STARMET
Metallurgical Excellence

June 25, 2001

Ms. Sheryl Burrows
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Mail Stop T9F31
Rockville, MD 20555

Subject: Robins Air Force Base (RAFB) Report - Repair and Refurbishment of C-141 Aircraft Counterweights, Contract F09603-97-C-0435, 0003AA & 0003AB

Dear Ms. Burrows:

Please find enclosed a sanitized version of the subject report for reference purposes. For viewing clarity, color copies were made of the figure pages. The final page (a schedule) was removed from the report due to the sensitivity of the information appearing on the entire page.

Should you have any questions or require additional information, please contact me at (803) 259-2321, Extension 234.

Sincerely,

Carol A. Hamilton
DU Product Manager

Enclosure

cc: Mr. Dodd Hamlin, RAFB
File

Starmet CMI
P. O. Box 1366, 365 Metal Drive, Highway 80, Barnwell, SC 29812
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FAA License M6IR928J/JAA License JAA.4296

June 8, 2001

MEMORANDUM TO: Carol Hamilton
Starmet CMI, Inc.
365 Metal Drive
Barnwell, SC 29812

FROM: Sheryl Burrows
U.S. Nuclear Regulatory Commission
MS T9F31
Washington, DC 20555

SUBJECT: Request for final copy of report used as a reference in NUREG-1717

Ms. Hamilton,

Per our telephone conversation, I am requesting a final copy of the report titled, "Repair and Refurbishment of Aircraft Counterweights", which was prepared by your company for the Department of the Air Force, Robins Air Force Base. The reason for this request is that it is a reference used in a draft NUREG-1717, "Systematic Radiological Assessment of Exemptions for Source and Byproduct Materials", and therefore the Nuclear Regulatory Commission is required to make it publically available on our website when the NUREG is published. We anticipate a June 2001 publication date.

As we discussed, we will not use the draft version which contains pricing information that you do not wish to make available to the public. I would appreciate a clean copy of the final report with any sensitive or proprietary information blacked out. If you have any questions, I can be reached at (301) 415-6086.

Again, thank you for your help and responsiveness.

Respectfully,

Sheryl A. Burrows

Sheryl A. Burrows
Office of Nuclear Regulatory Research, RES
U.S. Nuclear Regulatory Commission

SCIENTIFIC AND TECHNICAL REPORT
CONDITION ASSESSMENT/COST ANALYSIS REPORT

REPAIR AND REFURBISHMENT OF C-141

AIRCRAFT COUNTERWEIGHTS

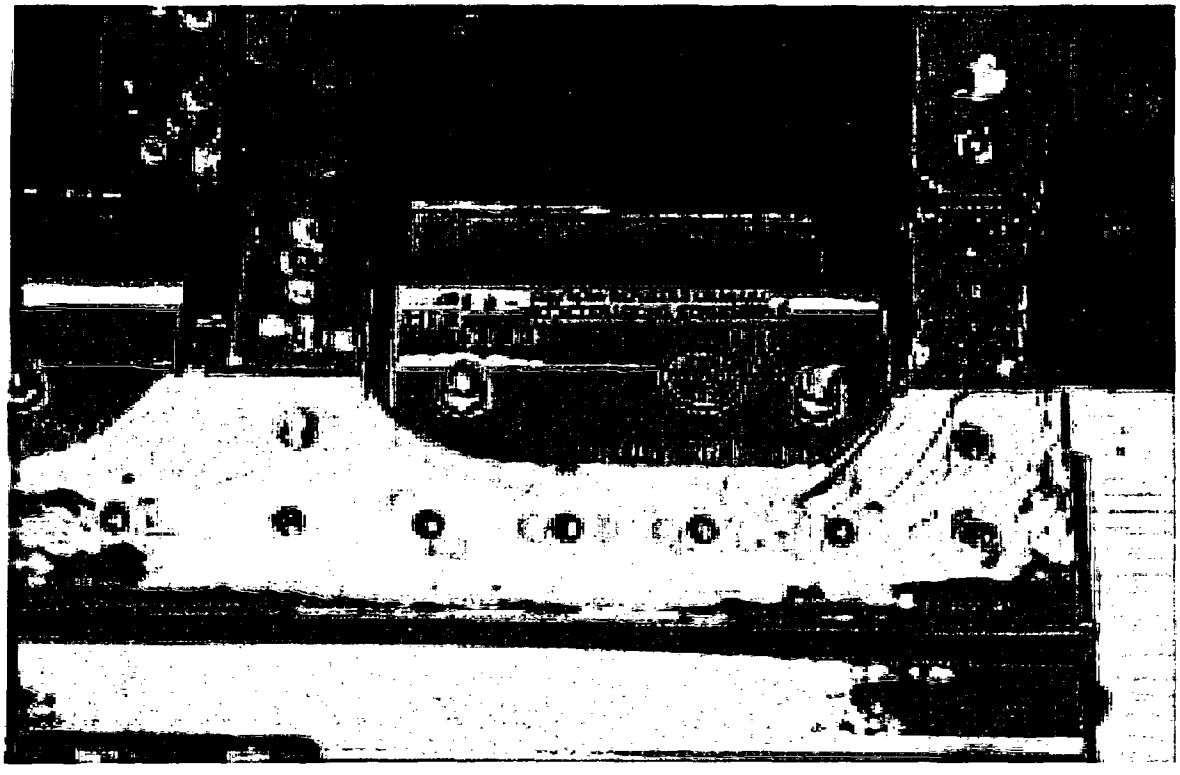
Contract No.: F09603-97-C-0435
Contract Data Items: 0003AA & 0003AB

Submitted To: *DEPARTMENT OF THE AIR FORCE*
ROBINS AIR FORCE BASE

Submitted By: *Starmet CMI*
P.O. Box 1366
365 Metal Drive, Highway 80
Barnwell, SC 29812

Department of the Air Force
Robins Air Force Base

Report: Repair and Refurbishment of C-141 Aircraft Counterweights



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1.0 Introduction

The C-141 aircraft located at Robins Air Force Base (RAFB) contain depleted uranium (DU) counterweights located in the elevator and aileron sections of the flight control surfaces. Through 20-30 years of operation, the depleted uranium counterweights have become severely corroded and have contaminated the interior surfaces of these wing sections with radioactive material. The radioactive contamination is in the form of depleted uranium oxide. Periodically, maintenance is required on the elevator sections and, therefore, maintenance personnel are required to open sections of the wing. When these sections of the wing are opened, maintenance personnel are exposed to the radioactive contamination and the potential exists to spread this contamination to the surrounding areas. This creates a health and safety concern to the workforce as well as a contamination control concern for the owners of the facilities. Decontamination of buildings and equipment can create a costly problem for the owners.

The commercial airlines typically refurbish their counterweights every 3-4 years. Counterweight refurbishment is a standard practice due to the health and safety, and contamination concerns mentioned above. Routine refurbishment also allows the repairman to inspect the integrity of the weight. In addition, the refurbishment process produces a superior product. The coatings that are applied restrict future corrosion of the uranium and help maintain the specified weight. In addition to these advantages, the practice of refurbishing the uranium counterweights is consistent with FAA requirements.

In order to minimize costs, minimize radiation exposure to their workforce, and avoid the spread of radioactive material in their maintenance areas, most airlines have contracted outside vendors to perform the uranium counterweight refurbishment. Starmet is currently refurbishing counterweights for many of the commercial airlines.

