U.S. NUCLEAR REGULATORY COMMISSION
OFFICE OF INSPECTION AND ENFORCEMENT

Region I

Report No. 078-154-A - Part 2 of 2

Subject: Radioactive Material in Uncontrolled Location, Norton, Massachusetts

Investigation at: Norton and Attleboro, Massachusetts

Investigation conducted: November 14, 1978 - April 1, 1979

Investigator: Walter H. Martin — 6/7/79
Walter G. Martin, Chief, Safeguards Branch — date signed

Approved by: James M. Allan — 6/12/79
James M. Allan, Deputy Director, Region I — date signed

Investigation Summary:

Investigation on November 14, 1978 - April 1, 1979 (Report No. 078-154-A - Part 2)
Area Investigated: Investigation to determine the source of uranium material found in Norton landfill area. The investigation was based on allegations by Mr. John Sullivan, 33 Chartley Brook Lane, Attleboro, Massachusetts, that Texas Instruments of Attleboro possibly had discarded radioactive material at a private landfill area in Norton, Massachusetts. This investigation concerns itself solely with the uranium material found at the Norton landfill area.
Results: It has been determined that M&C Nuclear, Inc., a totally owned subsidiary of Metals & Controls Inc. (now Texas Instruments) worked with the three types of material found at the Norton landfill site. Other possible sources of the material could not be identified. All of these materials were of the type used in performance of work on AEC contracts by M&C Nuclear and are not representative of any license activities of any companies in the area.

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I. REASON FOR INVESTIGATION

During the investigation initiated on November 14, 1978 and continuing through January 12, 1979 at the Norton landfill area and several other locations in the Attleboro and Norton, Massachusetts areas, samples were taken from the Norton landfill for analysis of the radioactive material. The analyses indicated that depleted, normal and enriched uranium materials were present at the Norton landfill area. This investigation was performed in two parts; the first part concerned itself with interviews of involved personnel and the second part with records and contract reviews, along with a limited number of interviews. This is the second part of that investigation.

II. DETAILS

A. Introduction

The results of the Norton, Massachusetts landfill sample analyses as of December 1, 1978, indicated that large quantities of depleted uranium and lesser quantities of normal and enriched uranium were present at the landfill site. Uranium materials were not found to be present at the other landfill areas surveyed. The results of the analyses of material from the Norton site are shown in Table I. In order to confirm the results of the enriched uranium samples, additional analyses of these samples were performed at the U.S. Department of Energy, New Brunswick Laboratory, Argonne, Illinois. The Analytical Service Request and results of these analyses are included as Enclosure 1 to this report.

B. Scope of Investigation

This investigation was initiated on November 14, 1978 to determine the possible source of the uranium materials found at the Norton landfill site. The investigation was performed in two parts with the first part concerned with interviews of people concerned with the landfill activities and the possible source of the material and the second part includes a detailed analysis of the material and a review of the work performed by companies in the area during the time span from the year 1957 through 1968. The activities of 13 companies within a radius of 45 miles were reviewed as possible sources of the material. Eleven of these companies were eliminated due to the distance from the landfill site and the type of work performed. The previous activities of D. E. Makepeace and M&C Nuclear Inc. were considered to be the most likely sources of the uranium and the investigation concentrated on their activities.

C. Individuals Directly Interviewed or Contacted During the NRC Investigation

1. Mr. Kenneth C. Duffy, San Diego, California: Mr. Duffy was the Nuclear Materials Accountability Representative for M&C Nuclear from November 1957 to March 1963.

2. Mr. George H. Scott, Jr.: General Manager, Engelhard Minerals & Chemicals Corporation, Route 152, Plainville, Massachusetts.

3. Mr. William I. George: Assistant Vice President, Texas Instruments Inc., Attleboro, Massachusetts.

4. Mr. Fred Sherman: Project Manager, Texas Instruments Inc., Attleboro, Massachusetts.

5. Mr. Ronald Donn: Argonne National Laboratory

6. Mr. George Morgan: Schenectady Naval Reactors Office

D. Investigation Findings

The results of the analyses as of December 1, 1978, indicated large quantities of depleted uranium and small quantities of normal and enriched uranium were present at the Norton landfill site.

A review of the work performed by D. E. Makepeace, Division Engelhard Industries, Plainville, Massachusetts (now Engelhard Industries) during the period 1957 through 1968 did not reveal work performed during that time span which had any similarity to the enriched samples from the Norton landfill area. D. E. Makepeace had performed work with enriched, depleted and normal uranium. The enriched material was not of the type found at the Norton landfill area and there were no large quantities of depleted material unaccounted for.

A review of the work performed by M&C Nuclear Inc., a totally owned subsidiary of Metals & Controls Inc. (now Texas Instruments) revealed that M&C Nuclear had performed work with materials similar to the enriched uranium samples found at the Norton landfill site as well as with normal and depleted uranium.

Table I reveals that many of the areas surveyed and analyzed at the Norton landfill area contained depleted uranium material. M&C Nuclear Inc., in a contract with Argonne National Laboratory, performed a large fabrication job with depleted uranium. Upon completion of this work, there was a depleted uranium loss in excess of one ton. In several telephone conversations with Mr. Kenneth Duffy, former Nuclear Material Accountability Representative for M&C Nuclear, it was learned that M&C Nuclear burned depleted uranium chips and turnings in order to render it non-pyrophoric prior to returning this material to Argonne National Laboratory.

