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Semi-Annual Report on Strategic Special Nuclear Material Inventory Differences

July 1978

U.S. Department of Energy

Assistant Secretary for Defense Programs

Office of Safeguards and Security

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Assistant Secretary for Defense Programs
Office of Safeguards and Security
Washington, D.C. 20545

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STATEMENT OF THE
DEPARTMENT OF ENERGY (DOE) DIRECTOR OF SAFEGUARDS AND SECURITY

The Department of Energy has specified accounting requirements as part of its integrated safeguards system for the protection of special nuclear materials. This report provides and explains the generally small differences between the amounts of nuclear materials charged to DOE facilities and the amounts that could be physically inventoried.

These Inventory Differences, previously called Material Unaccounted For (MUF), are being publicly released on a semiannual basis. This report covers data for the period from April 1, 1977, through September 30, 1977, and includes certain identified accounting corrections for data from earlier periods. It is the second such semiannual report, [subsequent to the August 4, 1977, publication (by DOE's predecessor, Energy Research and Development Administration) of all historical Inventory Difference data prior to October 1, 1976.] All Inventory Differences reported here have been analyzed, investigated when necessary, and resolved.

These data and explanations, together with the absences of physical indications of any theft attempt, support a finding that during this period no theft or diversion of a significant amount of strategic special nuclear material has occurred.

H. E. Lyon

H. E. Lyon, Director
Office of Safeguards and Security
Department of Energy

UNITED STATES DEPARTMENT OF ENERGY
REPORT ON STRATEGIC SPECIAL NUCLEAR MATERIAL INVENTORY DIFFERENCES
APRIL 1, 1977 THROUGH SEPTEMBER 30, 1977

This periodic report of Inventory Differences (ID) covers the last six months of fiscal year 1977 (April 1, 1977 through September 30, 1977) for Department of Energy (DOE) and DOE contractor facilities possessing significant quantities of strategic special nuclear material (SSNM)*. The initial ID report, issued as ERDA 77-68 in August 1977, contained data for fiscal year 1976 (July 1, 1975, through September 30, 1976) for Energy Research and Development Administration (ERDA) and ERDA contractor facilities and also contained historical data for ERDA/AEC and ERDA/AEC contractor facilities from 1947 through fiscal year 1975 and for AEC licensees from 1954 through calendar year 1967, including cumulative IDs by facility. The first semiannual ID report was issued as DOE/DP-000-1 in January 1978 and covered the first six months of fiscal year 1977.

Included in this report are the low enriched uranium IDs for DOE's gaseous diffusion plant cascades. Two of the three cascades produce only very low enriched uranium (natural uranium enriched in the uranium-235 isotope to less than 5 percent). One plant, Portsmouth (Piketon, Ohio), does produce some amount of highly enriched uranium (to greater than 20 percent in the uranium-235 isotope). However, for inventory purposes it is not possible to distinguish between this highly enriched material and the vast bulk of low enriched material; hence the average enrichment of the plant ID is listed. The meaning of these cascade IDs are further placed in perspective by the analysis on page 16. Not included in this report are data for the Rocky Flats and Y-12 nuclear weapons production facilities. These are not included in order to protect classified nuclear weapons information.

*Strategic special nuclear material is plutonium or uranium-233 or uranium-235 in material whose uranium-235 content is 20% or greater (known as highly enriched uranium). A significant quantity is either 2 kilograms of plutonium or uranium233 or 5 kilograms of uranium-235 in highly enriched uranium or the appropriate weighted combination.

Inventory Differences are simply the differences in amount of material between what the accounting records show charged to a facility and what a physical inventory shows on hand. These differences are generally due to errors in estimating material in unmeasurable form at the time of an inventory, unmeasurable holdup in equipment, measurement imprecisions, inaccuracies in initial determinations of SSNM produced or used in nuclear reactors, and inventory or bookkeeping errors. They do not always represent actual material and may be either positive or negative, indicating apparent loss or gain. Typical examples of apparent inventory gains which illustrate this point occurred in both the plutonium and uranium material balances. There was a 35.9 kg gain at the Atlantic Richfield Hanford Co. operations attributed to a measurement of plutonium hold-up in process equipment, vessels and transfer piping contained in over 40 protective glove box enclosures where the material is inaccessible to conventional sampling techniques without dismantling the equipment. Measurements through the use of recently developed nondestructive assay (NDA) instrumentation, utilizing gamma and neutron radiation, have provided a measurement of the inventory where previously none existed.