The Department of the Air Force contracted Starmet to refurbish depleted uranium counterweights on several flight control surfaces and provide a detailed report summarizing the work performed and associated pricing. The aileron and elevator sections of the aircraft were shipped intact to Starmet's facility in Barnwell, SC for refurbishment. Since Starmet is licensed to handle radioactive material, all of the required controls are in-place and the work is controlled to ensure personnel exposure is minimized and the depleted uranium oxide is removed from the wing sections, collected, stabilized, and shipped to an approved disposal facility. The primary goal of this work is to control the spread of contamination, minimize exposure to RAFB maintenance personnel, properly handle the disposition of the depleted uranium oxide contamination, and refurbish the counterweights to prevent future problems.

Starmet CMI successfully performed the refurbishment of the aileron and elevator sections as well as the depleted uranium counterweights. This technical report summarizes the steps performed during the refurbishment work and provides a detailed cost report.

2.0 Scope of Work

The scope of work is to provide cost and delivery information to disassemble, repair and reassemble counterweights on [redacted] flight control surfaces ([redacted] ailerons [redacted] elevators). In addition, cost data, including estimated cost to repair each remaining C-141 aircraft, is required. This work is in response to RFP number F09603-97-R-30031 from the Department of the Air Force WRALC/LJK.

Additional requirements written in the inquiry are listed below. This list includes the referenced section of the inquiry and specific requirements of the Statement of Objectives:

Section 1.3) Background

Some depleted uranium counterweights have excessive corrosion problems that would pose potential health concerns with maintenance personnel working with and around the contaminated weights.

Section 1.4) Purpose

To develop and document the process of refurbishing the depleted uranium counterweights located on the aileron and elevator flight control surfaces. This task will provide WR-ALC/LJ with [redacted] complete sets of refurbished depleted uranium counterweights to serve as prototype exhibits. This will restore the counterweights to their original condition and prevent potential health hazards from arising. The prototype exhibits will establish the standard for future depleted uranium counterweight rework.

Section 3.1.b) Requirements

Repair depleted uranium counterweights as required to comply with drawings listed in paragraph 2.0 and with EPA requirements.

Section 3.1.c) Requirements

Install refurbished depleted uranium counterweights on control surface in accordance with I.O. 1C-141B-4-2. The maximum number of depleted uranium strip balance weights [redacted] per shipment) shall be installed on elevator control surface regardless of the number installed when delivered to contractor's facility.

Section 3.3) Requirements

The contractor shall estimate the cost required to repair the depleted uranium counterweights for each remaining C-141 aircraft and provide a cost analysis.

Section 3.4) Requirements

The contractor shall document all efforts performed in paragraphs 3.1/3.2 and provide to the government a technical report detailing all procedures. The contractor data requirement list shall include as part of the technical report two subtitles (1) Condition Assessment and (2) Cost Analysis Report.

3.0 Condition Assessment

This technical report summarizes the steps performed during refurbishment of the depleted uranium counterweights located on the aileron and elevator flight control surfaces of the C-141 aircraft. A detailed description of the tasks performed is provided in the following subsections:

3.1 Project Planning

3.2 Unpacking

3.3 Disassembly

3.4 Counterweight Refurbishment

3.5 Re-assembly

[redacted] elevator and [redacted] aileron flight control surfaces were shipped to Starmet CMI and successfully refurbished. A detailed schedule was not developed due to unknown conditions of the flight control surfaces. However, using the data gathered during this demonstration, a detailed schedule was developed for refurbishment of future flight control sets.

All work at Starmet CMI is performed under South Carolina Radioactive Materials License No. 322 and in accordance with applicable regulations, procedures and work instructions.

3.1 Project Planning

A contract to perform the scope of work listed in Section 2.0 was received on [redacted] 1997. Following contract award, Starmet personnel began reviewing the project requirements and developing detailed questions to be addressed during the Robins Air Force Base visit.

On [redacted] Starmet personnel traveled to RAFB and met with Robins Air Force Base personnel. During the visit, the flight control surfaces were inspected and the Balance Technician was questioned about specific removal and assembly operations. Information collected during the site visit was used to develop a list of required tools and supplies. These tools and supplies were procured once Starmet personnel returned from the site visit.

3.2 Unpacking

The [redacted] elevator flight control surfaces were shipped to Starmet CMI via a commercial freight carrier. The shipment was received on [redacted] 1997. Starmet had difficulty removing the crates from the trailer. In the future, if commercial freight carriers are used, a maximum of [redacted] crates should be carried on a single trailer. Once offloaded from the trailer, the crates were moved inside the Starmet CMI facility and staged for inspection and unloading.

The [redacted] aileron flight control surfaces were shipped to Starmet CMI on a lowboy trailer. The shipment arrived on [redacted] 1997. The crates were moved inside the Starmet CMI facility and staged for inspection and unloading. This shipment also presented a problem in offloading because the lowboy trailer was not compatible with the receiving dock. It is recommended that lowboy trailers not be used in the future and only [redacted] crates should be placed in each enclosed transport trailer.

Prior to removing the flight control surfaces, four (4) wheel dollies are placed under each crate to enable the boxes to be easily moved while inside Starmet CMI's facility. The crates are then positioned under a hoist for unloading. The hoist was specifically designed with a spreader lifting bar to enable the flight control surfaces to be removed without damaging the units. The bolts/nails are removed from the top lid and side panel of each crate. The crane is then used to remove the lid from the crate. Once the lid is removed, the flight control unit is strapped to the lifting bar and removed from the crate using the crane. While suspended, the crate is rolled away and a worktable is rolled under the flight control unit. The flight control unit is then lowered onto the worktable and the hoist is disconnected. Any other parts located in the crates are also removed and placed on the worktable.

The worktable is then transported to the disassembly area and an inspection is performed to document any unusual conditions, note any damaged parts, and make a list of missing parts. The table, flight control unit and any other parts are labeled with the same unique identification number. The identification number will facilitate tracking during the refurbishment process. The flight control surfaces are now ready for disassembly.

It was noted that one of the flight control surfaces was damaged prior to arrival at Starmet CMI. Metal was disfigured and some of the paint was scraped from the exterior surfaces. The damage is shown on photographs provided as Figure 1 and Figure 2. The damage to the flight control surfaces was probably due to uncontrolled movement of the flight control surfaces while inside the crate. If so, this can be prevented in the future by properly securing the item inside the crate.

3.3 Disassembly

Depleted uranium counterweights are removed from the flight control surfaces by removing the bolts and/or screws. Some counterweights are located inside covers. For these counterweights, the covers must first be removed. Broken or sheared bolts/ screws are removed from the counterweight or housing by being drilled out or pressed out. Care is taken when removing the counterweights to prevent the spread of depleted uranium oxide contamination. Photographs of the counterweights following removal from the [redacted] elevator sections of the flight control surfaces are provided as Figure 3, Figure 4, Figure 5, and Figure 6.

