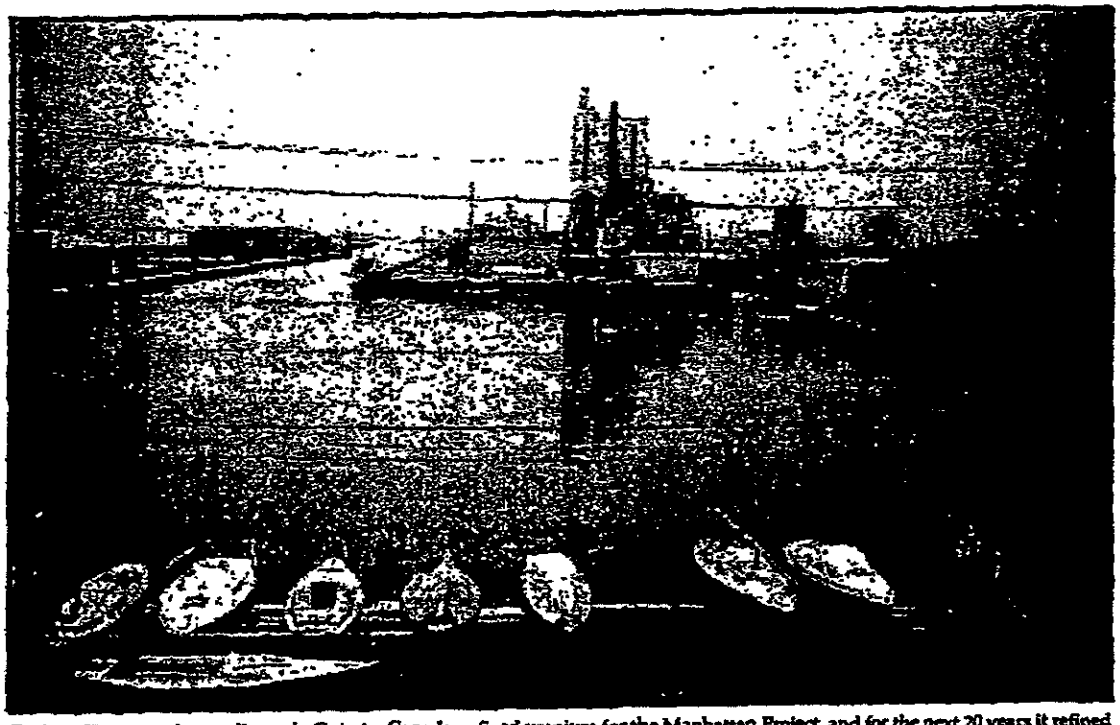
Figure B-3. Flow of Materials Through the Nuclear Weapons Complex (one of four)

The four following diagrams illustrate the flow of materials in the US nuclear weapons complex during the four major phases of its evolution. They do not depict any single point in time. Some simplification was necessary to bring out the major features of each time period.



A 47 p.2



The Port Hope uranium refinery in Ontario, Canada, refined uranium for the Manhattan Project, and for the next 20 years it refined uranium for the U.S. nuclear weapons program. *Eldorado Uranium Refinery, Blind River, Ontario, Canada. August 25, 1946.*

Mallinckrodt in St. Louis, Missouri; DuPont in Deepwater, New Jersey; and Iowa State University also produced uranium metal using the magnesium process. Metal Hydrides, DuPont, and Iowa State recycled scarce uranium scrap. Quality control was provided by the University of Chicago Metallurgical Laboratory (the "MetLab"), Princeton University, the Massachusetts Institute of Technology, and the National Bureau of Standards in Washington, D.C.

Beginning in 1944, the Oak Ridge Y-12 Plant converted UO_3 to uranium tetrachloride (UCl_4) feed for the Calutron electromagnetic spectrograph. Harshaw and DuPont produced hexafluoride (UF_6) from UF_4 as feed for the S-50 Thermal Diffusion and K-25 Gaseous Diffusion projects in Oak Ridge. By early 1945, the S-50 and K-25 plants were supplying low-enriched UF_6, which was also converted to UCl_4 at Y-12 to be further enriched in Calutrons.

In 1945, the HEU (also called "Oralloy," for Oak Ridge Alloy) from the Calutrons was converted at Y-12 into UF_4 and sent to Los Alamos. The Los Alamos Chemistry and Metallurgy Division further purified the HEU and reduced it to metal for the "Little Boy" atomic bomb. Refining highly enriched uranium (HEU) required special considerations because of criticality and security concerns.

Post-War Uranium Purchases

After the War, the United States continued to import uranium from Canada and the Belgian Congo. Australia, South Africa, Portugal, and other nations also exported uranium to the United States. The Atomic Energy Commission (AEC) began a program to stimulate the domestic mining and milling of uranium in 1948; as a result, the domestic uranium mining and milling industry grew rapidly. Hundreds of uranium mines in New Mexico, Colorado, Arizona, Utah, Oregon, Texas, Wyoming, and Washington

A.47p.3 WDL

Early Research and Development

Much of the early theoretical and experimental work that led to development of the first nuclear weapon was accomplished outside the United States. For example, Rutherford's artificial transmutation of nitrogen into oxygen in 1919 (England); Chadwick's discovery of the neutron in 1932 (England); Fermi's early work with neutron bombardment in 1934 (Italy), and Hahn and Strassmann's discovery of the process of fission in uranium (Germany).

In the United States, nuclear physics research was being done at many institutions, including the University of California at Berkeley, Columbia University, Princeton University, the University of Minnesota, the University of Wisconsin, Stanford University, Purdue University, Iowa State College, Cornell University, the Rice Institute, the University of Chicago, the Massachusetts Institute of Technology, the University of Rochester, Harvard University, the University of Illinois, and the Carnegie Institute of Washington and the National Bureau of Standards. American researchers made a number of fundamental contributions, such as Ernest Lawrence's operation of the world's first particle accelerator, the cyclotron, in 1932 and later development of electromagnetic isotope separation; Bohr and Wheeler's 1939 work on fission theory at Princeton; Zinn, Anderson, Fermi and Szilard's, chain reaction and pile experiments at Columbia University in 1939-40; Dunning and Nier's work on uranium-235 fission at Columbia and Minnesota; and the 1941 discovery of plutonium by Seaborg and his colleagues at Berkeley.

By mid-1942, government support resulted in research being concentrated at Columbia University (gaseous diffusion and gas centrifuge for uranium separations), Berkeley (electromagnetic process for uranium separations), and University of Chicago Metallurgical Laboratory (chain reacting pile to produce plutonium). The thermal diffusion process for uranium separation had been dropped from consideration to produce material for a weapon but retained by the Navy for propulsion research. Many commercial organizations were involved in Manhattan Project research. Some of the larger contributors were E.I. du Pont de Nemours, Monsanto Chemical Company, Westinghouse Electric Company, and the Mallinckrodt Chemical Works.

Construction of a centralized laboratory for atomic bomb research and production began at Los Alamos, New Mexico (called "Site Y"), in November, 1942. In March, 1943, scientists and technicians began arriving at the laboratory. Early organization featured theory, experimental physics, chemistry and metallurgy, ordnance groups and many shops. The laboratory's mission was to develop and apply chain reaction and fissile material assembly theory, measure the physical, chemical, and nuclear parameters of various materials, develop processes for chemically purifying and fashioning uranium and plutonium, and engineer the final bombs. Initially, research concentrated on the "gun assembly" device, which assembled two subcritical masses into a supercritical mass using a gunbarrel. After it was discovered that this method would not work with plutonium because of its high neutron background, development of the plutonium bomb concentrated on implosion. Implosion uses explosives to compress a subcritical mass into a supercritical mass.