The 11.7 kg plutonium gain and also the 42.1 kg gain in enriched uranium at the E. I. duPont de Nemours Co. is attributed to the imprecision of calculating the plutonium production and uranium burnup within fuel elements undergoing irradiation while in the nuclear reactors.

The 13.5 kg ID in the enriched uranium account reported by Argonne National Laboratory is attributed to an error in calculating U-235 burnup in the nuclear reactors and adjustment to the accounting records for shipper-receiver measurement differences covering an extended period which were previously explained but erroneously reported as a normal operating loss.

Since it is possible that even a small ID may be caused by theft of nuclear material, both DOE and contractors operating DOE facilities carefully maintain, analyze, and investigate ID data. While the IDs are expected in nuclear material processing and are not necessarily evidence of lost or stolen material, ID analysis provides valuable information on the effectiveness of the safeguard system's physical protection and material control measures as well as a check on the process controls and material management procedures. IDs outside safeguards control limits or involving a missing SSNM discrete item are investigated. When necessary, operations or selected processes have been temporarily shut down until an apparent significant ID has been resolved.

Analysis of accounting statistics alone, however, cannot show with absolute certainty that theft has not occurred. Therefore, DOE relies on a safeguards system that integrates stringent physical security and material control measures with material measurement and accounting to ensure that material is not misappropriated. It is this total integrated safeguards system coupled with analysis and, when necessary, investigations of IDs, that DOE and DOE contractors operating DOE facilities use to arrive at a judgment of whether or not theft of significant amounts of SSNM has occurred. Analyses of the data as they were generated, in each case, have resulted in the explanations for the IDs provided in this report. These explanations, together with the absences of physical indications of any theft attempt, support a finding that during this period no theft or diversion of a significant amount of nuclear material has occurred.

INVENTORY DIFFERENCE DATA

APRIL 1, 1977 TO SEPTEMBER 30, 1977

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
PLUTONIUM*

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Albuquerque		
Los Alamos Scientific Lab. Los Alamos, New Mexico	5.0	Cumulative inventory difference from measurement uncertainties involving many measurements of complex residues and also to material holdup in processing equipment.
Mason & Hanger - Silas Mason Amarillo, Texas	None	Contained in weapon parts. All weapon parts accounted for.
Monsanto Research Corp, Mound Laboratories, Miamisburg, Ohio	<0.1	Cumulative inventory differences due to measurement uncertainties for low-level residues.
Sandia Laboratories Albuquerque, New Mexico	None	Contained in discrete items. All items accounted for.
Chicago		
Argonne National Laboratory Argonne, Illinois	0.8	To correct for shipper/receiver differences which heretofore were erroneously charged to Normal Operating Losses instead of Inventory Differences.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase
*This and subsequent Plutonium tables exclude Pu-238 which is reported separately.

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
PLUTONIUM*

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Chicago (continued)		
Argonne National Lab., Idaho National Engineering Laboratory Idaho Falls, Idaho	0.8	To correct for shipper/receiver differences which heretofore were erroneously charged to Normal Operating Losses instead of Inventory Differences.
Battelle Memorial Institute Columbus, Ohio	0.1	Inventory difference due to shipper/receiver remeasurement differences.
Brookhaven National Laboratory Upton, New York	None	Contained in inactive inventory. All material accounted for.
Idaho		
Allied Chemical Corporation, Idaho National Engineering Laboratory Idaho Falls, Idaho	(2.2)	Cumulative amounts of plutonium produced in and recovered from irradiated high enriched uranium fuel elements for which zero plutonium production was assumed.
EG&G, Idaho, Inc. TRA, LPTF Idaho National Engineering Laboratory Idaho Falls, Idaho	None	Contained in discrete items. All items accounted for.
EG&G, Idaho, Inc. ARA, LOFT, PBF, TAN Idaho National Engineering Laboratory Idaho Falls, Idaho	0.1	Cumulative inventory differences due to rounding.

< 0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase
*This and subsequent Plutonium tables exclude Pu-238 which is reported separately.