Following removal of all counterweights, the surfaces of the flight control unit are vacuumed to remove any loose depleted uranium oxide. Following removal of loose oxide, the covers, inside bays and other accessible surfaces are wiped down to decontaminate the flight control surfaces. The accessible surfaces are decontaminated to the release limits for unrestricted use as specified in Regulatory Guide 1.86. Since the contamination levels cannot be monitored in the inaccessible areas, Starmet CMI cannot ensure that these areas meet free-release criteria for unrestricted use. Figure 7 shows the cover of one of the elevator sections prior to being removed. Figure 8 shows the amount and extent of depleted uranium oxide contamination in each elevator following counterweight removal.

The following discrepancies were noted on the received flight control surfaces:

1. The TO 1C-141B-4-2 indicates one (1) of P/N 3T53066-105 per assembly. Three (3) were found as indicated in the diagram. In addition, the diagram incorrectly shows the positions of P/N 3T53066-105 and 3T53066-101.
2. The TO 1C-141B-4-2 indicates two (2) of P/N 3T53070-103 per assembly. Three (3) were found as indicated in the diagram.
3. The TO 1C-141B-4-2 does not indicate inboard strip balance weights in bay eight (8) of the elevator. Three (3) were found per assembly with P/N 3T53067-101. One (1) inboard strip balance weight was damaged.
4. Five (5) defective counterweights were found with P/N 3T53066-107.
5. Two (2) counterweights were missing.

Items 1 and 2 must be addressed by RAFB. The TO 1C-141B-4-2 should be modified by RAFB to reflect the actual number of counterweights. In addition, the diagram for Item 1 should be modified to reflect the correct position of P/N 3T53066-105 and 3T53066-101.

Item 3 requires modification of the TO 1C-141B-4-2 and fabrication of a new counterweight to replace the damaged strip balance weight. The TO 1C-141B-4-2 should be modified by RAFB to reflect the inboard strip balance weights. Starmet replaced the damaged inboard strip balance weight with a new counterweight. Starmet manufactured one (1) inboard strip weight as needed for bay eight (8) using recycled depleted uranium.

For Item 4, Starmet repaired the defective counterweights. In addition to the defective counterweights, Starmet could not place a chamfer in the base of the counter bore of the inboard counterweight on one (1) of the five (5) defective counterweights, P/N 3T53066-107. Starmet submitted a deviation/waver from the specifications for RAFB approval. Following fabrication, the counterweight was inspected, assigned a unique tracking number and sent for refurbishment in accordance with Section 3.4.

As indicated in Item 5, two (2) inboard counterweights were missing from CMI 1 or elevator number 1560.00.128.9001, counterweight part numbers 3T53070-101 and 3T53064-101. Starmet replaced the missing pieces by manufacturing new counterweights using drawings provided by RAFB. The new counterweights were inspected, assigned a unique tracking number, and sent for refurbishment in accordance with Section 3.4. Starmet then fabricated the outboard strip weights as required by the SOW.

One of the interior counterweights was previously incorrectly installed by RAFB. Figure 9 provides a photograph of two (2) screws that were installed to connect the counterweight. Apparently, the weight was turned over and did not properly fit the original bolt hole locations. Therefore, RAFB personnel increased the bolt hole sizes and installed the counterweight upside down. Washers were used to cover the enlarged bolt hole locations. Following refurbishment, Starmet installed the counterweight in the correct position with washers. Starmet could not repair the enlarged bolt hole openings.

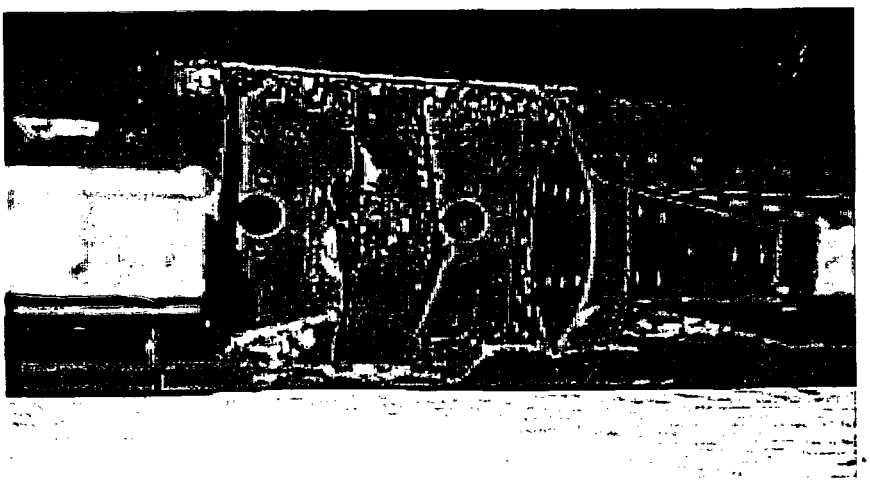


Figure 1, Metal Disfigured During Transport

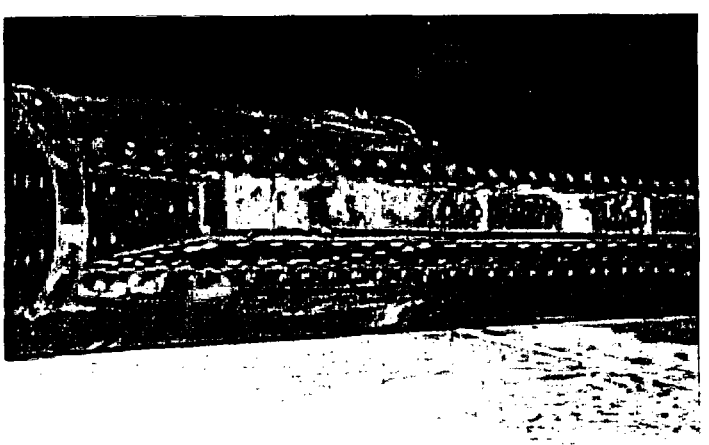
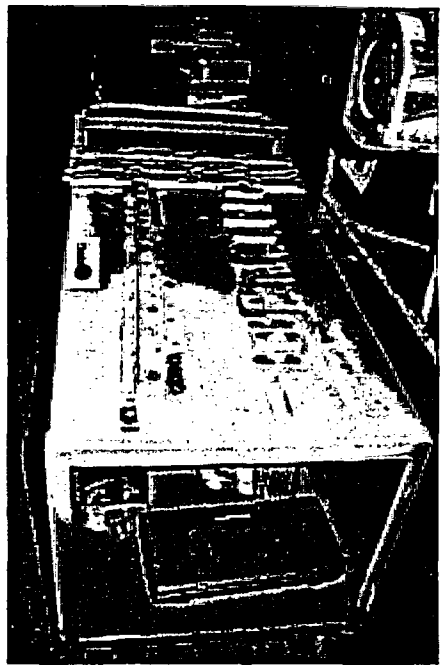


