RI - DNMS Licensee Event Report
Disposition

Licensee: FAA

Event Description: Loss of 5 Photographic Film Static Eliminator bars

License No: ~~[illegible]~~ | Docket No: 9999001 | MLER-RI: 2006-018

Event Date: 2/22/06 | Report Date: 2-23-06 | HQ Ops Event #: 42369

1. REPORTING REQUIREMENT

- [ ] 10 CFR 20.1906 Package Contamination
- [X] 10 CFR 20.2201 Theft or Loss
- [ ] 10 CFR 20.2203 30 Day Report
- [ ] Other
- [ ] 10 CFR 30.50 Report
- [ ] 10 CFR 35.3045 Medical Event
- [ ] License Condition

2. REGION I RESPONSE

- [ ] Immediate Site Inspection — Inspector/Date
- [ ] Special Inspection — Inspector/Date
- [ ] Telephone Inquiry — Inspector/Date
- [X] Preliminary Notification/Report
- [X] Information Entered in RI Log
- [ ] Report Referred To:
- [ ] Daily Report
- [ ] Review at Next Inspection

3. REPORT EVALUATION

- [X] Description of Event
- [X] Levels of RAM Involved
- [X] Cause of Event
- [X] Corrective Actions
- [ ] Calculations Adequate
- [ ] Additional Information Requested from Licensee

4. MANAGEMENT DIRECTIVE 8.3 EVALUATION

- [ ] Release w/Exposure > Limits
- [ ] Repeated Inadequate Control
- [ ] Exposure 5x Limits
- [ ] Potential Fatality
- [ ] Deliberate Misuse w/Exposure > Limits
- [ ] Pkging Failure>10 rads/hr or Contamination>1000x Limits
- [ ] Large# Indivs w/Exp>Limits or Medical Deterministic Effects
- [ ] Unique Circumstances or Safeguards Concerns

If any of the above are involved:

- [ ] Considered Need for IIT
- [ ] Considered Need for AIT

Decision/Made By/Date:

5. MANAGEMENT DIRECTIVE 8.10 EVALUATION (additional evaluation for medical events only)

- [ ] Timeliness - Inspection Meets Requirements (5 days for overdose / 10 days for underdose)
- [ ] Medical Consultant Used-Name of Consultant/Date of Report:
- [ ] Medical Consultant Determined Event Directly Contributed to Fatality
- [ ] Device Failure with Possible Adverse Generic Implications
- [ ] HQ or Contractor Support Required to Evaluate Consequences

6. SPECIAL INSTRUCTIONS OR COMMENTS

Special Inspection Conducted

- [ ] Non-Public
- [X] Public-SISP REVIEW COMPLETE

Inspector Signauture: [signature] Date: 6/6/06

Branch Chief Initials: [signature] Date: 6/7/06

Location of File: G:\Reference\Blank Forms\LER FORM.wpd

Rev. 02/25/05

U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of Air Traffic Organization

800 Independence Ave., SW.
Washington, DC 20591

May 12, 2006

Mr. George Pangburn, Director
Division of Nuclear Materials Safety
U.S. Nuclear Regulatory Commission, Region I
475 Allendale Road
King of Prussia, PA 19406

Dear Mr. Pangburn:

I am writing to convey to the Nuclear Regulatory Commission (NRC) the final actions taken by the Federal Aviation Administration (FAA), National Aeronautical Charting Group (NACG) to locate five (5) photographic film static eliminator bars containing a small quantity of Americium 241. I reported the missing bars to Mr. Arlon Costa at NRC Headquarters (301-816-5100) on February 23, 2006, Event Notification Number: 42369.

Status: Originally, NACG possessed nine (9) static eliminator bars produced by NRD LLC (company name) of Grand Island, New York. NACG apparently once used the bars on photo processing equipment to support the production of aeronautical charts. NRD confirmed that it had delivered nine (9) such bars of varied length to NACG in the early 1980s. {NACG was a U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA) organization until transferred to FAA in FY2000.} After an exhaustive search by NACG and DOC personnel on at least four different occasions over the last two months, only four (4) of the NRD static eliminator bars have been located, leaving five (5) unaccounted for.