This burning was accomplished out of doors in open trays which frequently spilled over or failed. The ground around these trays was often covered with depleted uranium. It was also learned that large quantities of soil were contained in the drums of material returned to Argonne as a result of trying to shovel this material into drums for return. The area where this burning occurred was cleaned and it is fairly certain that the material resulting from the cleanup was taken to the Norton landfill area. A parking lot and railroad spur are now in the area where the burning took place. A copy of the correspondence relating to this contract and the missing depleted uranium is presented as Enclosure 2 to this report.

THIS PARAGRAPH HAS BEEN INTENTIONALLY DELETED; IT CONTAINED CONFIDENTIAL-RESTRICTED DATA - UNAUTHORIZED DISCLOSURE SUBJECT TO ADMINISTRATIVE AND CRIMINAL SANCTIONS.

Mr. K. C. Duffy also furnished information with regard to uranium-aluminum fabrication work performed at M&C Nuclear during the period from 1957-1963. He states that there were several contracts for uranium-aluminum work with uranium enriched to small fractions below 20%. One job of this type performed for Belgium had uranium unaccounted for in excess of normal limits. These jobs were performed on a U.S. Government to Foreign Government contract through Metals & Controls Inc. Sample F-12 in Table I represented also by NBL Sample No. E 5581A in Enclosure 1 is the sample of this type of material found at the Norton landfill site.

Mr. Duffy also related that the licensed material at M&C Nuclear during the time span under investigation consisted primarily of uranium metal foil and foil grade ingots of various enrichments. The materials were pure uranium unalloyed with other materials. They were present in small quantities when compared with the M&C Nuclear government contract material.

Materials of unalloyed enriched uranium were not found to be present at the Norton landfill area.

E. Conclusions

The conclusion of this investigation is that M&C Nuclear Inc. was the probable source of the uranium materials found at the Norton landfill site and that the materials identified were from contract work performed by M&C Nuclear Inc. for the Atomic Energy Commission.

TABLE I

Norton, Mass. Landfill Sample Results as of December 1, 1978

Sample No.	Location	Date Sampled	Sample Results	Radiation Survey Results contact (G-M)
0-1	See Map	10/24/78	Depleted Uranium. U-238 in -35 mesh soil fraction = 2.25 ± 0.9 E-1 uCi/gm. X-ray diffraction and emission spectrographic analyses indicated Uranium and Silica the major components with Uranium as U_3O_8 and UO_2.	2-6 mR/hr
0-2	See Map	10/24/78	Natural Uranium. U-238 in -35 mesh soil fraction = 1.35 ± 0.45 E-6 uCi/gm.	2-6 mR/hr
0-3	See Map	10/24/78	Depleted Uranium. U-238 in -35 mesh soil fraction = = 9.01 ± 0.32 E-2 uCi/gm.	10-15 mR/hr
1-1	Hole A top 6"	10/31-11/2/78	-35 mesh soil fraction is depleted Uranium. The soil is approximately 26% Uranium; the Uranium concentration in the soil = 8.6 E-2 uCi/gm. A metal strip found in the soil contains enriched Uranium to approximately 8%. X-ray diffraction and emission spectrographic analyses indicated the metal strip to be Uranium and Zirconium.	10-15 mR/hr

Sample No.	Location	Date Sampled	Sample Results	Radiation Survey Results contact (G-M)
1-2	Hole A (east side) 3" from top	10/31-11/2/78	-35 mesh soil fraction is depleted Uranium. The soil is approximately 36% Uranium. X-ray diffraction and emission spectrographic analyses indicated Uranium in the Forms $UO_3.2H_2O$ and MgU_2O_6.	~ 30 mR/hr
1-3	Hole A 12" depth	10/31-11/2/78	Depleted Uranium.	2 mR/hr
1-4	Hole A 21"-23" depth	10/31-11/2/78	Depleted Uranium and Radium.	1 mR/hr
1-5	Hole B top 3"	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 36*.	2-3 mR/hr
1-6	Hole C 9" depth	10/31-11/2/78	-35 mesh soil sample contains Radium. The radium concentration in the soil = 1.4 $\pm$ 0.3 E-2 uCi/gm.	3 mR/hr
1-7	Hole C surface	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 20*.	1 mR/hr
1-8	Hole D surface	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 26*.	0.3 mR/hr

Sample No.	Location	Date Sampled	Sample Results	Radiation Survey Results contact (G-M)
1-9	Hole D-1 surface	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 78*.	0.3 mR/hr
1-10	Hole D 6" depth	10/31-11/2/78	Radium only.	0.2 mR/hr
1-11	Hole D-1 3"-6" depth	10/31-11/2/78	Radium and Uranium-235 present. Ra^{226}/U^{235} = 45*.	0.3 mR/hr
1-12	metal casting	10/31-11/2/78	The casting contains Uranium enriched to 15 weight percent. X-ray diffraction and emission spectrographic analyses indicated Uranium and Aluminum in the form UAl_3.	~ 30 mR/hr
1-13	Mud A	10/31-11/2/78	Radium and Uranium-235 and 238 present. Ra^{226}/U^{235} = 1.	0 mR/hr
1-14	Mud B	10/31-11/2/78	Radium only.	0 mR/hr
1-15	Mud C	10/31-11/2/78	Radium only.	0 mR/hr
1-16	Mud D	10/31-11/2/78	Radium only.	0 mR/hr

1 of 1

ENCLOSURE 1

U.S. Department of Energy
New Brunswick Laboratory
Argonne, Illinois
Analytical Service Request

12-21-78	R:1		W. MARTIN
Norton Dump (NRC)	Norton, MA	—	—

Description of Samples (include known impurities and approximate enrichment)

U-AL CASTING

U-Zr CHIP

Classification

Sample		Report
X	Unclassified	X
☐	Confidential	☐
☐	Secret	☐

If sample is classified, state basis for classification, e.g., shape, composition, mountings, etc.)