Figure 2, Paint Damaged During Transport

Figure 3, Counterweights Removed From Elevator



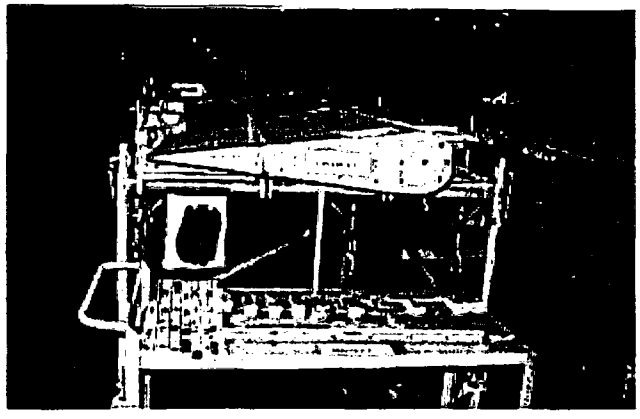
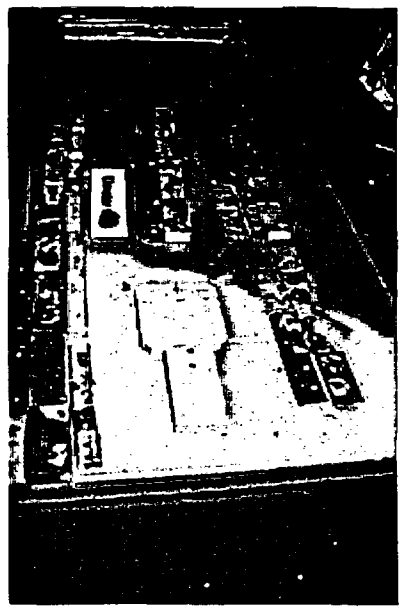


Figure 4, Counterweights Removed From Elevator



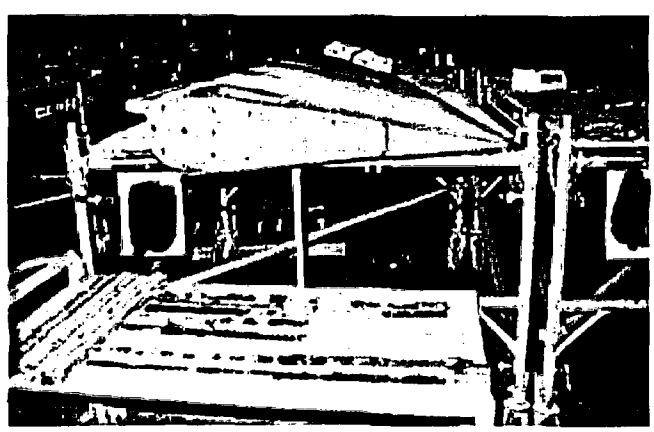
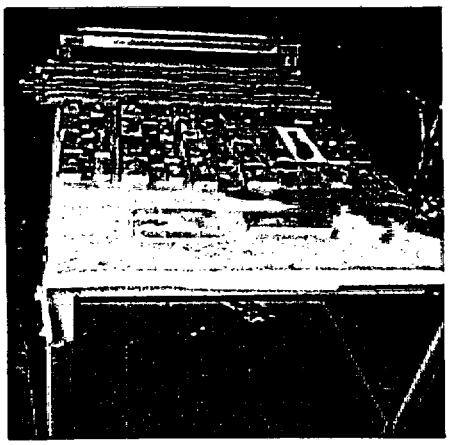


Figure 5, Counterweights Removed From Elevator



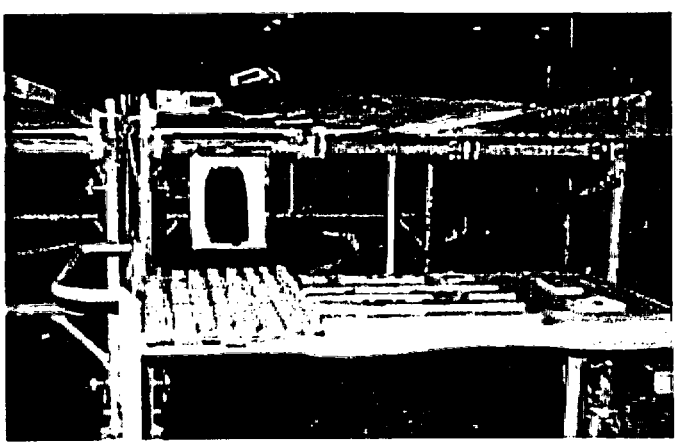
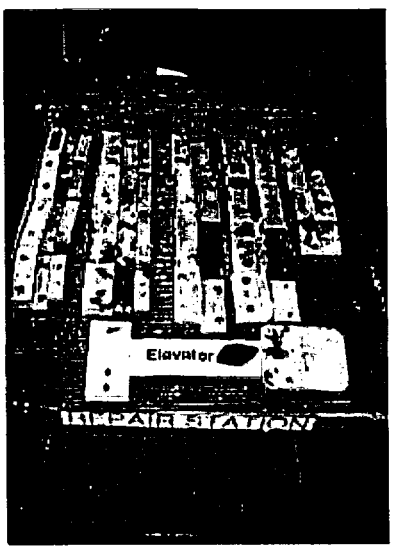


Figure 6, Counterweights Removed From Elevator



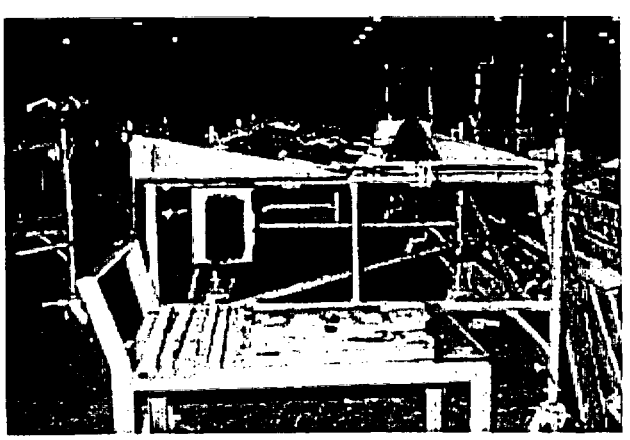


Figure 7, Elevator Cover Being Removed

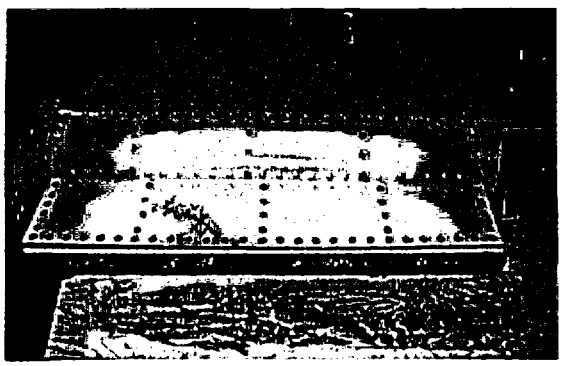


Figure 8, View of Elevator Interior
Following Cover Removal

3.4 Counterweight Refurbishment

Once the depleted uranium counterweights are removed from the flight control surfaces, they are ready to be refurbished. The first step in the refurbishment process is to remove any oxides or coatings from the counterweights. This is done by abrasive decontamination in a hooded and vented area followed by an acid etching process. Once the counterweights are clean, they are plated with a protective metallic layer. The counterweights are loaded into plating solutions and nickel and cadmium coatings are applied. Following the plating steps, the counterweights are flashed with chromate. Surface imperfections on the counterweights are then fared and detailed to create a smooth surface. The counterweights are then primed and painted. The final step is to label each counterweight with a unique identification number. Photographs showing the counterweights during installation are provided as Figures 10 through 13.

Following refurbishment, the counterweights undergo a series of inspections to ensure the counterweights meet the quality requirements. Dimensional, weight and surface quality are checked against the requirements to ensure compliance with the specifications. For this demonstration, all counterweights met the weight, surface quality, and dimensional specifications.