Los Alamos was assisted in its task by many other laboratories. The University of Michigan developed radar fuses and ordnance research. Scientists at the Dahlgren Naval Proving Ground, in Virginia, also performed ordnance research and development for the Manhattan Project. Explosives and gun propellant research at the Explosives Research Laboratory in Bruceton, Pennsylvania was crucial to the development of the atomic bomb. The Naval Gun Factory in Washington, D.C. made test guns for the development of the gun assembly device. Monsanto developed purification techniques for the polonium used in the initiators. Ohio State University researched the properties and manufacture of liquid deuterium. Plutonium chemistry and metallurgy were researched at U.C. Berkeley and the University of Chicago. Crucibles for reducing plutonium to metal without introducing light-element impurities were developed and manufactured by MIT, Iowa State College and Brown University. Experimental detonators came from the Hercules Powder Company. The "Camel" project, managed by the California Institute of Technology (CalTech) began in late 1944 to study weapon assembly mechanisms and combat delivery and to research and engineer specialized components including detonators.

Box 92

doc A48

THE AEROSPACE CORPORATION

20030 Century Blvd., Germantown, Maryland 20767, Telephone: (301) 428-5500

7716-78-AN-13

18 April 1978

Mr. John P. Allen, Project Director
Special Projects Division
General Services Administration
7th & D St., Reporters Bldg., Room 301
Washington, D.C. 20407

Dear Mr. Allen:

NATIONAL BUREAU OF STANDARDS BUILDING, WASHINGTON, D.C.

As I stated in our telephone conversation of April 5, 1978, Aerospace is summarizing the status of sites which were formerly utilized for the processing and storage of principally uranium and thorium for the Atomic Energy Commission and the Manhattan Engineer District. The purpose of the task is to obtain complete records for these sites that will verify their radiological safety. The task is being performed for the Division of Environmental Control Technology of the Department of Energy.

In order to insure the correctness of the information regarding the NBS building on Van Ness Street, Washington, D.C. that I collected as a result of our telephone conversation, I have listed the material which I entered into the file for that building below:

1. The building was excessed to GSA from NBS.

2. The Washington Technical Institute (starting in 1968) used the building for administration purposes under a GSA permit.

3. In 1968, to verify the radiological safety, a survey was performed (March 22).

4. The building has since been demolished. Approval for destruction was given in August of 1976 and conducted September or October of 1976.

5. The site is being used by the State Department as part of the International Center. It is expected that most of the area (Lot 14 or 8) will be open area (street or park).

#4802

I would like to thank you for your assistance in gathering this information. If any corrections are required please contact me at (301) 428-2709.

Very truly yours,

Andrew Wallo III
Environmental Control Technology
Systems Evaluation Office
Environment and Energy
Conservation Division

AW/le

cc: W. Mott
R. Ramsey
R. Allen

bcc: R. Kuhns
J. Dock

[redacted]

This document consists of 7 pages
No. 3 of 3 copies, Series A

doc A48

MADISON SQUARE AREA

URANIUM INVENTORY AS OF 31 DECEMBER 1946

		Inventory in Pounds of Uranium Metal
Raw Materials (Ores)		4,473,751
In Process Materials		1,197,203
Finished Materials		
Billets	106,128	
Hexafluoride	23,515	
Orange Oxide	82,455	
Rods	30,058	242,156
Scrap Materials		
Currently Recoverable	133,026	
Potentially (not economically) Recoverable	403,630	
Held in Trusteeship	66,611	603,267
Miscellaneous and Development		2,342
Total Madison Square Area Uranium Inventory as of 31 December 1946		6,518,719

I certify that to the best of my knowledge the above inventory of Uranium Materials as of 31 December 1946 is an accurate statement of physical inventory.

Signed Lewis A. DeBlois, Jr.
LEWIS A. DEBLOIS, JR.
Chief, Metal Accountability Records Branch

SPECIAL REREVIEW
FINAL DETERMINATION
UNCLASSIFIED
By: [signature] 10/9/80
Date: 10/9/80

Approved

G. W. BEELER
Colonel, Corps of Engineers
Acting Manager

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
1st Review-Date: [illegible]
Authority: ADC ADD
Name: [illegible]
2nd Review-Date: [illegible]
Authority: ADD
Name: [illegible]
Determination (Circle Number(s))
1. Classification Retained
2. Classification Changed To:
3. Contains No DOE Classified Info
4. Coordinate With:
5. Classification Cancelled
6. Classified Information Bracketed
7. Other (Specify):

[redacted]

Form U-2

10

[redacted] This document consists of 7 pages
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A49 p2

Madison Square Area

DETAIL OF YEAR-END INVENTORY BY LOCATION

Location	Contractor or Sub-Area Office	Inventory in Lbs. U-Metal
Middlesex, New Jersey	Middlesex Warehouse	4,456,826
Grand Junction, Colorado	Grand Junction Warehouse	9,289
St. Louis, Missouri	Mallinckrodt Chemical Works	821,889
Robertson, Missouri	St. Louis Area Engineer (Airport Site)	36,834
Tyson, Missouri	St. Louis Area Engineer (Tyson Valley Powder Farm)	208,110
St. Louis, Missouri	St. Louis Area Engineer	34,277
Penns Grove, New Jersey	E. I. du Pont de Nemours & Co.	294,382
Cleveland, Ohio	Harshaw Chemical Works	146,390
Beverly, Massachusetts	Metal Hydrides, Inc.	142,797
Chicago, Illinois	Chicago Area Engineer	5,660
Niagara Falls, New York	Electro Metallurgical Co.	246
New York, New York	Madison Square Area	613*
Washington, D. C.	National Bureau of Standards	449
Cambridge, Massachusetts	Massachusetts Institute of Technology	74
Princeton, New Jersey	Princeton University	32
Niagara Falls, New York	Madison Square Area (Baker Smith Area)	59,966
Buffalo, New York	Madison Square Area (Haist Property)	86,482
Niagara Falls, New York	Madison Square Area (Lake Ontario Ordnance Works)	49,387
	Sub-Total	6,351,705

* INCLUDES MATERIAL AT ROCHESTER AREA (425 lbs.)

Intransit as of 12/31/46:

From E. I. du Pont de Nemours & Co. to Harshaw Chemical Works (Brown Oxide)	40,210
From Mallinckrodt Chemical Works to Middlesex Storage (Orange Oxide & K-65 Residues)	45,728
From Metal Hydrides, Inc. to Chicago Area Engineer (Eggs)	203
From Middlesex Warehouse to E. I. du Pont de Nemours, Inc. (K-35 Material)	49,946
From Tyson Valley Powder Farm to Vitro Manufacturing Co. (308 Residues)	50,927
Total Intransit	187,014
Grand Total of Inventory	6,538,719

Special Rereview
Final Determination
Unclassified
By: K. A. W[illegible]
Date: [illegible]

Note:

As of December 31, 1946, there was 38.75 lbs. of C-616 in transit from Project K-25 to Harshaw Chemical Company. This material has been omitted from the above inventory, as it was not received in Madison Square Area until January 2, 1947.