Analyses Requested

U-AL CASTING
1.) Wt/o U
2.) % U^{235}
3.) CHECK FOR PRESENCE OF Ti, greater than trace quantity

U-Zr CHIP
1) W/o U
2) % U^{235}

Reporting Basis
☐ As-recd. Wt.
☐ Dry Wt.
☐ Pickled Wt.

Reporting Unit
☐ Wt./Sample Wt.
☐ Wt./Sample Vol.
☐ Wt./Element Wt.
☐ Other (specify)

NBL Sample No.	Requestor's Sample No.	NBL Sample No.	Requestor's Sample No.	NBL Sample No.	Requestor's Sample No.
EU-5581A	Resl/ID # 11479-12				
EU-5582A	Resl/ID # 11474-1				

Date Analytical Service Request Received: Date Samples Received: 12-21-78 Date Samples Shipped:

Sample Condition and Appearance:

DOE-CH 406 (5-78)

ORIGINAL

Date	Project	Page
2/21/79	Norton Dump	1 of 1

U.S. Department of Energy
New Brunswick Laboratory
Argonne, Illinois
Report of Analysis (General)

NBL Sample No.	Requestor's Sample No.	Wt.% U	At. Wt.	Standards
EU-5581A	Resl/ID # 11479-12			
SUBSAMPLE 1		39.63	237.44	A, B
SUBSAMPLE 2		39.78	237.44	A, B
SUBSAMPLE 3		37.29	237.44	C, D
SUBSAMPLE 4		38.44	237.44	C, D
EU-5582A	Resl/ID # 11474-1	7.29	235.20	E, F

Comments or Notes:

Unknown Control Standards (% Relative Difference from Assigned Values)

A. -0.06 B. -0.09 C. +0.04 D. -0.08 E. -0.04 F. -0.06

Carl Hassell
Signature

Carl Hassell, Jr., Chief
Name, Title

Uranium/General Chemistry Section
Organization

Copies:
W. Martin, NRC-I

FORM NO. DOE-CH406A (5-78)

ORIGINAL

2/21/79	Norton Dump	1 of 1

U.S. Department of Energy
New Brunswick Laboratory
Argonne, Illinois
Report of Analysis (Isotopic)

NBL Sample No.	Requestor's Sample No.	Wt. % ^{234}U	Wt. % ^{235}U	Wt. % ^{236}U	Wt. % ^{238}U	
EU-5581A	Resl/ID # 11479-12		19.857 ± 0.16%			
EU-5582A	Resl/ID # 11474-1		92.913 ± 0.013%			

NBL Sample No.	Requestor's Sample No.	Wt. % ^{238}Pu	Wt. % ^{239}Pu	Wt. % ^{240}Pu	Wt. % ^{241}Pu	Wt. % ^{242}Pu

Amos W. Summers
Signature

Amos W. Summers, Chief
Name, Title

Mass Spectrometry Section
Organization

Copies:
W. Martin, NRC-I

Comments or Notes

Results are corrected to NBS standards for this level. Relative 95% confidence limits for individual reported values are as listed.

FORM NO. DOE CH4088 (5-78)

ORIGINAL

2/21/79	Norton Dump	1 of 1

U.S. Department of Energy
New Brunswick Laboratory
Argonne, Illinois
Report of Analysis (Elemental)

☐ Element ☐ As rec'd. ☐ Wt % ☐ —g/g
☐ Sample ☐ Fired ☐ μg/g ☐ —g/l
☐ ☐ Dried ☐ ☐

VS = > 10% VW = 0.001 — 0.01%
S = 1 — 10% T = 0.0001 — 0.001%
M = 0.1 — 1% FT = < 0.0001%
W = 0.01 — 0.1% (-) = Not detected

NBL Sample Number	Requestor's Sample No.	NBL Sample Number	Requestor's Sample No.	NBL Sample Number	Requestor's Sample No.	NBL Sample Number	Requestor's Sample No.
EU-5581A	Res1/TD #11479-12 (b)			EU-5582A	Res1/TD #11474-1 (b)		