Starmet CMI performed the counterweight refurbishment in accordance with internal procedure number [redacted] Carolina Metals, Inc., Aircraft Ballast Plating Process Operating Manual. Starmet CMI is licensed by the Federal Aviation Administration (FAA) to perform refurbishment of depleted uranium and tungsten aircraft counterweights, License No. M61R928J.

3.5 Re-assembly

The exterior and strip weights are installed and secured for shipping purposes. RAFB personnel shall re-inspect and verify proper installation prior to reuse. Photographs are provided which show the condition of the counterweights during installation.

Once the depleted uranium counterweights are installed, the flight control surfaces are loaded into the transportation crates. The flight control surfaces are secured in the crate, the side panel and top lid of the crate are replaced and secured. The crate is ready for return shipment to RAFB.

Figure 9, Modified Bolt Hole Locations

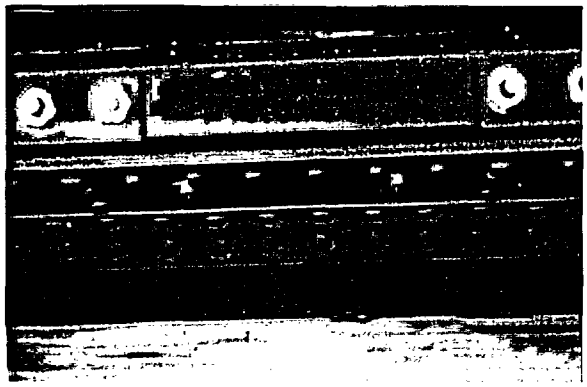


Figure 10, Re-Assembly of Counterweights

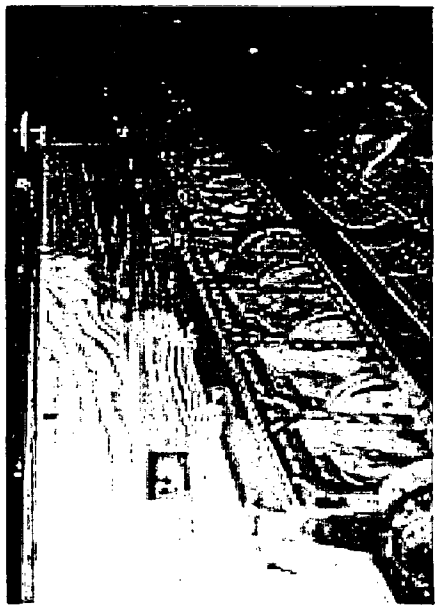
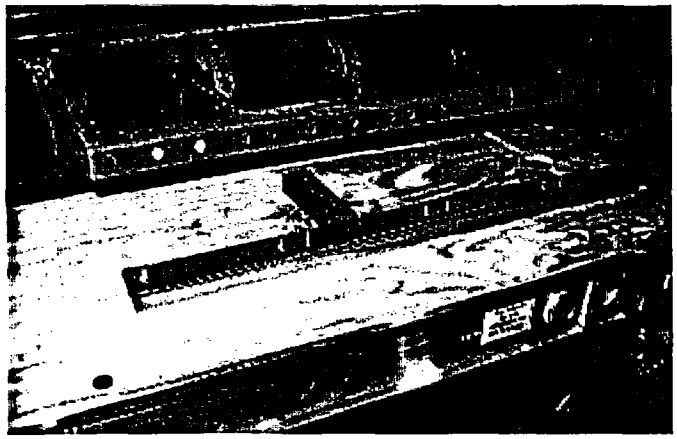


Figure 11, Photographs Taken During Installation of the Elevator Counterweights



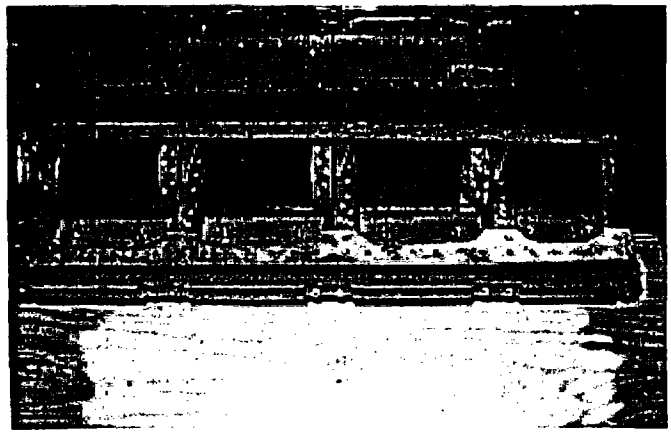


Figure 12, Closeup of Installed Elevator Counterweights

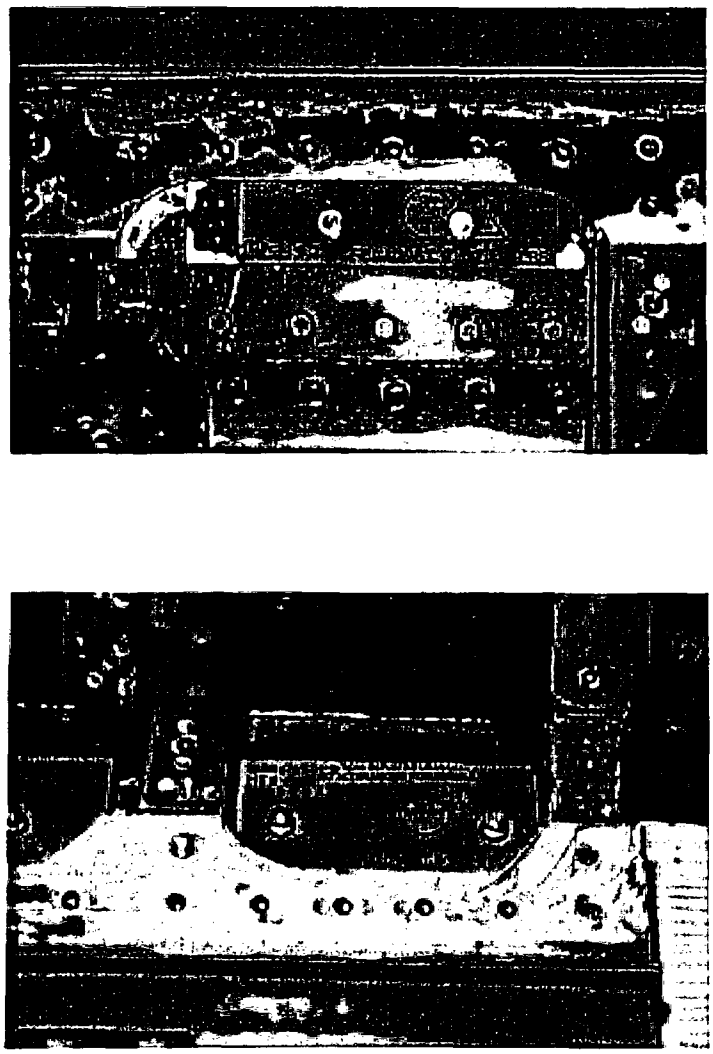
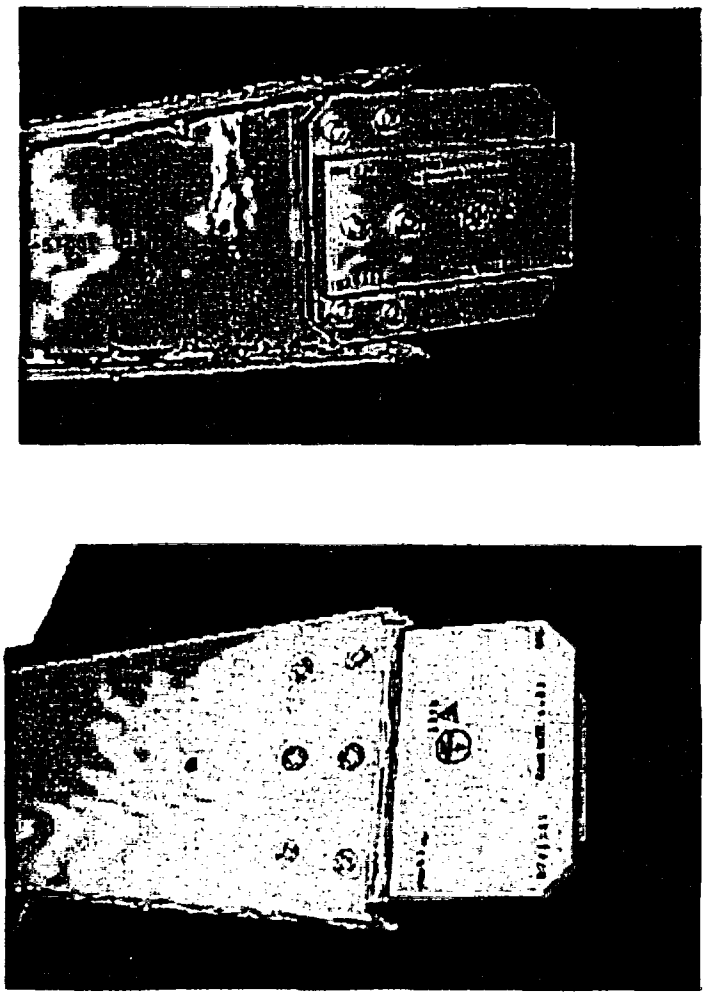