TAS 1/18/96

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
1st Review - Date: 1-8-96
Authority: ☐ADC ☒CO
Name: [redacted]
2nd Review - Date:
Authority: ADD
Name:
Determination (Circle Number(s)):
1. Classification Retained
2. Classification Changed To:
3. Contains No DOE Classified Information
4. Coordinate With:
5. Classification Changed
6. Classification [illegible]

[redacted]

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A49p3

[redacted]

MADISON SQUARE AREA

THORIUM INVENTORY AS OF 31 DECEMBER 1946

	Inventory in pounds Thorium Metal
	Total
Miscellaneous Metal and Compounds	16.75 lbs.

I certify that to the best of my knowledge the above inventory of Thorium Materials as of 31 December 1946 is an accurate statement of physical inventory.

Signed Lewis A. DeBlois, Jr.
LEWIS A. DEBLOIS, JR.
Chief, Metal Accountability Records Branch

Approved _____
C. W. BEELER
Colonel, Corps of Engineers
Acting Manager

Special Rereview
Final Determination
Unclassified
By: K. A. Waller
Date:

TRO 1/10/01

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
1st Review - Date: 1-11-96
Authority: ☐ADC ☒ADD
Name: W. Hollaway
2nd Review - Date:
Authority: ADD
Name:
Classification Circle Number(s):
2. Classification Retained
3. Classification Changed To:
4. Contains No DOE Classified Information
5. Contains With:
6. Classification Canceled
7. Classified Information Bracketed
8. Other (Specify):
[redacted]

Form 7-2

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A48P.4

[redacted]

Madison Square Area

DETAIL OF YEAR-END INVENTORY BY LOCATION

Location	Contractor or Sub-Area Office	Inventory in pounds Thorium Metal
New York, New York	Madison Square Area	6.82
Middlesex, New Jersey	Middlesex Warehouse	1.63
New York, New York	Columbia University	3.06
Washington, D. C.	National Bureau of Standards	5.24
	Grand Total of Inventory	16.75

Special Review
Final Determination
Unclassified
By: K. A. Walter
Date: 1980
P. F. Brovin

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
1st Review - Date: 1-9-1
Authority: ☐ADC ☒ADO
Name: [illegible]
2nd Review - Date:
Authority: ADO
Name:
Determination (Circle Number(s))
1. Classification Retained
2. Classification Changed To:
3. Contains No DOE Classified Information
4. Coordinate With:
5. Classification Corrected
6. Classified Information Redacted
7. Other Cite Authority:

[redacted]

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A49 p.5

[redacted]

MADISON SQUARE AREA

HISTORICAL SUMMARY AS OF 31 DECEMBER 1946

		Pounds Thorium Metal	
1.	Receipts from Other Areas to 31 December 1946	11.51	
2.	Miscellaneous Receipts to 31 December 1946	5.30	
3.	Shipments to 31 December 1946	.06	
4.	Difference		16.75
5.	Inventory as of 31 December 1946	16.75	
6.	Known Losses 0		
7.	Unknown Losses ..... 0 Total Losses	0	
8.	Inventory plus Losses		16.75
	Item 4 equals Item 8		
	% Loss (cumulative to 12/31/46		0 %
	% Loss for last six months of 1946		0 %

Special Rereview
Final Determination
Unclassified
By: K. A. Walter
Date: 1980
P. F. Brown

I certify that to the best of my knowledge the above inventory of Thorium Materials as of 31 December 1946 is an accurate statement of physical inventory.

Signed Lewis A. DeBlois, Jr.
LEWIS A. DEBLOIS, JR.
Chief, Metal Accountability Records Branch

Approved
G. W. BEETLER
Colonel, Corps of Engineers
Acting Manager

[redacted]

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
1st Reviewer - Date: 10-21-94
Authority: ☐ADC ☒ADD
Name: [illegible]
2nd Reviewer - Date:
Authority: ADD
Name:
Determination (Circle number(s))
1. Classification Retained
2. Classification Changed To:
3. Contains No DOE Classified Information
4. Coordinate With:
5. Classification Cancelled
6. Classified Information Bracketed
7. Other (Specify):

Form T-3

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A 48 p.6

[redacted]

SCHEDULE OF PROCUREMENT OF THORIUM BY THE MANHATTAN DISTRICT

(Start of Operations thru 12/31/46)

	Pounds Thorium Metal
IOWA STATE COLLEGE	
Lindsay Light & Chemical Company	16,374.62
CLIFTON LABORATORIES	
Lindsay Light & Chemical Company	475.86
LOS ANGELES	
D. MacKay	8.73
Y-12 AREA	
Maywood Chemical Works	8.40
Lindsay Light & Chemical Company	10.50
City Chemical Corporation	61.00
General Chemical Company	6.70
	86.60
CHICAGO	
Lindsay Light & Chemical Company	48.84
Westinghouse Manufacturing Company	102.38
Norton Company	100.78
A. C. Spark Plug Company	2.19
	254.19
TOTAL	17,200.00

Special Review
Final Determination
Unclassified
By: K. A. Walter 1980
Date:
P. F. R. [illegible]

DEPARTMENT OF ENERGY DECLASSIFICATION REVIEW
1st Review - Date: 6-14-94
Authority: ☐ADC ☒DD
Name: [illegible]
2nd Review - Date:
Authority: ADC
Name:
Description (Circle Number(s))
1. Classification Retained
2. Classification Changed To
3. Contains no DOE Classified Information
4. Coordinate With:
5. Classification Cancelled
6. Classified Information Bracketed
7. Other (Specify):

[redacted]

doc A59

Memo to the files

THRU: Robert W. Ramsey, Jr., Assistant Director for Nuclear Programs
Division of Environmental Control Technology, DOE-HQ

DECONTAMINATION AND DECOMMISSIONING: REVIEW OF MANHATTAN DISTRICT HISTORY (CLASSIFIED DOCUMENTS) - MED

The subject history is comprised of eight (8) books containing 36 volumes which are further divided into parts and sections. The history covers the activities of the Manhattan District from prior to its inception on August 16, 1942, until the entire project was turned over to the U.S. AEC through the Atomic Energy Act of 1946 on December 31, 1946.

Mr. Robert W. Ramsey, Jr. asked that I review the subject documents to ascertain if the list of sites, previously used (during the Manhattan District activities) for operations involving Uranium ores, oxides, daughter products or other related radioactive materials, was complete in that no locations associated with the MED were omitted from the previously compiled list of sites. I understood that the subject documents were not reviewed by those that compiled the original list of "MED-AEC-ERDA Previously Used Sites."

To make an indepth review of the MED history would take an undue length of time and produce much unusable data (in regard to the information required). Therefore, Book I, volume I, which contained general information including a combined table of contents (appendix B) was reviewed. This table of contents was broken down by book, volume, chapter, section, and/or paragraph and appendices. Also within the table of contents was an introduction to the history which includes, in paragraph number 1-5, page 1.15, "What the History Contains." This paragraph gives very briefly (a paragraph to a few pages) a description of the content for the various books and volumes.