Ag		N		Ag		N	Ag		N	Ag		N
Al	M	Na		Al		Na	Al		Na	Al		Na
As		Nb		As		Nb	As		Nb	As		Nb
Am		Nd		Am		Nd	Am		Nd	Am		Nd
Au		Ni		Au		Ni	Au		Ni	Au		Ni
B		O		B		O	B		O	B		O
Ba		Os		Ba		Os	Ba		Os	Ba		Os
		P		Be		P	Be		P	Be		P
Bi		Pb		Bi		Pb	Bi		Pb	Bi		Pb
Br		Pd		Br		Pd	Br		Pd	Br		Pd
C		Pr		C		Pr	C		Pr	C		Pr
Ca		Pt		Ca		Pt	Ca		Pt	Ca		Pt
Cd		Pu		Cd		Pu	Cd		Pu	Cd		Pu
Ce		Rb		Ce		Rb	Ce		Rb	Ce		Rb
Cl		Re		Cl		Re	Cl		Re	Cl		Re
Co		Rh		Co		Rh	Co		Rh	Co		Rh
Cr		Ru		Cr		Ru	Cr		Ru	Cr		Ru
Cu		S		Cu		S	Cu	Va	S	Cu		S
Dy		Sb		Dy		Sb	Dy		Sb	Dy		Sb
Er		Sc		Er		Sc	Er		Sc	Er		Sc
Eu		Se		Eu		Se	Eu		Se	Eu		Se
F		Si		F		Si	F		Si	F		Si
Fe	M	Sm		Fe		Sm	Fe	M	Sm	Fe		Sm
Ga		Sr		Ga		Sr	Ga		Sr	Ga		Sr
Gd		Ta		Gd		Ta	Gd		Ta	Gd		Ta
Ge		Tb		Ge		Tb	Ge		Tb	Ge		Tb
H		Te		H		Te	K		Te	H		Te
Hf		Th		Hf		Th	Hf		Th	Hf		Th
Hg		Ti	(-)	Hg		Ti	Hg		Ti	(-)	Hg		Ti
Ho		Tl		Ho		Tl	Ho		Tl		Ho		Tl
I		Tm		I		Tm	I		Tm		I		Tm
In		U	7S	In		U	In		U	7S	In		U
Ir		V		Ir		V	Ir		V		Ir		V
K		W		K		W	K		W		K		W
La		Y		La		Y	La		Y		La		Y
Li		Yb		Li		Yb	Li		Yb		Li		Yb
Lu		Zn		Lu		Zn	Lu		Zn		Lu		Zn
Mg		Zr		Mg		Zr	Mg		Zr	7S	Mg		Zr
Mn				Mn			Mn				Mn		
Mo				Mo			Mo				Mo		

Comments or Notes: Analysis by Emission Spectrography Unless Otherwise Noted Below

(a) Combustion - Gas Chromatography (b) X-Ray Spectroscopy (c) Atomic Absorption (d) Spark-Source Mass Spectrometry

(e)

Richard Graff
Signature
Richard Graff, Chief
Name, Title
Spectrochemistry Section
Organization

Copies:
W. Martin, NRC-1

698 167

ORIGINAL

ENCLOSURE 2

M&C NUCLEAR, INC.

P.O. BOX 696 ATTLEBORO, MASSACHUSETTS, U.S.A.

TELEPHONE [redacted]

November 30, 1959

Filer AEL-17

AIR MAIL SPECIAL DELIVERY

Argonne National Laboratory
Box 299
Lemont, Illinois

Attention: Mr. J. E. McKinley
Senior Buyer

Gentlemen:

In reply to your inquiry of October 28, 1959, we are pleased to furnish the following quotation.

M&C Nuclear, Inc. will supply 39,300 pieces of depleted uranium metal to the specifications contained in your letter, telegram of October 29, and Drawings EP-1-20411-8, EP-1-20412-8, and EP-1-20413-8 for a lump sum of $219,348.00.

We will require 68,200 kilograms of depleted uranium metal in the form of ductiles, approximately twelve inches in diameter and five inches thick, and weighing 300-150 pounds each. Our quotation assumes that the starting material will be supplied and delivered to M&C Nuclear, Inc. at no charge to M&C Nuclear, Inc. We have also assumed that usable metal and scrap remaining at completion of the order will be returned to Argonne National Laboratory at no cost to M&C Nuclear, Inc.

We estimate approximately 9,000 kilograms of usable material will remain at completion. Also, our quotation includes provision for our financial responsibility in connection with material losses. In computing our responsibility, we based our calculations on a charge of $8.15 per kilogram, the published price for depleted uranium (0.0048 w/o U235) as contained in the Oak Ridge price list of September 28, 1959. If the material is of a different percent depletion or there is a later price list of which we do not have knowledge, we would have to adjust our quotation.

Delivery will commence prior to January 31 and be completed by May 31, 1960, provided that we receive at least 25% of the required starting material by January 1 and 25% the first of each succeeding month through April 1, 1960. We would need an order by December 14, 1959, in order to procure necessary tooling and supplies.

NAC Nuclear, Inc. will supply additional pieces of each size, in minimum quantities per order of 6,000 kilograms, for a charge per piece in accordance with the following table:

Nominal Size (in.)	Price Per Piece ($)
1 x 1 x 1	3.30
1 x 1 x 2	3.75
1 x 1 x 3	5.05
1 x 1 x 5	6.40
2 x 2 x 2	6.70
2 x 2 x 5	13.40
1/8 x 1 x 1/2	2.15
1/8 x 1 x 1	3.00
1/8 x 2 x 1/2	2.45
1/8 x 1 x 1	2.65
1/8 x 1 x 2	3.15
1/8 x 1 x 3	3.45

The above-quoted prices per piece are based on the same assumptions regarding starting material, scrap, and loss charges as our quotation for the 18,300 pieces. For any additional 6,000 kilogram order, we would require 7,500 kilograms of additional starting material. Needless to say, this requirement could be reduced by the use of usable scrap remaining at the completion of fabrication of the original order for 18,300 pieces.

In view of the variations in yield and manufacturing process requirements in any order of this magnitude, we would appreciate provision in your order for authorization for us to ship up to 10% in excess of the number of pieces required of each type, such to be invoiced at the unit prices listed in the above schedule.

NAC Nuclear, Inc. is an established accountability station (NAC) and has been for seven years. We have fabricated several thousand kilograms of uranium--enriched, natural, and depleted--for critical experiments, submarine propulsion cores, and reactors for research, training, and power generation. We also supplied Argonne National Laboratory enriched uranium plates somewhat similar to this requirement in connection with your Fast Breeder Critical program of 1954-5. We operate in strict compliance with AEC health, safety and security requirements as administered by the Schenectady and [illegible] Operations Offices, and are presently doing work under several AEC contracts.