NRD Static Eliminator Bar Information:

Serial No.	Radiation (mCi: milliCuries)	Bar Length	Disposition
SA2199	25.875 mCi	71"	Found at NACG/DOC; returned to NRD
SA2200	20.250 mCi	54"	Found at the Mostoller Landfill, PA; returned to NRD
SA2201	20.250 mCi	54"	Found at NACG/DOC; returned to NRD
SA2202	20.250 mCi	54"	Found at the Mostoller Landfill, PA; Returned to NRD
SA2203	20.250 mCi	54"	Missing
SA2204	18.000 mCi	48"	Missing
SA2205	18.000 mCi	48"	Missing
SA2206	6.750 mCi	18"	Missing
SA2207	6.750 mCi	18"	Missing

Background:

In early February 2006, an NACG employee working at the NACG printing facility in the basement of the U.S. DOC, Herbert C. Hoover Building (HCHB),Washington, D.C., discarded two NRD static eliminator bars (NRD bars) in the HCHB trash compactor. The serial numbers for the two bars are: SA2200 and SA2202. The employee was engaged in cleaning up NACG's workspace as part of NACG's relocation to a new printing and distribution facility. NACG had resided in HCHB since the 1930s.

NACG employees were using the HCHB trash compactor, also located in the basement of HCHB, as a primary receptacle for cleanup debris. At some point in early February, the two NRD bars were discarded in the trash compactor. On February 10, 2006, a DOC contractor transported the trash compactor contents, including the two NRD bars, to the Mostoller Landfill in Cambria County, Pennsylvania. Because Mostoller does not have a permit to receive radioactive waste, the landfill is equipped with a gate alarm to detect radioactive material entering the facility. Mostoller's radiological gate alarm was reportedly triggered when trash from the HCHB trash compactor entered the landfill.

Reacting to the alarm, Mostoller staff called Applied Health Physics (AHP), a local contractor, to separate the contractor's load from the HCHB trash compactor. Mostoller also asked AHP to identify and monitor the radioactive source, and decontaminate the site if necessary. AHP subsequently discovered that one of the NRD bars was bent/damaged. Additional survey work by AHP revealed that the two NRD bars had not contaminated any part of the landfill. Therefore, no decontamination of the landfill was required. AHP took possession of both static eliminator bars discovered at the landfill and coordinated with NACG to have the bars returned to NRD. NACG paid AHP for its landfill survey work and to ship the static eliminator bars (SA2200 and SA2202) to NRD. NRD accepted both static eliminator bars at no cost to NACG or AHP.

Mostoller also contacted the Pennsylvania Department of Environmental Quality and NRC. An investigation of the shipping box label and contact with NRD led NRC to contact DOC as the possible source of the bars. On February 14, 2006, senior DOC environmental and occupational safety and health (EOSH) personnel contacted NACG management about the Mostoller incident. Based on additional information on the shipping box label, NACG management then confirmed that NACG was the source of the NRD bars discovered entering the Mostoller Landfill. On February 17, I was designated as FAA's point-of-contact (POC) for coordinating all aspects of the agency's response to the discovery of the two NRD bars at the landfill. As of the date of this letter, I have participated in the coordination of, and have authorized payment for, all activities related to this issue as described below:

Activities:

1. During the period of February 17-24, 2006, notified NRC (Mr. Craig Gordon, Region I), FAA, DOC, Mostoller, and AHP senior personnel that I was FAA's POC for coordination and payment of services related to the NRD bars.
2. Reported the Mostoller Landfill incident to NRC Headquarters on February 23, 2006, as described above.
3. Coordinated with DOC EOSH officials to secure the services of the U.S Public Health Service, Federal Occupation Health Service (FOH). These services included: 1) multiple radiological contamination assessment surveys and technical reports associated with the NACG/DOC areas where the radiological bars had been stored; 2) survey and report of the HCHB trash compactor; 3) coordination to return to NRD the two static eliminator bars (SA2199 and SA2201) found in NACG's area at HCHB, which included "formal chain of custody correspondence;" and 4) final reports (enclosed).
4. Coordination with AHP to return to NRD the two static eliminator bars (SA2200 and SA2202) discovered entering the landfill. This has been completed, and NACG has paid AHP for this service.
5. Authorized payment to FOH for all services rendered, which included FOH radiological surveys, reports, and coordination of the return to NRD of the two static eliminator bars (SA2199 and SA2201) found at HCHB. The successful return of these two bars has been confirmed.
6. Apprised Mr. Gordon, NRC representative, almost daily of my activities related to this matter. Accepted Mr. Gordon's guidance in this matter.
7. Arranged for Mr. Gordon to visit NACG and HCHB on March 30, 2006, as part of NRC's ongoing investigation of NACG's static eliminator bars. Mr. Gordon observed the packing and removal from HCHB of the above referenced NRD bars (SA2199 and SA2201), performed a walk-through of the NACG area in HCHB, and held a meeting with FAA and DOC management and EOSH officials and FOH representatives. The purpose of the meeting was to provide Mr. Gordon the opportunity to review the findings of the FOH surveys and reports and to discuss what follow-on actions might be necessary.

Search Activities: As described above, NACG and DOC conducted exhaustive searches for the five (5) missing NRD bars (SA2203-07). These search activities included:

1. Separate and joint searches throughout NACG's area in HCHB. Because NACG has now totally vacated HCHB, the final searches were unencumbered by equipment, material, or debris.
2. The NACG printing manager found property records from the mid-1990s for photo processing equipment on which the NRD bars might have been installed. During the mid-1990s, this photo processing equipment, to which the NRD bars might have been installed, was excessed and replaced with new photo processors. The property records were shared with NOAA, whose property management office would have accepted the excessed photo processing equipment. Unfortunately, NOAA no longer has property records for the photo processing equipment NACG excessed during the

1990s. Nevertheless, I contacted Melissa Hartman, the past supervisor of the NACG Photo Branch, who was involved with replacing NACG's photo processing equipment in the mid-1990s. Ms. Hartman was unaware of whether or not any radiological equipment was installed on the excessed photo processors. NACG is still using the photo processors purchased by Ms. Hartman. These replacement photo processors do not use radiological static eliminator bars.

Conclusion:

1. Summary of FOH's Phase 2 – Americium 241 Radiological Health Assessment Project Revised Final Report of April 22, 2006:

"The (FOH) findings and results of all samples (instrument and swipe surveys) indicated that the printing plant facility, loading dock, trash compactor and storage closet Room B-911 were free of fixed and removable contamination and qualify for "Unrestricted Use" as specified by the Nuclear Regulatory Commission (NRC) regulations, standards, and guidelines."

"The results of the Radiological Health Safety Assessment indicate that radiation exposures to personnel are well below the guidelines, recommendations, and radiation standards of currently accepted various state, local, federal and national regulatory agencies and therefore do not pose or represent any health hazard or health risk at this time."

2. AHP found no contamination to any part of the Mostoller Landfill.
3. NACG has made every attempt to locate the five (5) missing NRD static eliminator bars. It is unlikely any of the missing NRD bars (SA2203, SA2204, SA2205, SA2206, and SA2207) will be located.

If you require additional information or action, please contact me at 301-713-2619.