The comprehensive table of contents was reviewed to determine what books would be applicable to, and furnish the information requested by, Mr. Ramsey. It appeared from this study that Book VII, Volume 1 and 2, entitled "Feed Material, Special Procurement and Geographical Exploration," would furnish the required data. In conjunction with Book VII, Book I, volume 9, was also read. This volume entitled "Priorities Program" only mentions uranium once when the "Uranium Project" was given the highest priority by President Roosevelt. The volume does not discuss "feed material" and talks to non-radioactive materials, re: steel, aluminum, silver, machinery, lumber, etc.

Based on the above, attention was focused on the content of Book VII, Volume 1. The information contained therein contained data relative to feed materials and special procurement. Part A was "General Features." "Part B-Procurement" dealt with materials from Africa, Canada, and the U.S., Market and Miscellaneous Procurement, and Procurement of Other

doc. 50 p. 2

Radioactive Materials. Part C talked to the refining, treatment, and production of the various ores, oxides, metals, Thorium, Quality Control, and Accountability.

The procurement, storage, and processing of the basic raw materials containing uranium is summed up as follows:

The ores and/or oxides received from the African sources were stored in various warehouses. These storage areas were: (1) Archer-Daniels-Medland Co. Warehouse, Port Richmond, Staten Island, NY (prior to the MED); (2) Seneca Ordanance Depot, Romulus, NY; (3) Clinton Engineer Works, Clinton (Oak Ridge), Tennessee; and (4) Perry Warehouse, Middlesex, NJ. The main storage area was the Perry Warehouse. The bulk of the African ores were stored there. This location also became a sampling, weighing, and assaying facility. Inasmuch as the contract with the African source called for only the black oxide, the tailing and residue containing the radium and other precious metals were returned to the vendor. Those residues from ores containing greater than 10% U_3O_8 were stored at the Clinton Engineer Works, Tennessee, or at the Perry Warehouse, Middlesex, NJ, prior to shipment back to the vendor. Residues from ores containing less than 10% U_3O_8 were stored at the Lake Ontario Ordanance Works prior to shipment to the vendor. Some of the residues were returned to the Belgium facility of African Metals, and some is still at the U.S. storage sites.

The African ores samples were assayed and weighed by Lucius Pitkin, New York City, NY; Ledoux and Co., New York City, NY; and Frick Chemical Laboratory, Princeton University, Princetown, NJ.

The African ores were refined to black oxides (U_3O_8) at facilities of the Linde Air Products Co., Tonawanda, NY; Eldorado Mining and Refining Ltd., Port Hope, Ontario, Canada; and Vitro Manufacturing Co., Cannonsburg, PA.

The Canadian ores were refined at the Port Hope facility of the Eldorado Mining and Refinery Ltd. The American ores (Carnotite) were processed for Vanadium by U.S. Vanadium Corp. at Uravan, Colorado. The Vanadium sand tailings were also processed at the USV Uravan plant for Uranium Oxide. These went directly to Linde. They (USV) also had a plant at Durango, CO, for processing Vanadium tailings and sands to produce a green sluge. The output from the USV Durango and Uravan facilities went to Grand Junction, Colorado, for processing to yellow sluge (15% U_3O_8) that in turn went to the Linde refinery at Tonawanda, NY. Concurrently with the U.S. Vanadium operation, the Vanadium Corp. of America was processing American ores for Vanadium at its plants in Naturita, Colorado, and Monticello, Utah. The slimes (45% U_3O_8) from these plants went directly to Vitro Manufacturing Co., Cannonsburg, PA, for processing.

doc. 50 p.3

Vitro Manufacturing Co. also received high grade carnotite ores for processing to sodium salts

The black oxide was further refined to orange oxide (UO_3) at the Mallinckrodt Plant, St. Louis, MO. Brown oxide (UO_2) was also made from black oxide at the duPont Plant, Deepwater, NJ, who also made brown oxide from uranium peroxide ($UO_4 \cdot 2H_2O$) obtained from uranium scrap processing. Brown oxide was also processed by Harshaw Chemical Co., Cleveland, OH, and by Mallinckrodt who also made brown oxide from high grade pitchblende ore.

Brown and orange oxides in turn were refined into green salt by duPont, Harshaw, Mallinckrodt and Linde. Harshaw also made UF_6 for the S50 and K25 projects.

The green salts were utilized in metal manufacturing by duPont; Mallinckrodt; Iowa State University, Ames, Iowa; Westinghouse, Bloomfield, NJ; Brush Laboratories, Cleveland, Ohio; Electromet, Niagara Falls, NY; and Metal Hydrides, Inc., Beverly, MA.

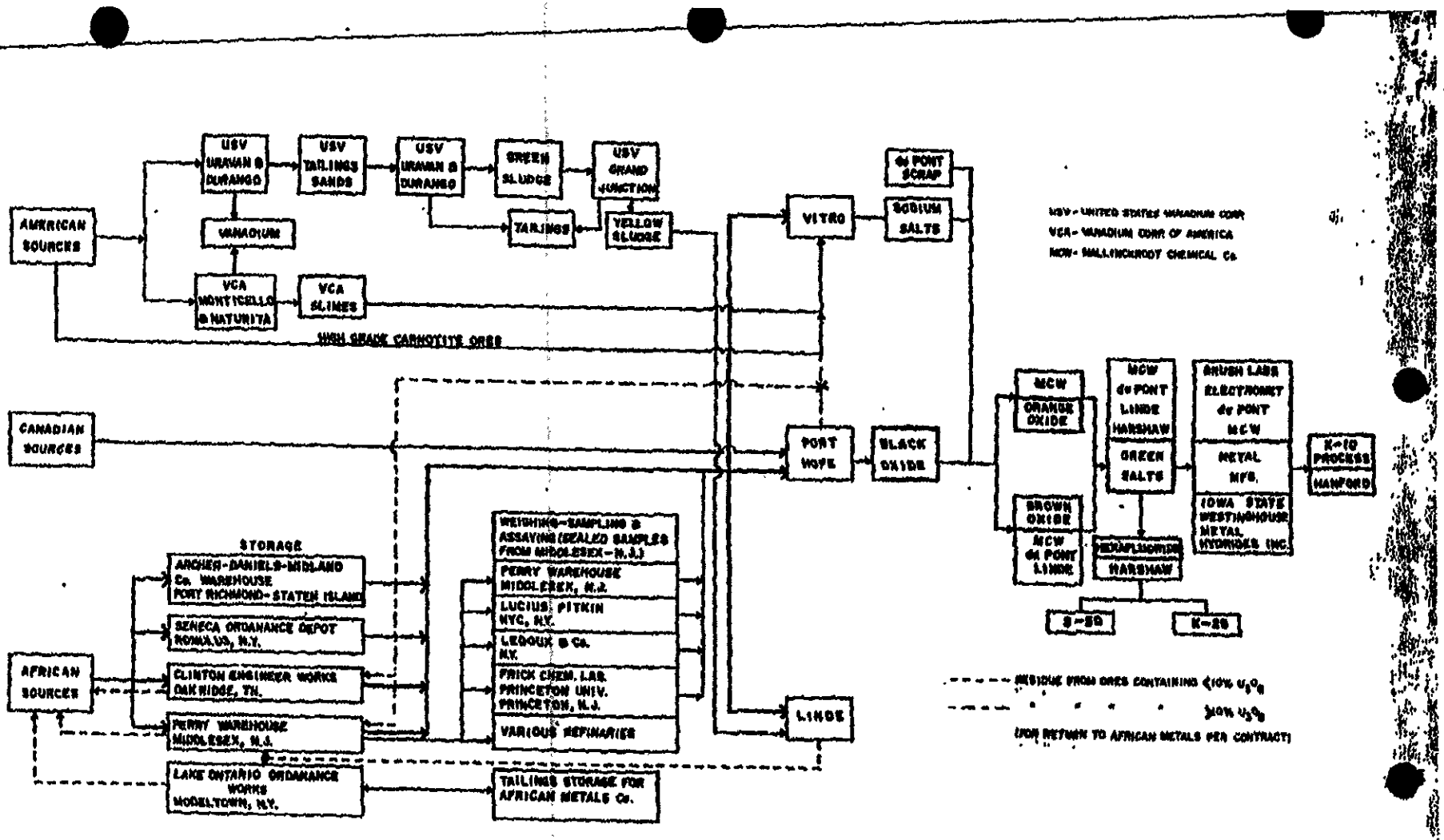
The metals manufactured by these various companies were then shipped to the Hanford Site at Richland, Washington, for use in the X-10 process.