We will permit your inspe[illegible]lication, and test of materials and workmanship at all reasonable times during processing, but such naturally must be subject to conformance with any security requirements of the AEC and company measures to safeguard proprietary information.

In order to guarantee the Laboratory that [illegible] your requirements, it is our intention to conduct an initial [illegible] approximately 225 pieces. We will calculate the density and [illegible] and dimensionally inspect 100% of these pieces. We will then ascertain, to your satisfaction, that we can meet your weight specifications without 100% weighing as long as we meet your dimensional specifications.

Our terms are net 30 days, and delivery is F.O.B. our plant, Attleboro, Massachusetts.

We have enclosed our standard patent indemnity, warranty, and nuclear hazards indemnity clauses for your consideration for inclusion in any purchase subcontract with which you may favor us.

Our base quotation will remain valid for 30 days from this date; our unit price quotation will remain valid until June 1, 1960.

M&C Nuclear, Inc. has processed over 15,000 pounds of U235 and 40,000 pounds of natural and depleted uranium during the past seven years. We have a privately owned facility of 202,000 square feet as well as the experience and capabilities needed to furnish the product to your meeting specifications. We would be happy to provide more detailed information if you so desire. We look forward to your early authorization to fabricate the 39,300 pieces.

Cordially yours,

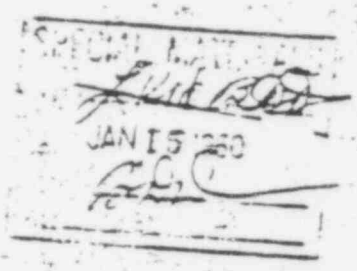
G. T. Williams
President

GW/sl

Encs.

ARGONNE NATIONAL LABORATORY
Lemont, Illinois

January 15, 1960



C. L. Williams, President
M & C Nuclear, Inc.
P. O. Box 898
Attleboro, Massachusetts

Re: Materials Processing Contract
No. 31-109-38-1162

Dear Mr. Williams

Enclosed are five copies of a proposed Subcontract No. 31-109-38-1162 between Argonne National Laboratory and M & C Nuclear, Inc. This subcontract provides for the fabrication and supply of 39,900 pieces of depleted uranium metal by M & C and gives Argonne the option to increase these requirements until June 1, 1960. The subcontract has been prepared in accordance with your proposal of November 30, 1959, as modified by Mr. Dutton's letter dated December 18, 1959.

We have carefully considered your proposed standard articles with respect to Patents, Warranty and Indemnity. I believe you will find that Patents and Warranty Articles appearing in the contract will be satisfactory to you. The Indemnity Article has not been incorporated in the subcontract; however, there is enclosed herewith a copy of a letter which I have signed quoting certain provisions of the Laboratory's Prime Contract with the United States Government, which indicates that the Laboratory has Price-Anderson nuclear hazards indemnity. I believe that you will find that the quoted provisions, when read in conjunction with the Atomic Energy Act, afford to you the protection which you are seeking. You will note also that we have incorporated in the subcontract a clause pertaining to responsibility for loss of material supplied by the Laboratory which essentially duplicates that clause proposed by your representatives upon their visit to the Laboratory on December 15, 1959.

The enclosed subcontract has been reviewed and approved by the Chicago Operations Office of the Atomic Energy Commission. If it meets with your approval, kindly execute and return four copies to this office.

The Laboratory will then complete the execution, obtain the signature of the appropriate representative of the Chicago Operations Office, AEC, and will return one fully executed and approved copy to you for your files. Upon your execution and return of the requested copies you may proceed with whatever work may be accomplished under the subcontract prior to the receipt of fixed material.

Very truly yours,

J. H. McKinley
Business Manager

JHM:em
Enclosures

cc: E. D. Bevins
J. J. Button
A. C. Hirins
P. E. Nilsson

APPENDIX B

SCOPE OF THE WORK

1. ORIGINAL REQUIREMENTS

The Contractor shall fabricate and deliver to locations specified by the Laboratory 39,900 pieces of depleted uranium to the specifications contained in drawings SF-1-20811-3, SF-1-20812-3, and SF-1-20813-3 attached to this contract and made a part hereof. The following weight requirements with a deviation of plus or minus 2 per cent apply:

Nominal Size (in.)	Quantity Original	Quantity Current	Weight (gm) ± 2%	Maximum excess Authorized
1 x 1 x 1	200	409	301.1	20
1 x 1 x 2	1500	2,500	603.6	150
1 x 1 x 3	1600	2,600	906.2	160
1 x 1 x 5	6900	8,534	1511.0	690
2 x 2 x 2	4000	7,684	2419.0	400
2 x 2 x 5	5200	9,534	6063.0	520
1/8 x 1 x 1/2	200	350	18.35	20
1/8 x 1 x 1	300	600	36.79	30
1/8 x 2 x 1/2	1800	3,600	36.66	180
1/8 x 2 x 1	2000	4,000	73.50	200
1/8 x 2 x 2	7500	27,500	147.2	750
1/8 x 2 x 3	8600	60,600	220.5	860

In view of variations in yield and manufacturing process requirements in orders of this magnitude the Contractor is authorized to ship up to 10% in excess of the number of pieces required of each type described above.