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
PLUTONIUM*

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Nevada		
Nevada Test Site Mercury, Nevada	None	Contained in test devices. All test devices accounted for.
Oak Ridge		
Oak Ridge National Laboratory Oak Ridge, Tennessee	<0.1	Cumulative inventory difference of small measurement inaccuracies.
Pittsburgh Naval Reactors		
Duquesne Light Co. Shippingport, Pennsylvania	None	Contained in irradiated fuel elements. All elements accounted for.
Westinghouse Naval Reactor Facility Idaho National Engineering Laboratory Idaho Falls, Idaho	None	Contained in irradiated fuel elements. All elements accounted for.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase
*This and subsequent Plutonium tables exclude Pu-238 which is reported separately.

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
PLUTONIUM*

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Richland		
Atlantic Richfield Hanford Co.** Richland, Washington	(35.9)	Inventory difference representing a material gain as determined by measurements of material holdup in equipment using recently developed technology.
Hanford Engineering Development Lab. Richland, Washington	0.9	Cumulative small inventory differences between measured values of plutonium taken at different inventory periods.
Pacific Northwest Lab., Battelle Richland Washington	(0.3)	Cumulative inventory difference identified to be in equipment holdup as determined by advanced measurement techniques.
Rockwell Hanford Operations** Richland, Washington	(0.2)	Cumulative small inventory differences between measured values of plutonium obtained at different inventory periods.
United Nuclear Industries Richland, Washington	0.3	Cumulative small inventory differences from periodic inventory evaluations of plutonium contained in irradiated fuel elements.

< 0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase
*This and subsequent Plutonium tables exclude Pu-238 which is reported separately.
**On July 1, 1977, Rockwell Hanford Operations became a Richland operating contractor, replacing Atlantic Richfield Hanford Co.

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
PLUTONIUM*

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
San Francisco		
Atomics International Canoga Park, California	0.1	Cumulative inventory differences due to rounding and remeasurement differences.
Lawrence Livermore Laboratory Livermore, California	0.1	Cumulative inventory differences resulting from measurement uncertainty and recategorization of wastes to normal operating losses.
Savannah River		
E. I. duPont de Nemours Aiken, South Carolina	(11.7)	Cumulative inventory difference for adjustments resulting from improved theoretical reactor calculations of plutonium produced in plutonium production reactors versus the measurement of the amount actually recovered.

0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase
*This and subsequent Plutonium tables exclude Pu-238 which is reported separately.
**On July 1, 1977, Rockwell Hanford Operations became a Richland operating contractor, replacing Atlantic Richfield Hanford Co.

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
U-235 IN 20% AND GREATER ENRICHED URANIUM

Field Office and Contractor	Inventory Differences in kilograms	Analysis Findings
Albuquerque		
Los Alamos Scientific Lab. Los Alamos, New Mexico	9.3	Inventory differences attributed to Laboratory-wide adjustments from nominal assigned values (their historical practice) to shippers' actual values; with minor differences due to adjustments made as the result of material holdup and subsequent cleanout, improved measurements and rounding.
Mason & Hanger - Silas Mason Amarillo, Texas	None	Contained in weapon parts. All weapon parts accounted for.
Monsanto Research Corp., Mound Laboratories, Miamisburg, Ohio	None	Contained in weapon parts. All weapon parts accounted for.
Sandia Laboratories Albuquerque, New Mexico	0.1	Cumulative inventory differences due to rounding.
Chicago		
Ames Laboratory Ames, Iowa	None	Contained in finished fuel elements. All elements accounted for.
Argonne National Laboratory Argonne, Illinois	13.5	To correct for prior error in calculation of fuel burnup and shipper/receiver difference data heretofore erroneously entered against Normal Operating Losses.

< 0.1 means inventory difference amount is less than 50 grams
( ) means an inventory difference

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
U-235 IN 20% AND GREATER ENRICHED URANIUM

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Chicago (continued)		
Argonne National Laboratory, Idaho National Engineering Laboratory, Idaho Falls, Idaho	(2.9)	Accounting adjustment to correct prior entry error.
Battelle Memorial Institute Columbus, Ohio	<0.1	Cumulative inventory differences due to rounding.
Brookhaven National Laboratory Upton, New York	(0.9)	To correct 1971 posting of fission data erroneously entered as inventory difference.
Idaho		
Allied Chemical Corp., Idaho National Engineering Laboratory Idaho Falls, Idaho	(0.2)	Cumulative inventory differences resulting from cleanup of irradiated fuel storage basin.
EG&G, Idaho, Inc. TRA, LPTF Idaho National Engineering Laboratory Idaho Falls, Idaho	0.1	Cumulative small inventory differences between measurements of scrap and material recovered.
EG&G, Idaho, Inc. ARA, LOFT, PBF, TAN Idaho National Engineering Laboratory Idaho Falls, Idaho	0.7	Cumulative small inventory differences between estimated scrap values and measured material recovered.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
U-235 IN 20% AND GREATER ENRICHED URANIUM