All the companies and locations noted in flow of Uranium ores, tailings, or slimes to the finished product have been accounted for in the listing of "MED-AEC-ERDA Sites Previously Used" as compiled by ECT. There were no companies or organizations that could not be accounted for in this particular phase of the MED history that I reviewed.

As a side note, the Thorium obtained for R&D at Iowa State College was all procured by Lindsay Light and Chemical Co., West Chicago, IL. This company is also accounted for in the aforementioned listing.

Quality control of various processes in the ore/metal chain were done by University of Chicago, Metallurgy Lab, Chicago, IL; Princeton University, Princeton, NJ; MIT, Cambridge, MA; and NBS, Washington, DC. All these organizations are on the aforementioned listings.

Arthur J. Whitman, Assistant
to the Director
Bioenvironmental Sciences Division


USV
URAVAN & DURANGO
USV
TAILINGS SANDS
USV
URAVAN & DURANGO
GREEN SLUDGE
USV
GRAND JUNCTION
AMERICAN SOURCES
VANADIUM
TAILINGS
YELLOW SLUDGE
VCA
MONTICELLO & NATURITA
VCA
SLIMES
HIGH GRADE CARNOTITE ORES
du PONT SCRAP
VITRO
SODIUM SALTS
CANADIAN SOURCES
PORT HOPE
BLACK OXIDE
MCW
ORANGE OXIDE
MCW
du PONT
LINDE
HARSHAW
GREEN SALTS
BRUSH LABS
ELECTRONET
du PONT
MCW
METAL MFR.
IOWA STATE
WESTINGHOUSE
METAL HYDRIDES INC.
K-10 PROCESS
HANFORD
BROWN OXIDE
MCW
du PONT
LINDE
HEXAFLUORIDE
HARSHAW
S-50
K-25
STORAGE
ARCHER-DANIELS-MIDLAND Co. WAREHOUSE
PORT RICHMOND-STATEN ISLAND
SENECA ORDANANCE DEPOT
ROMULUS, N.Y.
CLINTON ENGINEER WORKS
OAK RIDGE, TN.
PERRY WAREHOUSE
MIDDLESEX, N.J.
LAKE ONTARIO ORDANANCE WORKS
MODELTOWN, N.Y.
AFRICAN SOURCES
WEIGHING-SAMPLING & ASSAYING (SEALED SAMPLES FROM MIDDLESEX-N.J.)
PERRY WAREHOUSE
MIDDLESEX, N.J.
LUCIUS PITKIN
NYC, N.Y.
LEGOUX & Co.
N.Y.
FRICK CHEM. LAB.
PRINCETON UNIV.
PRINCETON, N.J.
VARIOUS REFINARIES
LINDE
TAILINGS STORAGE FOR AFRICAN METALS Co.
USV - UNITED STATES VANADIUM CORP.
VCA - VANADIUM CORP OF AMERICA
MCW - MALLINCKRODT CHEMICAL Co.
RESIDUE FROM ORES CONTAINING <10% U_3O_8
" " " " >10% U_3O_8
(FOR RETURN TO AFRICAN METALS PER CONTRACT)

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p. 4

FEB 1 1978

doc A50

J. L. Liverman, ASEV
S. H. Greenleigh, GC
R. G. Hewlett, Historian's Office, XS

SUMMARY OF MANHATTAN PROJECT URANIUM FLOW SHEET

In our efforts to develop a complete identification of formerly utilized sites, we had Arthur J. Whitman of the Nevada Operations Office develop the enclosed summary of relationships among the sites from the MED history. The review provides an interesting perspective and identifies the functions of the various sites considered in the Formerly Utilized MED/AEC Site Survey Program.

151

William E. Mott, Director
Division of Environmental Control Technology

Enclosure:
As stated

cc w/o encl: A. J. Whitman, NV

bcc: W. E. Mott, ECT
R. Frost, Aerospace

ECT AD/N	ECT DIR
RWRamsey:cav	WEMott
01/18/78	01/27/78

ATTACHMENT I

doc A 52

PRELIMINARY HISTORY OF AEC THORIUM RESEARCH & DEVELOPMENT

The principal source of thorium during the late 1940's and 1950's was Monazite sand from India or Brazil. Concentrates of these ores contained from 5-7% ThO_2 while similar concentrates from Idaho contained only 3-4% ThO_2. For the most part the thorium (generally in the forms of a salt, such as thorium nitrate, or thorium bearing sludges or residues) purchased by the AEC was produced as a byproduct of commercial operations at chemical companies conducting rare earth extractions; the largest being Lindsay Light and Chemical Company in Illinois. Other major suppliers, during the early years, were Maywood Chemical Company in New Jersey; Rare Earths, Inc., in New York (with a plant in Pompton, NJ); and Wolff-Alport Chemical Co., locations being determined.

In later years the thorium salts were also produced at AEC facilities and prime contractor locations such as Ames, Iowa and Fernald, Ohio. W.R. Grace in Maryland was also contracted to refine the monazite sands for the AEC.

In addition to companies discussed above the Norton Company of Massachusetts and Harshaw Chemical Company of Ohio are known to produce thorium compounds for the AEC and/or its contractors; however, the extent and types of compounds are still being investigated.

The thorium salts were refined to thorium tetrafluoride and then to metal at Ames, Iowa and Fernald, Ohio. Thorium oxide was refined to thorium powder for use in powder metallurgy at the Sylvania-Corning Hicksville/Bayside complexes in New York. Horizons, Inc. in Ohio also experimented with conversions of uranium nitrate to metal by an electrolytic process.

The metal was formed, rolled, extruded, and/or machined at Simonds Saw and Steel Company in New York, Brush Beryllium in Ohio, American Machine and Foundry Corp. in New York, and Revere Copper and Brass Company in Michigan. The metal was ultimately shipped to the Savannah River and Hanford facilities for reactor experiments.

doc.52 p. 2.

The Middlesex Sampling plant and the AEC portions of the Lake Ontario Ordnance Works were used for storing the various Thorium products and wastes. Middlesex was used for the compounds, scrap and residues while the ordnance works was used more for metal storage.

Research in the refining of ores or residues, metal production, or metal working was conducted at University of Iowa, Battelle Memorial Insitute, Oak Ridge National Laboratory, Argonne National Laboratory as well as at private company facilities such as those of Sylvania Corning and Brush Breyllium.