2. OPTION TO INCREASE REQUIREMENTS

It is agreed that the Laboratory has the option to increase the requirements stated in section 1. above in increments of 6,000 kg. lots of finished pieces but not exceeding a total of 60,000 kgs. The Laboratory may exercise such option from time to time by written direction to the Contractor, and without formal supplement to this Contract, no later than June 1, 1960. The Contractor will be held to the exact requirements of any such direction and will not be paid for any pieces fabricated in excess of such requirements.

2. The price for depleted uranium pieces furnished by the Contractor pursuant to the authority granted him, in Section 2 of Appendix B, in excess of the requirements set forth in Section 1 of that appendix shall be determined in accordance with the following unit prices and the price so determined shall be payable under this contract in addition to the price stipulated in Section 1 above:

Nominal size piece (in.)	Unit price
1 x 1 x 1	3.19
1 x 1 x 2	3.74
1 x 1 x 3	5.03
1 x 1 x 5	6.37
2 x 2 x 2	6.67
2 x 2 x 5	13.33
1/8 x 1 x 1/2	2.34
1/8 x 1 x 1	2.99
1/8 x 2 x 1/2	2.44
1/8 x 2 x 1	2.64
1/8 x 2 x 2	3.14
1/8 x 2 x 3	3.43

3. Appendix B, Scope of the Work, is amended in its entirety to read:

1. Requirements

The Contractor shall fabricate and deliver to locations specified by the Laboratory 127,911 pieces of depleted uranium to the specifications set forth on drawings SP-1-20811-B, SP-1-20812-B and SP-1-20813-B attached to this contract and made a part hereof. The nominal sizes, quantities and weight requirements for such uranium pieces are as follows:

Nominal Size (in.)	Quantity	Weight (gm) ± 1%
1 x 1 x 1	409	301.1
1 x 1 x 2	2,500	603.6
1 x 1 x 3	2,600	906.2
1 x 1 x 5	8,534	1511.0
2 x 2 x 2	7,684	2419.0
2 x 2 x 5	9,534	6063.0
1/8 x 1 x 1/2	350	18.35
1/8 x 1 x 1	600	36.79
1/8 x 2 x 1/2	3,600	36.66
1/8 x 2 x 1	4,000	73.50
1/8 x 2 x 2	27,500	147.2
1/8 x 2 x 3	60,600	220.5

2. Variations

In view of variations in yield and manufacturing process requirements in orders of the magnitude provided for in this contract the

Contractor is authorized to deliver hereunder uranium pieces in excess of the quantities specified in Section 1 but such excess pieces shall not exceed the quantities hereinafter specified for the various sizes:

Nominal Size (in.)	Maximum Excess Authorized
1 x 1 x 1	25
1 x 1 x 2	150
1 x 1 x 3	160
1 x 1 x 5	680
2 x 2 x 2	400
2 x 2 x 5	520
1/8 x 1 x 1/2	20
1/8 x 1 x 1	30
1/8 x 2 x 1/2	180
1/8 x 2 x 1	200
1/8 x 2 x 2	750
1/8 x 2 x 3	860

6. All other terms, provisions and conditions of said subcontract will sometime in full force and effect.

ARGONNE NATIONAL LABORATORY
(Operated by The University of Chicago)

By /s/ J. E. McKinley

Title Business Manager

METALS & CONTROLS INC.

By /s/ G. L. Williams
A & C Engineer

Title Product Group Manager

I, Townsend M. Gunn, certify that I am the _____ Secretary of the corporation named as the "Contractor" in the within Supplemental Agreement; that George L. Williams who signed the said Supplemental Agreement on behalf of the Contractor was the M-C Project Engineer of said corporation; that I know his signature and his signature thereto is genuine; and that said Supplemental Agreement was duly signed, sealed and attested for and in behalf of said corporation by authority of its governing body.

By /s/ Townsend M. Gunn

Title Secretary

METALS & CONTROLS INC. P O BOX 868 · ATTLEBORO, MASS · CASTLE 2-3800

A CORPORATE DIVISION OF TEXAS INSTRUMENTS INCORPORATED

File: AML-37
November 21, 1963

Mr. J. E. McKinley
Business Manager
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois

Subject: Contract No. 31-109-38-1162

Reference: Your Letter of November 1, 1963 Addressed to Mr. R. Morrow

Dear Mr. McKinley:

On November 13, 1963 I telephoned to advise receipt of your November 1st letter and to express our surprise at your request. As stated at that time, M&C did not consider that we were financially liable for additional reported S.R. differences, based on earlier discussions with both Argonne and COO representatives.

I have reconstructed the following sequence of events from the file and pass them on to you for any comment or advise should we have misunderstood the situation:

1. Letter - Finerty of M&C to McKinley of AML dated May 14, 1962 states M&C contention that AML receivers samples not accurate enough to substantiate difference indicated.

2. Letter - McKinley of AML to Finerty of M&C dated May 25, 1962 stating belief that AML samples are adequate and referring M&C to the Commission and the disputes clause of the contract.

3. Letter - Finerty of M&C to Dunbar of COO dated June 6, 1962 enclosing above letters and requesting resolution of S.R. differences.

4. Letter - Finerty of M&C to COO in October, 1962 requesting information on findings.

From October of 1962 until your letter of November 1, 1963, there has been no written correspondence. However, during the interim, Mr. Ken Duffy, our accountability representative, was advised by Mr. Sheldon Kops of COO that the S.R. difference review by COO produced a decision in M&C's favor. This information was also confirmed orally by Mr. John P. Jewett,

C/C 11-2
Serial 2765

Assistant Manager for Administration, CCO to Mr. Duffy. Earlier this month, Mr. R. Corson, our current accountability representative, telephoned Mr. Kops to discuss the situation. Mr. Corson reports that Mr. Kops did recall a decision in M&C's favor.