Figure 13, Photograph of Installed Counterwights on End of Flight Control Surface

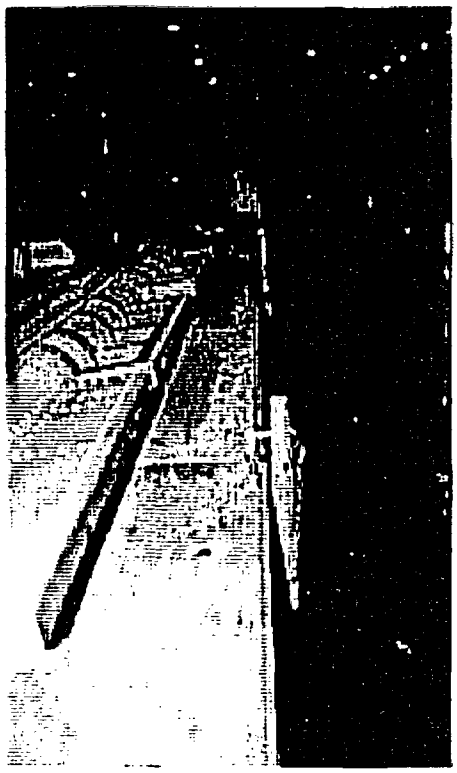


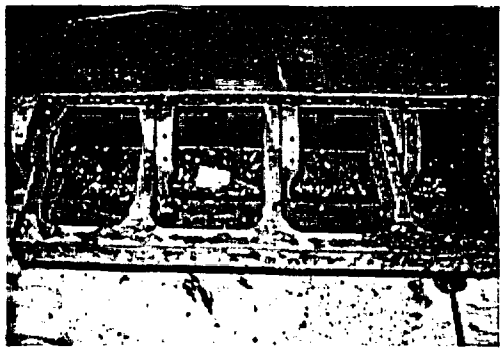
4.0 DU Contamination

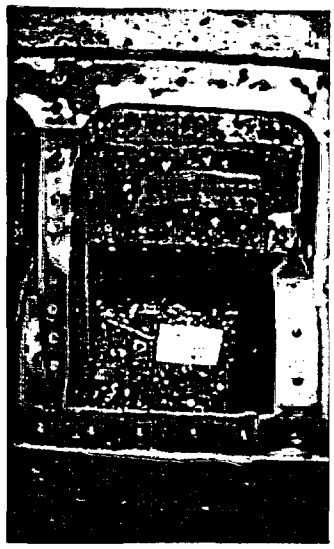
The RAFB flight control surfaces contained elevated levels of depleted uranium contamination. A detailed radiological survey is provided in Appendix B. As shown, the average alpha contamination is 62 times greater than the release limits for unrestricted use and 39 times greater than the release limit for beta/gamma contamination. The average contamination levels are 50 times greater than the release limits or roughly 10,000 dpm/100cm2. If a worker is exposed to 10,000 dpm/ 100cm2 average contamination level every workday without the proper personal protection, the radiation exposure could exceed the annual permissible radiological intake limits for occupational exposure. In addition, the intake levels equate to about 12 mg of uranium. This intake level is greater than the generally accepted weekly safe intake level for toxic effects of uranium. Photographs of the contamination are provided in Figure 14.

Routine refurbishment of DU counterweights greatly reduces the potential exposure to workers. Newly refurbished counterweights are not a handling problem for workers. As the C-141 weights continue to corrode, there is increasing potential that weights inside the flight control surface will need to be replaced, thereby increasing the frequency of cover removal. Removal of covers exposes the worker to DU oxides. During the refurbishment process, a cursory cleaning of the inside surfaces greatly reduces the amount of oxide present, thereby allowing workers access to these areas without concern. Refurbishment of weights also benefits the processing facilities by reducing the long term decontamination liability for Robins and other sites where the C-141 is housed and repaired.

Figure 14, Photographs Demonstrating the Extent of Contamination Present in the Elevators







5.0 Cost Analysis Report

This section provides detailed pricing for processing each flight set for RAFB. For the purpose of the price and schedule analysis, we have assumed at total of [redacted] aircraft. Should the overall number of aircraft needing weight refurbishment be somewhat less, i.e. [redacted] unit pricing would remain the same. A summary of the pricing for each flight set is provided in Table 1. As shown, the overall price for each flight set or aircraft is [redacted] Pricing for fabrication of missing or damaged counterweights will be provided as needed. However, based upon this demonstration, missing or damaged counterweights are not expected to impact the overall price by more that a few percent.

Table 1, Pricing Breakdown

Task	Price
Unpacking	[redacted]
Disassembly	[redacted]
Counterweight Refurbishment	[redacted]
Fabrication of Strip Weights	[redacted]
Re-assembly	[redacted]
Total	[redacted]

* Based upon building all strip weights during one run. Otherwise, a [redacted] increase in price must be added if several runs are required.

5.1 Unpacking

Unpacking of each flight set requires [redacted] man-hours. The price to unpack each flight set is [redacted]

5.2 Disassembly

Disassembly of each flight set requires [redacted] man-hours. In addition to the manpower, screws and bolts are replaced. The replacement cost for these materials equates to approximately [redacted] per flight set. The price to disassemble each flight set is [redacted]

5.3 Counterweight Refurbishment

Pricing for counterweight refurbishment is provided in accordance with Starmet's published price list. This price list is provided in Appendix B. The total price for each flight set is [redacted]

5.4 New Strip Weights

Pricing for fabrication of the strip weights for each flight set is [redacted] This price is based upon building all strip weights during one run. A [redacted] increase in price will be added if several runs are required.