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Nevada		
Nevada Test Site Mercury, Nevada	None	Inventory consists principally of test devices and nuclear rocket fuel. All material accounted
Oak Ridge		
Goodyear Atomic Corp., Piketon, Ohio (except cascades)	25.7	Over sixty percent of the inventory difference results from management decisions to blend greater than twenty percent enriched uranium in scrap and similar forms with less than twenty percent material to obtain economical processing batches. The resulting blends of material were less than twenty percent and accordingly appeared as a gain to that category. The balance is due to combined uncertainties in measurements and sampling of receipts, removals, and inventories; including heterogeneous scrap materials.
Oak Ridge National Laboratory Oak Ridge, Tennessee	(0.3)	Cumulative inventory differences due to sampling and measurement uncertainties.
Pittsburgh Naval Reactors		
Duquesne Light Co. Shippingport, Pennsylvania	None	Contained in irradiated fuel elements. All elements accounted for.
Pittsburgh Naval Reactors Office West Mifflin, Pennsylvania	None	Contained in unirradiated fuel elements. All elements accounted for.
Westinghouse Bettis Laboratory West Mifflin, Pennsylvania	0.1	Cumulative inventory differences due to remeasurements and rounding.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
U-235 IN 20% AND GREATER ENRICHED URANIUM

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Pittsburgh Naval Reactors (continued)		
Westinghouse Naval Reactor Facility Idaho National Engineering Laboratory Idaho Falls, Idaho	None	Contained in unirradiated and irradiated fuel elements. All elements accounted for.
Richland		
Hanford Engineering Development Lab. Richland, Washington	0.1	Attributable to blending of uranium isotopes to produce specific U-235 enrichments of less than 20%. This small cumulative inventory decrease of U-235 is compensated by a comparable inventory increase of U-235 in the less than 20% enriched inventory.
Pacific Northwest Lab., Battelle Richland, Washington	None	Contained in fabricated shapes in static storage under seal. All material accounted for.
Rockwell Hanford Operations* Richland, Washington	None	Contined in scrap in static storage under seal. All material accounted for.
San Francisco		
Atomics International Canoga Park, California	None	Contained in principally static inventory. All items accounted for.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
U-235 IN 20% AND GREATER ENRICHED URANIUM

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
San Francisco (continued)		
Lawrence Livermore Laboratory Livermove, California	<(0.1)	Cumulative inventory differences resulting from calculation error, shipper-receiver difference, recategorization of waste to normal operating loss and measurement uncertainty.
Lawrence Livermore Laboratory Mercury, Nevada	None	Contained in reactor fuel. All items accounted for.
Savannah River		
E. I. duPont de Nemours Aiken, South Carolina	(42.1)	Cumulative inventory differences between: (1) the amount obtained from theoretical calculations of uranium burned up in reactor operations and the measured amount later recovered; and (2) the initial measurements of uranium in scrap and the measurements of uranium later recovered.
Schenectady Naval Reactors		
General Electric Co., Kesselring Site West Milton, New York	<0.1	Cumulative inventory differences due to rounding.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
U-235 IN 20% AND GREATER ENRICHED URANIUM

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Schenectady Naval Reactors (continued)		
General Electric Co., Knolls Lab. Schenectady, New York	<0.1	Cumulative inventory differences of many small measurement differences and correction of data reported in previous reporting periods.
General Electric Co., Windsor Site Windsor, Connecticut	<0.1	Cumulative inventory differences due to rounding.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
FOR THE URANIUM GASEOUS DIFFUSION PLANTS
U-235 IN LESS THAN 5% ENRICHED URANIUM

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Oak Ridge		
Goodyear Atomic Corp. Piketon, Ohio (Average Enrichment = 1.8%)	93.1	The inventory differences are due to equipment holdup, the combined uncertainties of sampling and measurement of receipts, removals, taking of the gas phase inventory, and rounding of inventory figures in the various material accounting areas to the nearest kilogram.
Union Carbide, Nuclear Division Oak Ridge, Tennessee (Average Enrichment = 0.88%)	64.3	
Union Carbide, Nuclear Division Paducah, Kentucky (Average Enrichment = 0.68%)	67.7	