In view of this information, which I believe to be factual, it appears that a reversal has occurred in the earlier CCO position. It does not seem appropriate that M&C should now be required to pay a penalty as a result of that changed position.

Our material balance records indicate a loss of 959 Kg. for which M&C is financially responsible. This amount we believe was accepted last year by CCO as an accurate and representative figure. We therefore request that the $10,145.00 amount currently being withheld on the contract be reduced to $5,350.00 and that amount be paid in full to M&C. This adjustment would represent payment by M&C of 959 Kg x $5.00 per Kg or $4,795.00 for material unaccounted for.

Very truly yours,

George P. Howland
Manager, Industrial Nuclear Products

GPH/be

METALS & CONTROLS INC. P O BOX 608 · ATTLEBORO MASS · CABLE 2-3600

A CORPORATE DIVISION OF TEXAS INSTRUMENTS INCORPORATED

File: AEC-37
January 2, 1964

Mr. J. R. McKinley
Business Manager
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60440

Subject: Shipper/Receiver Differences Concerning U_3O_8
Metals & Controls Contract No. AT-(49-1)-1162

Dear Mr. McKinley:

As a result of the position stated in the Chicago Operations Office's letter of December 13, 1963 and the request contained in your letter of December 17, 1963, we have reviewed the provisions of the subject contract and the circumstances pertinent to the shipper/receiver differences regarding the source of depleted uranium returned under the contract.

In view of the extended period of time this final matter under the contract has been under consideration; the fact that the material in question is no longer available in the scrap returned, if at all; and the unlikelihood that any additional facts can be developed to assist in resolving the shipper/receiver differences; we have attempted to resolve the differences on equitable basis for final settlement, all factors considered.

Our understanding of the value of the difference is $5,350, representing 1070 Kgs of depleted uranium at $5, per Kg. This amount has been adjusted as follows:

Argonne's order No. 11627 dated 6/13/62 anticipated uranium processing loss,	2029 Kgs x $5. = $10,146.
Metals and Controls records reflect uranium processing loss,	959 Kgs x $5. = $ 4,796.
Difference	1070 Kgs x $5. = $ 5,350.

Our records indicate that 991 Kgs of the total difference of 1070 Kgs is attributable to a shipment of 26 drums of unusable scrap in the form of metal and oxide on November 20, 1961. This shipment was recorded on the shipping form 101 M&C/ANL 100. The remainder of the difference (1070-991) 79 Kgs has not been identified to any particular shipment of product or scrap under the contract.

In considering an equitable resolution of the difference of the 991 Kgs, we have reviewed the following pertinent circumstances and contract provisions:

a. The 16 drums of metal and oxide shipped on 11/10/61 represented the return of unusable scrap in a nonpyrophoric state.

b. This depleted uranium in the form of unusable scrap had no economical value. We understand it was disposed of as it was not suitable for processing for reclamation.

c. Our processing loss figure of 959 Kgs was established on the basis, among other factors, of the depleted uranium in the scrap form of dross (clinkers and fines).

d. We proposed various alternative methods of rendering the unusable scrap nonpyrophoric to AML during March 1961. Although some consideration was given to these alternatives, we were advised to burn the unusable scrap.

e. After burning we calculated from our original scrap weights the percent of depleted uranium in the resulting metal and oxide.

f. Upon receipt of the 16 drums of metal and oxide, AML took 1 sample from each drum to establish the percent of depleted uranium weight content of each drum.

g. We have questioned the reliability of this sampling technique for the type of material involved. It is to be recognized that there was no requirement nor attempt made to burn the unusable scrap to produce a uniform or homogeneous product. The objective was to render the material nonpyrophoric. A simple burning process was employed.

h. The percents established by AML's sampling compared to our figures has created the shipper-receiver difference of 991 Kgs.

i. The provisions of Section A, Article II, of the contract establishes that we shall be financially responsible for processing losses of depleted uranium. Section J, Article II, obligates us to render all unusable scrap nonpyrophoric by conversion to uranium oxide or other chemical treatment prior to shipment.

Our understanding of the intent of these provisions was to provide us with the maximum incentive to produce the pieces ordered with a minimum quantity of depleted uranium feed material, furnished by the Government at no cost to us. We performed the job in a manner consistent with this objective. Our records indicate that the overall yield in end product from the Government-furnished material was very good. This yield was obtained by recycling usable scrap to the maximum extent feasible. We understand that the yields we obtained surpassed those experienced by other contractors performing similar work.

It is our interpretation that any uranium loss involved in the burning of unusable scrap to render it nonpyrophoric does not constitute a "processing loss" within the intent of the provision in Section 4, Article II. This interpretation is supported by the fact that the unusable scrap to be burned had no useful value in its scrap form in the burned state of metal and oxide, or any residues from such burning. There was no economical advantage to be gained by us or the Government in rendering the unusable scrap nonpyrophoric. This material simply had to be made as safe as possible to handle and store until it could be properly disposed of by the Government. We expended our best efforts in actually burning the unusable scrap and returning it to Argonne for subsequent disposal.