In addition to the facilities discussed above a number of other companies were identified in AEC accountability records. However, the type and quantity of thorium held by these companies as well as the type of work has not yet been identified. These companies are listed in Table 1. Records searches are presently in progress to obtain additional data relating to these companies.

	ACCOUNTABLE FOR MATERIAL CONTAIN POUNDS (Kgs) OF THORIUM	DATE	COMMENT
D. Mackay	8.73	12/46	
City Chemical Corp	61.00	12/46	
General Chemical Co.	6.70	12/46	
Westinghouse Mfg. Co.	102.38	12/46	
A.C. Spark Plug Co.	2.19	12/46	
Columbia University	3.06	12/46	
NBS, Washington, D.C.	5.24	12/46	probably analysis
General Electric Research Lab	0.5lbs of Thorium Acetate	8/47	
Hayden Chemical Co.	(25)	7/51-6/52	
American Smelting & Refinery	(4)	1/50-12/50	
Lanett Bleachery & Dye Works	(179)/(173)	7/51-6/52/ 7/52-6/53	
University of Rochester	150 lbs of Nitrate	5/3/48	requested from Maywood

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Database Report

Site: DC.01 -- NATIONAL BUREAU OF STANDARDS

Van Ness Street

COLLECTION FUSRAP files

BOX No. D.C.

FOLDER Nat'l Bureau of Standards

Note: The information contained within the FUSRAP Considered Sites Database must be viewed as predecisional and, as such, cannot be released to the public at this time.

Number of Records Returned: 1

Current Dataset Date: 1/16/00

Data Type	Reference	Source
Site: DC.01 -- NATIONAL BUREAU OF STANDARDS		
Alternate Site Name(s) (1)	INFORMATION NOT FOUND	2
Site Location (1)	MAP	2497
Evaluation Year (1)	1985	2502
Site Disposition (1)	ELIMINATED NOT REFERRED	2501
Type of Site Disposition Document (1)	OFFICIAL DISPOSITION DOCUMENT	2501
Elimination Basis (1)	NO AUTHORITY	2501
Site Operations (1)	FROM THE EARLY 1920S UNTIL 1952, A RADIOACTIVITY LABORATORY AT THE SITE WAS USED FOR MEASURING ALL RADIUM SAMPLES USED IN THIS COUNTRY FOR MEDICAL PURPOSES.	2496
Site Operations (2)	IN THE EARLY 1940S, PERFORMED QUALITY ANALYSIS FOR THE MANHATTEN ENGINEER DISTRICT	2496
Years of MED/AEC Involvement (1)	EARLY 1940S - EARLY 1940S	2496
Radioactive Materials Handled Under AEC/MED Contract (1)	YES	2496
Type of Radioactive Materials Handled Under AEC/MED Contract (1)	RADIUM	2496
Other Radioactive Materials Handled (1)	YES	2496
Type of Other Radioactive Materials Handled (1)	RADIUM	2496
Survey Conducted (1)	YES	2500
Survey	Site ID: DC.01 — Survey Type: RADIOLOGICAL — Survey year: 1968	2500
DOE Cleanup Action (1)		

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Non-DOE Clean Up	Site ID	Organization	Cleanup Year	
	DC.01	NATIONAL BUREAU OF STANDARDS	1968	2501
Current Site Owner (1)	INFORMATION NOT FOUND			2
Prior Site Owner(s) (1)				2498
Prior Site Owner(s) (2)				2498
Prior Site Owner(s) (3)				2499
Prior Site Owner(s) (4)				2498

Return to top of report
Return to Query Page

Last Updated 12/15/00 (jac)

doc. A. 54 p.1 IV-

Form A-20

NOT TO BE ACCEPTED AS AUTHORITY FOR INVESTIGATION OPERATIONS UNLESS ACCOMPANIED BY OFFICIAL CREDENTIALS

DEPARTMENT OF COMMERCE
APPOINTMENT DIVISION
WASHINGTON

May 13, 1931.

Through the Director, Bureau of Standards.

Sir:

You have been appointed, subject to taking the oath of office,

Minor Laboratory Apprentice

in the Bureau of Standards

at a salary of Ten Hundred and Twenty dollars per annum

effective upon entrance on duty.

Nature of appointment: Probationary.

Civil Service authority: Certificate No. 15293.

Classification allocation: SP-1.

By direction of the Secretary:

Respectfully,

Chief of Appointment Division.

N

Appropriation (unit): Bureau of Standards.

Vice: R. H. McMillin.

Legal Residence: Arkansas.

11-9857

Oath taken 5/26/31 - FC

(doc. 154 p.2)

Form A-30

NOT TO BE ACCEPTED AS AUTHORITY FOR INVESTIGATION OPERATIONS UNLESS ACCOMPANIED BY OFFICIAL CREDENTIALS

DEPARTMENT OF COMMERCE
APPOINTMENT DIVISION
WASHINGTON

April 1, 1936.

Through the Director, National Bureau of Standards

Sir:

You have been appointed, subject to taking the oath of office,

Junior Physical Science Aid (Physics)

in the National Bureau of Standards

at a salary of Fourteen Hundred & Forty dollars per annum

effective April 1, 1936.

Nature of appointment: Change from Minor Laboratory Apprentice, SP-1, at $1020 per annum

Civil Service authority: Letter dated May 13, 1936.

Classification allocation: SP-3

By direction of the Secretary:

Respectfully,

Chief of Appointment Division.

Appropriation (unit): National Bureau of Standards

Vice: Reallocation

Legal residence: Arkansas

U. S. GOVERNMENT PRINTING OFFICE 1936 11—8632

doc. A.54 P3
IV-6

Form A-30

NOT TO BE ACCEPTED AS AUTHORITY FOR INVESTIGATION OPERATIONS UNLESS ACCOMPANIED BY OFFICIAL CREDENTIALS

DEPARTMENT OF COMMERCE
DIVISION OF PERSONNEL
WASHINGTON

March 16, 1938.

Through the Director, National Bureau of Standards.

Sir:

You have been appointed, ~~subject to taking the oath of office~~

Assistant Physical Science Aid (Physics)

in the National Bureau of Standards

at a salary of Sixteen Hundred and Twenty dollars per annum

effective upon ~~entrance on duty~~. (3-16-38)

Nature of appointment: Change from Junior Physical Science Aid (Physics), Sp-3, at $1440 per annum.

Civil Service authority: Certificate No. Y-5609.

Classification allocation: SP-4.

By direction of the Secretary:

Respectfully,

Chief, Division of Personnel.

G

Appropriation (unit): National Bureau of Standards.

Vice: Reallocation.

Legal residence: Arkansas.

No Oath required! JEC

U. S. GOVERNMENT PRINTING OFFICE 12—8557

S. S. 116
6-1-40

DEPARTMENT OF COMMERCE
WASHINGTON, D. C.

doc A54 p.4 3
IV-9

Date prepared

Name

Bureau National Bureau of Standards

This is to notify you of the following personnel action:

Change in designation, grade and salary

	FROM	TO
Position	Assistant Physical Science Aid (Physics)	Physical Science Aid (Physics)
Grade and Salary	P-4 at $1620 per annum	P-5 at $1800 per annum
Bureau Division	National Bureau of Standards	National Bureau of Standards
Headquarters	Washington, D. C.	Washington, D. C.
Departmental or Field	Departmental	Departmental

EFFECTIVE DATE: NOV 16 1940

Remarks:

Personnel Standards
Per: A. B. C.