5.5 Re-assembly

Re-assembly of each flight set requires [redacted] man hours. The price to re-assemble each flight set is [redacted]

5.6 Transportation

Proposal assumes that the government will provide transportation at not cost tot the government. If transportation needs to be arranged by Starmet CMI, it will be performed at cost plus a [redacted] markup.

6.0 Schedule

Starmet has developed a detailed schedule for startup and refurbishment of RAFB flight sets. The detailed schedule is provided in Appendix C. The schedule is based upon receiving the first flight set no later than [redacted] 1998. As shown, Starmet will begin by processing [redacted] flight set per month and work up to processing [redacted] flight sets per month until all of RAFB flight sets are refurbished. The entire C-141 fleet would therefore be refurbished by [redacted] 2003.

Appendix A

Contamination Survey of RAFB Elevators

CAROLINA METALS INC.

RADIATION / CONTAMINATION SURVEY

Date: 10-1-97 | Time: 1330 | Survey No. 26861

Surveyed By: JW ELLIOTT/ECHO | Dose: —

Location: DU BUILDING

Description of Survey: (Type and Reason)

CONTAMINATION SURVEY OF WARNER/ROBBINS ELEVATORS

Air Activity
µCi/cc α —
µCi/cc βγ —

BKG cpm α 3.8
βγ 24.8
Count Time Min. 1

Correction Factor α 3.8 βγ 2.35

Location or Item	Contamination Survey: Instrument Type	Instrument No.	Net cpm α	Net cpm βγ	dpm/100cm² α	dpm/100cm² βγ	Instrument Survey: γ (mrem/hr)	βγ (mrem/hr)	α dpm/100 cm²	Distance	Dose Rates: WB	Skin	Ext.
SMEARS	PENN				> 10	> 100							

Typical α — dpm/100 cm²
Maximum α 6223.84 dpm/100 cm²

Typical βγ — dpm/100 cm²
Maximum βγ 19813.33 dpm/100 cm²

No. Smears 49
Gen. Dose Rate — mrem/hr

Remarks:

100
over 62 Times
The Radiation
Limits for
contamination
alpha

500
over 39 Times
The Radiation
Limit for
contamination
beta/gama

average
50 Times
over the
Limits for
non Radiation
area

Classification	dpm/100 cm² α	dpm/100 cm² βγ
Clean Area	≤ 10	≤ 100
Unrestricted Area	> 10 ≤ 100	> 100 ≤ 500
Restricted Area	> 100 ≤ 5000	> 500 ≤ 25,000
High Contamination Area	> 5000	> 25,000
Radiation Area	> 5 mrem/hr	< 100 mrem/hr
High Radiation Area		> 100 mrem/hr
HP Supervisor		

HSEC-1

..K	TIME MIN	ALPHA COUNTS	BETA COUNTS	ALPHA CPM	BETA CPM	ALPHA DPM	BETA DPM	TOD-CLOCK HR:MN:SEC
[illegible]	0.50	12	83	20.20	141.20	77.69	362.05	14:14:28
[illegible]	0.50	21	146	36.36	267.20	146.92	685.12	14:15:09
[illegible]	0.50	10	108	16.16	191.20	62.30	490.25	14:15:49
[illegible]	0.50	[illegible]	95	24.24	165.20	131.53	423.58	14:16:30
[illegible]	0.50	[illegible]	238	48.20	445.20	185.38	1141.53	14:17:10
[illegible]	0.50	[illegible]	470	238.20	815.20	916.15	2346.66	14:17:51
[illegible]	0.50	[illegible]	101	62.20	175.20	239.23	454.35	14:18:32
[illegible]	0.50	[illegible]	142	90.10	259.20	346.92	664.61	14:19:12
[illegible]	0.50	[illegible]	211	152.20	427.20	585.38	1223.58	14:19:53
[illegible]	0.50	[illegible]	198	54.20	371.20	208.46	951.79	14:20:33
[illegible]	0.50	14	35	8.20	47.20	31.53	121.02	14:21:14
[illegible]	0.50	[illegible]	85	24.20	45.20	93.07	115.89	14:21:55
[illegible]	0.50	[illegible]	33	6.20	29.20	6.76	74.87	14:22:35
[illegible]	0.50	10	58	16.20	89.20	62.30	228.56	14:23:16
[illegible]	0.50	42	179	80.20	333.20	308.46	854.35	14:23:57
[illegible]	0.50	10	41	32.20	57.20	123.84	146.66	14:24:37
[illegible]	0.50	[illegible]	47	48.20	69.20	185.38	177.43	14:25:18
[illegible]	0.50	[illegible]	543	308.20	1061.20	1185.38	2721.02	14:25:58
[illegible]	0.50	[illegible]	1026	624.20	2027.20	2400.76	5197.94	14:26:39
[illegible]	0.50	[illegible]	1139	574.20	2253.20	2208.46	5777.42	14:27:20
[illegible]	0.50	[illegible]	3798	1618.20	7573.20	6223.84	19418.46	14:28:00
[illegible]	0.50	[illegible]	3876	1090.20	7727.20	4193.07	19813.33	14:28:41
[illegible]	0.50	[illegible]	108	38.20	131.20	146.92	490.25	14:29:22
[illegible]	0.50	[illegible]	349	226.20	673.20	870.00	1726.15	14:30:02
[illegible]	0.50	[illegible]	206	142.20	387.20	546.92	992.82	14:30:43
[illegible]	0.50	15	41	28.20	57.20	100.75	146.66	14:31:24
[illegible]	0.50	[illegible]	51	44.20	77.20	170.00	197.94	14:32:04
[illegible]	0.50	[illegible]	21	2.20	17.20	8.46	44.10	14:32:45
[illegible]	0.50	[illegible]	45	38.20	67.20	139.23	172.30	14:33:25
[illegible]	0.50	[illegible]	133	56.20	241.20	216.15	618.46	14:34:06
[illegible]	0.50	[illegible]	199	80.20	361.20	308.46	926.15	14:34:47
[illegible]	0.50	[illegible]	268	156.20	511.20	600.76	1310.76	14:35:27
[illegible]	0.50	[illegible]	313	144.20	601.20	554.61	1541.55	14:36:08
[illegible]	0.50	[illegible]	481	196.20	937.20	762.30	2403.67	14:36:49
[illegible]	0.50	[illegible]	31	20.20	37.20	77.69	95.38	14:37:29
[illegible]	0.50	[illegible]	66	48.20	107.20	185.38	274.87	14:38:10
[illegible]	0.50	[illegible]	72	52.20	119.20	200.76	305.64	14:38:50
[illegible]	0.50	[illegible]	20	6.20	15.20	23.84	38.97	14:39:31
[illegible]	0.50	[illegible]	108	56.20	191.20	216.15	490.25	14:40:12
[illegible]	0.50	[illegible]	59	20.20	93.20	77.69	238.97	14:40:52
[illegible]	0.50	[illegible]	69	50.20	113.20	193.07	290.25	14:41:33
[illegible]	0.50	[illegible]	86	56.20	147.20	216.15	377.43	14:42:13
[illegible]	0.50	[illegible]	167	130.20	309.20	500.76	792.82	14:42:54
74	0.50	[illegible]	174	114.20	323.20	439.23	828.71	14:43:35
75	0.50	70	342	135.20	659.20	523.84	1690.25	14:44:15
76	0.50	30	123	56.20	221.20	216.15	567.17	14:44:56
77	0.50	79	204	136.20	383.20	523.84	982.56	14:45:37
78	0.50	12	23	20.20	21.20	77.69	54.35	14:46:17
79	0.50	10	14	16.20	8.20	62.30	8.20	14:46:56