In brief summary, we believe we delivered a quality product in a timely manner at a minimum cost, including the cost of depleted uranium feed material furnished by the Government. Payment for losses of depleted uranium scrap material which had no intrinsic or economic worth at $5. per Kg. or at any price, imposes a punitive measure never intended under the contract and serves no useful purpose either now or at the time the unusable scrap was rendered nonpyrophoric. Payment for worthless material alleged to be lost on the basis of a questionable sampling technique compounds the inequity that such payment would constitute.

In view of the preceding discussion, we consider that payment on our part for any part of the 991 Kg difference pertaining to the burned unusable scrap would be unfair and inequitable. Accordingly, we propose that we be credited for 991 Kgs of returned depleted uranium in the form of burned unusable scrap.

We have not attempted to establish the basis for the difference of the remaining 79 Kgs in question. It appears that the time and effort required to pinpoint this difference would delay final settlement and closing of the contract. Therefore, in the interest of avoiding any further delays, we propose that the processing loss of 959 Kgs be increased by 40 Kgs to a final total of 999 Kgs. The amount to be deducted for processing losses then would be $4,995. from the retainer of $10,145. The net amount payable would be $5,150.

We believe the proposed resolutions contained herein fairly establish our financial obligation for process losses consistent with the intent of the contract agreements. We will appreciate your consideration of our proposed settlement at an early opportunity.

Very truly yours,

George P. Howland
Manager, Industrial Nuclear Products

EH/hc

METALS & CONTROLS INC. P O BOX 696 · ATTLEBORO, MASS. · CASTLE 2-3600

A CORPORATE DIVISION OF TEXAS INSTRUMENTS INCORPORATED

Files ANL-37
January 21, 1964

NOTED: P.R.S. 3
C.L.
H.L.W.
R.B.S.
RECD. LEGAL DEPT.
JAN 24 '64
ACTION Copy & SPM
FILE

AIR MAIL

Mr. J. H. McKinley
Business Manager
Argonne National Laboratory
9700 South Cass Avenue
Argonne, Illinois 60440

Subject: Shipper/Receiver Differences Under Contract 31-109-38-1162

Dear Mr. McKinley:

Your letter of January 15, 1964 indicates that our offer of January 2, 1964 leaves you without reasonable justification for proposing a settlement to the A.E.C.; and further that, if our position was firm, you would be compelled to refer the matter to the A.E.C. for resolution as a "dispute" pursuant to the terms of the contract.

We have again reviewed the pertinent circumstances and contract provisions pertaining to the question of the amount of depleted uranium contained in the unusable scrap returned in the form of metal and oxide. Additionally, we have carefully read Mr. McSwain's letter of December 13, 1963, which was transmitted by your letter of December 17, 1963.

The third paragraph of Mr. McSwain's letter states "-----there appeared to be no factual means existant to establish a clearly preferential degree of accuracy on the part of either party." regarding the shipper-receiver difference. We agree with the judgement on which this statement is based. The statement implies that an equitable settlement of the difference would be to "split-the-difference." Such a settlement would result in an increase in the a[illegible]t we are to pay for processing losses under the contract of $2,675 ,350. + 7) for a total cost to M&C of $7,470.

We believe a "split-the-difference" basis for settlement is not truly equitable to our position and would not give recognition to the following circumstances:

a). The intent of the contract provisions establishing a $5. per Kg penalty on uranium not returned was to provide an incentive to us to use the Government furnished material as economically as possible. We believe that this objective was realized. The high yield in our product from the Government furnished material was obtained by recycling scrap to the maximum extent feasible.

b). The penalty of $5. per Kg was not intended to apply to the rendering of unusable scrap to a nonpyrophoric state. The unusable scrap was worthless and there was no economic advantage to be gained by ourselves or the Government from use of the material. It simply had to be made as safe as possible for storage and handling incident to proper disposal.

We would prefer that this matter be resolved without recourse to the disputes section of the contract. With this consideration in mind and in hopes of securing final resolution, we propose that our company pay to ANL a total amount of $6,195. Agreement on this amount increases our total liability substantially ($1,400.) and leaves a balance due us from the retainer under the contract of $3,950.

We trust that this proposal proves acceptable to you and permits you to secure the approval necessary from the A.E.C. to permit closing out of this order.

Very truly yours,

George P. Howland
Manager, Industrial Nuclear Products

be

Argonne National Laboratory

9700 SOUTH CASS AVENUE
ARGONNE, ILLINOIS 60440

February 17, 1964

Mr. George P. Howland, Manager
Industrial Nuclear Products
Metals & Controls, Inc.
P. O. Box 898
Attleboro, Massachusetts

Dear Mr. Howland:

I am pleased to advise that Argonne has decided to accept your proposal, as outlined in your letter of January 21, 1964, for settlement of our shipper/receiver differences under Contract No. 31-109-38-1162. On this basis Metals & Controls' liability for lost uranium is established at a total amount of $6,195. Argonne is presently holding back $10,145 under the contract and will remit to M&C final payment in the amount of $3,950 upon receipt of two properly executed copies of its standard release form, three copies of which are enclosed herewith.

Very truly yours,

J. E. McKinley
Business Manager

JEM:ad

Enclosures

bc: L. K. Burst
A. G. Nisius
F. R. Shlemon

SPECIAL MATERIALS

POOR ORIGINAL

698 183

ENCLOSURE 3

ENCLOSURE 3 HAS BEEN INTENTIONALLY OMITTED; IT CONTAINED CONFIDENTIAL-RESTRICTED DATA - UNAUTHORIZED DISCLOSURE SUBJECT TO ADMINISTRATIVE AND CRIMINAL SANCTIONS.