New appointees must take the Oath of Office and enter upon duty before any payment of salary can be made.

The salaries of employees in the Classified Service are subject to deductions if specified by law, for retirement purposes.

This notice is not to be accepted as authority for investigation operations unless accompanied by official credentials.

Yours very truly,

DIRECTOR OF PERSONNEL

November 18, 1940

doc. A 54 P5 3

DEPARTMENT OF COMMERCE
WASHINGTON, D. C.

Date prepared

Name

Bureau National Bureau of Standards

This is to notify you of the following personnel action:

Change in designation, grade and salary

	FROM	TO
Position	Physical Science Aid (Physics)	Junior Physicist (Optics) ~~Junior Physical Science Aid (Physics)~~
Grade and Salary	SP-5 - $1,800 per annum	~~SP-5~~ - $2000 per annum
Bureau Division	Optics	Optics
Headquarters	Washington, D. C.	Washington, D. C.
Departmental or Field	Departmental	Departmental

EFFECTIVE DATE: July 1, 1942

Remarks: Personnel Classification Board Per: A. E. C.

New appointees must take the Oath of Office and enter upon duty before any payment of salary can be made.

The salaries of employees in the Classified Service are subject to deductions if specified by law, for retirement purposes.

This notice is not to be accepted as authority for investigation operations unless accompanied by official credentials.

Yours very truly,

Acting DIRECTOR OF PERSONNEL

June 24, 1942.

S. S. 116

DEPARTMENT OF COMMERCE
WASHINGTON, D. C.
NATIONAL BUREAU OF STANDARDS

doc. A 54d 3 p.6

IV-9

Name

This is to notify you of the following personnel action:

Change in status

	FROM	TO
Position	Junior Physicist (Optics)	Physicist (Optics)
Grade and Salary	P-1 - $2100 per annum	P-2 - $2600 per annum
Bureau Division	Optics	Optics
Headquarters	Washington, D. C.	Washington, D. C.
Departmental or Field	☒ DEPARTMENTAL ☐ FIELD	☒ DEPARTMENTAL ☐ FIELD

EFFECTIVE DATE: MAR 9 1944 Personnel-Standards Per: H.S.

Remarks: [illegible]

New appointees must take the Oath of Office and enter upon duty before any payment of salary can be made.

The salaries of employees in the Classified Service are subject to deductions if specified by law, for retirement purposes.

This notice is not to be accepted as authority for investigation operations unless accompanied by official credentials.

Yours very truly,

DIRECTOR OF PERSONNEL

March 8, 1944

Standard Form 68
March 1944
U. S. CIVIL SERVICE COMMISSION
Dept. Cir. No. 474

Form approved.
Budget Bureau No. 50-R016.
Approval expires March 30, 1945.

NOTICE OF OFFICIAL EFFICIENCY RATING

REGULAR PROBATIONAL (X) or TRIAL PERIOD ( ) SPECIAL ( )

As March 31, 1945 based on performance during period from April 1, 1944 to March 31, 1945

Physicist (Optics) P-2
(Title of position, service, and grade)

IV-9 National Bureau of Standards Washington D. C.
(Organization—indicate bureau, division, section, unit, field station)

Efficiency rating: VG

W C Gerwell
(Signature)

JUN 12 1945
(Date of notification)

Personnel Officer
(Title)

Interpretation of Efficiency Rating

Excellent (E) means that performance in every important phase of the work was outstanding and there was no weakness in performance in any respect.

Very Good (VG) means that performance in at least half of the important phases of the work was outstanding and there was no weakness in performance in any respect.

Good (G) means that performance met requirements from an over-all point of view.

Fair (F) means that performance did not quite measure up to requirements from an over-all point of view.

Unsatisfactory (U) means that performance in a majority of important phases of the work did not meet job requirements.

Inspection and Appeals

If you have any question regarding your efficiency rating, it is suggested that you discuss the matter with your immediate supervisor. Your efficiency rating sheet (Standard Form 51, Revised), or a copy of it, will be made available to you for inspection, if you request it of your supervisor or the personnel officer. Such a request is not considered as an appeal. You are also entitled to see the final ratings (not the rating forms) of all employees in your office or station. Information on appeals may be secured from your supervisor or personnel office. There are time limits governing the filing of appeals.

Significance of Efficiency Ratings

The salary advancement act provides for successive salary advancements based on several factors, one of which is efficiency ratings. Ratings of "Good" permit periodic salary advancement by successive steps up to and including the middle rate for the grade (the fourth step in six rate grades), and ratings of "Very Good" and "Excellent" permit periodic salary advancement by successive steps above the middle rate of the grade.

The rate of compensation of an employee whose efficiency rating is "Fair" must be reduced one salary step if his rate of compensation is above the middle rate. If the rate of compensation is equal to or below such middle salary rate, it is not subject to reduction on that account.

An employee whose efficiency rating is "Unsatisfactory" is not permitted to remain in his position. He must be assigned to a position more nearly commensurate with his ability, either (1) in the same line of work, in which case the position must be in a lower classification grade and his rate of compensation must not be in excess of the middle rate for such grade, or (2) in some other line of work for which he is qualified, in which case he is considered as having received a new appointment to the extent that his rate of compensation must be at the minimum rate for such grade and he must begin a new probationary period; or if no suitable vacancy is available he must be separated from the service for inefficiency. A probationary employee, assigned to a position of lower classification grade, begins a new probationary period in the new position.

U. S. GOVERNMENT PRINTING OFFICE 16—32834-2

doc. A 54 p-7

OFFICE MEMORANDUM — UNITED STATES GOVERNMENT

(IV) August 1, 1945

You are advised that your compensation has been changed as indicated below, in accordance with the provisions of Section 402 of Public Law 106, 79th Congress, effective 7-1-45

From: $2980

To: 3090

Service and Grade: P-2

L. J. Briggs

Lyman J. Briggs, Director

doc. A 54 p.8

TRANSCRIPT/STATEMENT OF FEDERAL SERVICE

ME (Last, first, middle)

Date of Birth (mm,dd,yyyy)

Social Security Number

Information furnished below, taken from official records of the Federal Government, should be treated as CONFIDENTIAL.

TURE OF ACTION (column used only for a cript of employment)	EFFECTIVE DATE OR PERIOD (mm,dd,yyyy) FROM	TO	POSITION, GRADE AND SALARY	AGENCY AND LOCATION	REMARKS
	3/24/46	5/14/48	Physicist (Radioactivity) P-3 $4400pA	Dept of Commerce National Bureau of Standards Washington, DC	Resig
	(The above service was full time)			per	

doc. A.54 p.9

KEY TO ABBREVIATIONS

PPT	-Adjustments	EXT	-Extensions	REASSIGN	-Reassignment	SUSP	-Suspension
OND APPT	-Appointment	FURL	-Furlough	RIF	-Reduction in Force	TEMP	-Temporary
	-Career Apointment	INDEF	-Indefinite	REEMPL	-Reemployment	TERM	-Termination
	-Career Conditional Appointment	L.A	-Letter of Authority	REINS	-Reinstatement	TRANS	-Transfer
	-Conditional	LWOP	-Leave Without Pay	REM	-Removal	WGI	-Within Grade Increase
	-Continuance	MIL	-Military	RESIG	-Resignation	WSIA	-War Service Indefinite Appointment
	-Conversion	PHYS DIAB RET	-Physical Disability Retirement	RESTOR	-Restoration	WSTA	-War Service Temporary Appointment
	-Demotion	PROB	-Probational	RET	-Retirement		
	-Excepted	PROM	-Promotion	RTD	-Return to Duty		
				SEP	-Separation		

doc. A 55

of this section, informs me that he holds a low number in the selective service lists and may receive a questionnaire at any time.