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
URANIUM-233

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Albuquerque		
Los Alamos Scientific Laboratory Los Alamos, New Mexico	<0.1	Cumulative inventory difference due to rounding bulk amounts of material over many years.
Monsanto Research Corp., Mound Laboratories, Miamisburg, Ohio	None	U-233 feed being milked for Th-229. No measure ment differences noted.
Chicago		
Argonne National Laboratory Argonne, Illinois	None	Inventory consists of finished fuel plates. All plates accounted for.
Idaho		
Allied Chemical Corp., Idaho National Engineering Laboratory, Idaho Falls, Idaho	None	Inventory consists principally of irradiated fuel elements. All elements accounted for.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
URANIUM-233

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Oak Ridge		
Oak Ridge National Laboratory Oak Ridge, Tennessee	None	Contained in sealed batches in static storage. All material accounted for.
Pittsburgh Naval Reactors		
Duquesne Light Co., Shippingport, Pennsylvania	None	Contained in irradiated fuel elements. All elements accounted for.
Westinghouse, Bettis Laboratory West Mifflin, Pennsylvania	(0.3)	Cumulative inventory differences due to measuring material previously carried at an estimated value. Measurement was made possible by the cleanup of the process line and the removal of holdup in equipment.
Richland		
Atlantic Richfield Hanford Co.* Richland, Washington	(4.8)	Represents measured trace amounts of U-233 remaining in large volumes of thorium after separation of U-233 product from irradiated thorium fuel elements.
Pacific Northwest Lab., Battelle, Richland, Washington	None	Contained in fabricated shapes in static storage under seal. All material accounted for.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase
*On July 1, 1977, Rockwell Hanford Operations became a Richland operating contractor, replacing Atlantic Richfield Hanford Co.

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
URANIUM-233

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Richland (continued)		
Rockwell Hanford Operations* Richland, Washington	None	U-233 contained in large thorium holdings. No thorium inventory taken during the reporting period.
San Francisco		
Lawrence Livermore Laboratory Livermore, California	None	Inventory consists principally of oxides. All material accounted for.
Savannah River		
E. I. duPont de Nemours Aiken, South Carolina	None	Inventory consists principally of irradiated fuel in storage basin. All material accounted for.
Schenectady Naval Reactors		
General Electric Co. Knolls Atomic Power Laboratory Schenectady, New York	None	Inventory in sealed containers. All material accounted for.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase
*On July 1, 1977, Rockwell Hanford Operations became a Richland operating contractor, replacing Atlantic Richfield Hanford Co.

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
PLUTONIUM-238

Field office and Contractor	Inventory Difference in kilograms	Analysis Findings
Albuquerque		
Los Alamos Scientific Laboratory Los Alamos, New Mexico	0.1	Cumulative inventory differences resulting from remeasurement of backlogged residues.
Monsanto Research Corp., Mound Laboratories, Miamisburg, Ohio	(0.3)	Cumulative inventory differences resulting from cleanup of equipment and glove boxes in process areas.
Sandia Laboratories Albuquerque, New Mexico	None	Material contained in heat sources. All sources accounted for.
Oak Ridge		
Oak Ridge National Laboratory, Oak Ridge, Tennessee	< 0.1	Cumulative inventory differences due to uncertainties in sampling and measurement of receipts, removals, and inventories.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase

SECOND HALF OF FISCAL YEAR 1977 INVENTORY DIFFERENCES
DOE AND DOE CONTRACTOR SPECIAL NUCLEAR MATERIALS
PLUTONIUM-238

Field Office and Contractor	Inventory Difference in kilograms	Analysis Findings
Richland		
Atlantic Richfield Hanford Co.* Richland, Washington	None	Contained in scrap in static storage under seal. All material accounted for.
Rockwell Hanford Operations* Richland, Washington	None	Contained in scrap in static storage under seal. All material accounted for.
Savannah River		
E. I. duPont de Nemours Aiken, South Carolina	2.1	Cumulative inventory differences from imprecise theoretical reactor calculations of Pu-238 produced versus the measured amount recovered and many small measurement inaccuracies.

<0.1 means inventory difference amount is less than 50 grams
( ) means an inventory increase
*On July 1, 1977, Rockwell Hanford Operations became a Richland operating contractor, replacing Atlantic Richfield Hanford Co.

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