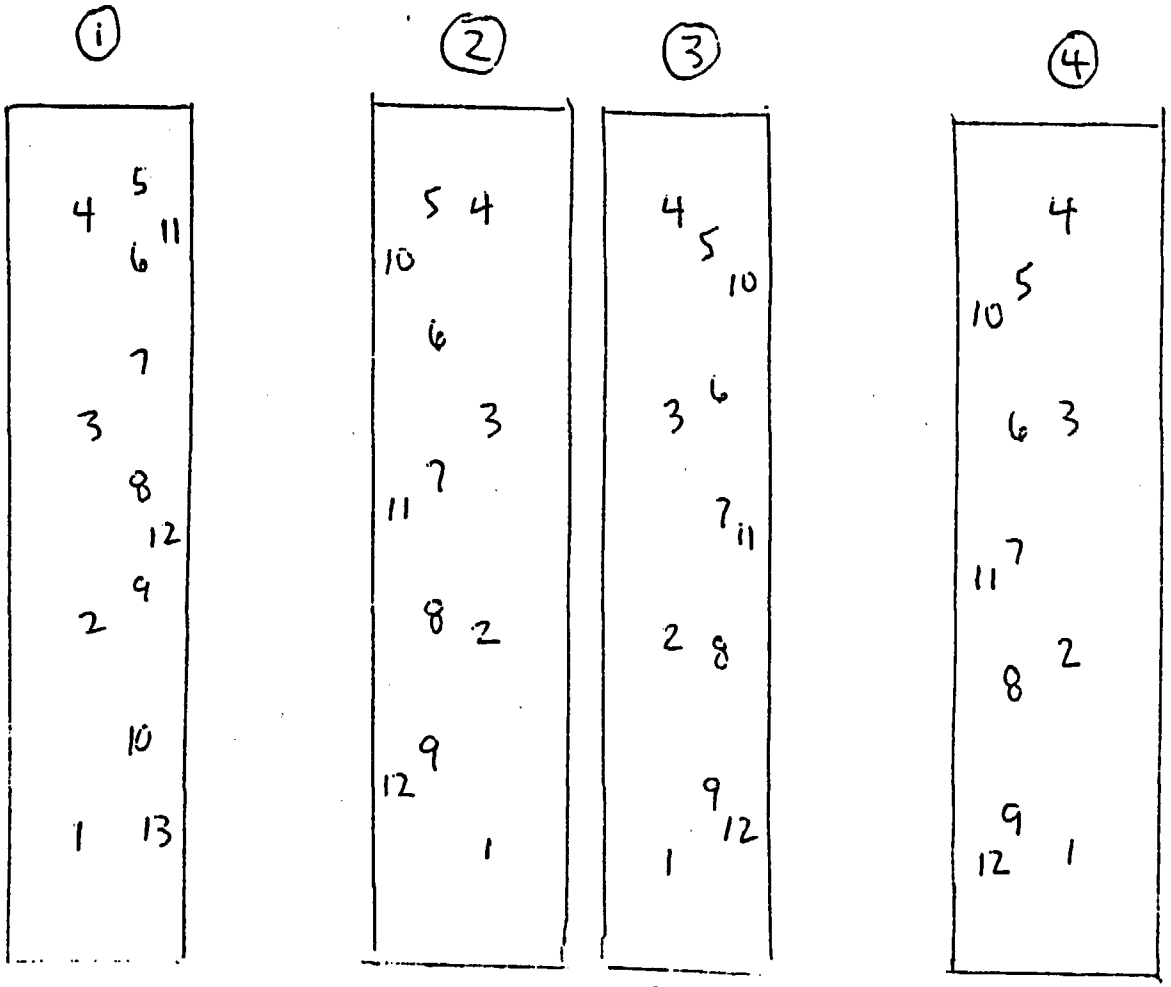
OPERATION COMPLETE

1-4
BAYS
5-10
TABLE
11-13

BAYS
5-9
TABLE
10-12

BAYS
5-9
TABLE
10-12

DU BUILDING



WING SURFACE
1-4
BAYS
5-10
TABLE
11-13

WING SURFACE
1-4
BAYS
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TABLE
10-12

WING SURFACE
1-4
BAYS
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TABLE
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Appendix B

Counterweight Refurbishment Standard Price List

C-141 AIRCRAFT
DEPLETED URANIUM (DU) COUNTERWEIGHTS
(Quantities are per Aircraft)

Part Number	Qty.	Cost (ea)	Cost (ot)	Weight (each) (lbs.)	Weight (ot) (lbs.)
3W34138-103	1	[redacted]	[redacted]	152	152
3W34138-104	1			152	152
3T53002-101	2			1.15	2.3
3T53002-103	2			0.89	1.78
3T53002-105	2			0.79	1.58
3T53003-101	2			1.1	2.2
3T53003-103	2			0.87	1.74
3T53003-105	2			0.78	1.56
3T53012-103	2			23.39	46.78
3T53013-101	2			6.25	12.5
3T53015-101	2			14.92	29.84
3T53024-101	2			0.94	1.88
3T53025-101	2			0.92	1.84
3T53034-101	2			14.45	28.9
3T53035-101	2			12.61	25.22
3T53037-101	4			10.52	42.08
3T53038-101	2			10.22	20.44
3T53040-101	2			21.13	42.26
3T53059-101	2			5.24	10.48
3T53060-101	6			0.77	4.62
3T53060-103	2			0.52	1.04
3T53061-101	1			3.15	3.15
3T53061-102	1			3.15	3.15
3T53062-101	3			4.69	14.07
3T53062-102	3			4.69	14.07
3T53063-101	2			3.1	6.2
3T53063-103	4			3.78	15.12
3T53063-105	2			3.05	6.1
3T53064-101	2			3.64	7.28
3T53064-103	6			4.85	29.1
3T53065-101	2			2.65	5.3
3T53065-103	4			3.32	13.28
3T53065-105	2			3.15	6.3
3T53066-101	2			1.11	2.22
3T53066-103	2			0.98	1.96
3T53066-105	4			0.8	3.2
3T53066-107	4			1.06	4.24
3T53068-101	6			0.34	2.04
3T53068-103	2			0.23	0.46
3T53069-101	2			0.33	0.66
3T53069-103	4			0.38	1.52
3T53069-105	2			0.31	0.62
3T53070-101	2			0.18	0.36
3T53070-103	4			0.24	0.96
3T53071-101	2			0.14	0.28
3T53071-103	4			0.17	0.68
3T53071-105	2			0.16	0.32
TOTAL					725.68

Appendix C

Schedule for Refurbishment of RAFB Flight Sets

Schedule (one page) removed due to sensitivity of information