[redacted] is engaged in research on problems in radioactivity concerned with national defense, of confidential nature, which would be seriously delayed if he were called away for a year. His work involves studies of nuclear fission as a source of atomic energy and requires the use of highly specialized equipment which he has developed and with which he alone is familiar. It would be difficult to replace him and it would require at least a year to train a man to attain the desired proficiency in the conduct of these investigations.

It therefore appears that the national defense is best served by retaining him in his present work.

SEC 34

June 1, 2005

Larry J. Elliott, MSPH, CIH
Director
Office of Compensation Analysis and Support
NIOSH MS-C-47
4676 Columbia Parkway
Cincinnati, OH 45226

Dear Mr. Elliott,
The enclosed affidavit from Dr. Rosalind Mendell includes information requested during my SEC qualification phone call on May 23, 2005. She worked as a physicist in the Radioactivity Lab at the National Bureau of Standards, Van Ness Street, Washington, D.C. from mid-1944 until 1946, leaving six months after the end of World War II. The events she describes occurred during that time period.

In her affidavit, Dr. Mendell states, "In those days, there were no badges to monitor our exposure to radiation; and samples were brought into the laboratory without information as to the nature of the materials delivered." I believe this statement will correct the deficiency in Form B, Section F, Item F.1.

The other deficiency involved Form B. Section E, Item E.5. Dr. Mendell has provided additional information about the two incidents described in my submission. One is exposure from a glass box that was wheeled into the laboratory; the other incident involved a spill in the radium room. In addition she mentions handling radioactive material from Oak Ridge.

If you need further information, you may contact me at 206-669-3386 or the address above. Please make sure your records have that address as the Fed Ex package with the letter concerning my SEC qualification phone call was sent to our previous address by mistake. We moved to our current address in December and I changed our address with NIOSH immediately. Other NIOSH notifications have been sent to the correct address. Dr. Mendell can be reached at R.B. Mendell, 89 Joyce Road, Hartsdale, NY 10530.

Respectfully,

SEC

R.S. Mendell

06-06-05A07:26 RCVD

To whom it may concern:

and I shared the same laboratory on Van Ness Street in the National Bureau of Standards during World War II. I did remember in years gone by that our laboratory was located on Van Ness Street. I did not remember the building number, but the documents which I have now seen show that it was the notorious Building Number 2.

I arrived in Washington in mid-1944, when my husband was transferred from to Washington D.C., where the army trained him first at Catholic University in Japanese and then in Vint Hill, Virginia, in preparation for cryptography. I left Washington in 1946, when my husband was released from the US army six months after the end of WWII.

Shortly after I arrived in Washington, I was hired by Leon Curtiss of the National Bureau of Standards to work on the alpha particle spectroscopy of "W Metal." Such was the degree of secrecy (classification) of the Manhattan Project in our area. In principle, I was not kept informed about the nature of my research. I knew that I was working on a project involving artificially induced fission of uranium only because I knew the energy of alpha particles from U235 and U238, because I could see the occasional huge pulses from natural fission of uranium, and because I was measuring the gradual enrichment of U235 alpha particles relative to those from U238. After all, my M.S. from Cornell University was in experimental nuclear physics.The information that I needed for my hypotheses had appeared in the physics journals before all such information became classified. As time progressed, I observed the enrichment of U235 relative to U238 from my measurements. My data was being used by Oak Ridge in relation to their enrichment program that used gaseous diffusion of uranium. Uranium enriched with U235 was eventally used in the fission bomb that fell on Hiroshima.

experiment involved special Geiger counters. My brief record of that period tells me that I also did some work with special Geiger counters, but my chief recollection was of electroplating the solutions of uranium salt and then putting the samples in my ionization chamber for measuring the energy and counting rates of the alpha particles.

In those days, there were no badges to monitor our exposure to radiation; and samples were brought into the laboratory without information as to the nature of the materials delivered. I do remember one incident of frightening proportions. One day a large glass case, about 5 feet high, was rolled into our laboratory not too far from my equipment. The case contained rather large thin pieces of shiny metal. At some point during the day, gan to fill his experimental geiger counter with gas generated in his glass apparatus. The laboratory was rather large and Burrell's experiment was at the other end of the laboratory from my apparatus and the glass case. When Burrell turned on his electronics, he was shocked to find no geiger counts from natural background radiation. He said that something was wrong with his apparatus; he began making tests. Nothing worked.

Eventually I made a suggestion. "Let me roll the glass case out of the room, and we'll see what happens." What did happen was that . counter began to count furiously once the case was out of the laboratory, with the door closed. In short, the

radiation coming from the glass case had swamped the geiger counter across the laboratory and was causing maximum geiger counts even when removed from the laboratory. I do not know how many other cases we had of exposure to unusual doses of radiation from apparatus rolled into the laboratory, but this one was enough to cling to my memory for 60 years.

Another incident has clung to my memory over the years. I was not involved with a room that was used to store radium in vials. Evidently, was still working with radium. One day over the box-lunches that we ate in our laboratory, expressed his concern over the radium room. He told me that vials of radium had burst from the build-up of gas in the vials (it must have been mostly alpha particles turned into helium gas and some radon), and now there was a radium spill all over the room. He was concerned that he might have to be the person to clean it up, and he was most unhappy at the prospect because he wanted to have children. I fear for the extent of radium clinging to clothes during that period.

Our other exposure came from handling radioactive material from Oak Ridge. I do know that in addition, was involved in the radium program, with which I had no involvement. I was shocked to learn recently from the documents of the degree of contamination in Buildng #2. But I suspected the hazards of our exposure over that time, I was especially concerned because as the war was drawing to a close, I wanted very much to begin having children. I finally thought that I was pregnant just about the time that my husband was given a furlough.

Back in New York, I visited my family physician, who had become a gynecologist. He informed me that he did not want to do the "rabbit test" fir pregnancy because I had

It took eighteen months for me to finally hold my daughter Laura in my arms. After Laura, I had a miscarriage. And after giving birth to Henry, I suffered three more miscarriages efore accepting the reality that I would never have another live child.

I have recently heard that was diagnosed to have zero sperm count after his years in the Radiation Lab and that their desire for children led and his wife to adopt his lovely daughter. Later on and his wife did have one biological child. Did he long for more children.? I only know that I did long for at least one more live birth that never came. I recently read Barbara Goldsmith's book on the sad life of Marie Curie and what radium did to her body. It is sad that while we did take precautions, we were not yet well enough informed to fully understand the risks that we were encountering.

Rosalind B. Mendell

Rosalind B. Mendell

VITO PETRIELLO
Notary Public, State of New York
No. 01PE6115272
Qualified in Westchester County
Commission Expires September 7, 2008