Sincerely,

Terry M Laydon

Terry M. Laydon
Manager, National Aeronautical
Charting Group

Enclosure

DEPARTMENT OF HEALTH AND HUMAN SERVICES
PUBLIC HEALTH SERVICE
FEDERAL OCCUPATIONAL HEALTH

TELEPHONE 301-594-0260 FAX 301-594-4991
4550 Montgomery Avenue ● Suite 950 ● BETHESDA, MARYLAND 20814

ENCLOSURE

DATE: April 24, 2006

TO: Mr. Terry Laydon

AGENCY: FAA

PHONE: (301) 713-2619
FAX: (301) 713-4587

FROM: Mr. Kiel Fisher

TELEPHONE (301) 594-0250/0260 IMMEDIATELY IF RETRANSMISSION IS NECESSARY

2

NUMBER OF PAGES
(NOT INCLUDING COVER PAGE)

SUBJECT: Phase 3 formal chain of custody correspondence between 3M and Ecology Services, INC.
-This document is in the Phase 3 report that you have in your possession, this is the formal version.

If you have any questions or require additional information, please contact me by email or at (301) 594-9868.

Thanks.

ECOLOGY SERVICES, INC.

10220 Old Columbia Road
Columbia, MD 21046
1-800-932-7299
FAX (410) 381-2602

Ray-Safe Associates
Michael Terpilak
1916 Grayslake Drive
Silver Spring, MD 20906

Mr. Terpilak,

In regards to the Polonium 210 static eliminator bars. I contacted 3M in Austin, TX about the return of the bars. Mr. Jerry Gosselin responded with the following:

Dear Mr. Keck,

The discontinued products, 3M Static Eliminator Bars, contained radioactive Polonium-210 (Po-210), which decays rapidly to a nonradioactive form. The radioactive half-life is 138.4 days. The Po-210 activity in the maximum activity 3M static eliminator (168 millicuries in an 84 inch long Model 210 or 315 bar) will decay to 0.1 microcuries in 7.9 years from the date of manufacture. The Po-210 activity in the minimum activity 3M static eliminator (4 millicuries in a 2 inch long Model 210 bar) will decay to 0.1 microcuries in 5.9 years from the date of manufacture.

In accordance with the provisions of NRC regulations found in Title 10 of the Code of Federal Regulations, Part 30.18, any device containing less than 0.1 microcuries of Po-210 is exempt form licensing. Further in accordance with the provisions of NRC regulations found in Title 10 of the Code of Federal Regulations, Part 20.1905(a) a container containing less than 0.1 microcuries of P0-210 is exempt form labeling.

Since the 3M Static Eliminator Bars have not been manufactured since 1988 (approximately 18 years ago) any devices that you would have in your possession would have decayed to less than 0.1 microcuries almost ten years ago. At this point there are two options you can consider:

1. Dispose of the device(s) in conventional waste, making sure to completely remove or obscure any remaining radioactive material labels prior to disposal.
or
2. Contact 3M Corporate Health Physics Department (located in St. Paul, MN) to request information for the return of the devices to 3M.
Please contact one of the following personnel: Fred Entwistle 651-736-0740 or Rich Hedlund 651-736-4156

Best regards,
Jerry Gosselin
512-984-3149

3M
Electronic Solutions Division
Austin, TX
Technical Service
Static Group

I informed 3M in Austin, TX and Corporate Health Physics Dept. in St. Paul. MN of my plans to dispose of the bars as conventional waste and supplied them with the serial numbers for their records. Please let me know if any further response is necessary. Please forward this information to the appropriate agency.

Thank you for providing this opportunity to Ecology Services, Inc. We look forward to providing services to you in the future.

Sincerely,

Greg Keck

DEPARTMENT OF HEALTH & HUMAN SERVICES
PROGRAM SUPPORT CENTER
U.S. PUBLIC HEALTH SERVICES
FEDERAL OCCUPATIONAL HEALTH

MEMORANDUM

DATE: April 22, 2006

TO: Mr. Terry Laydon
Safety & Environmental Operations
Federal Aviation Administration

FROM: Mr. Bradley W. Christ
Senior Program Manager
Federal Occupational Health, U.S. Public Health Service

SUBJECT: Phase 3 - Americium 241 Static Eliminator Bar Transfer Project
Concise Summary Report STM # A105952, S117786, P118134

CC: Mr. Pete Wixted, DoC
Mr. Bradley W. Christ, FOH
Mr. Michael Terpilak, FOH

Federal Occupational Health (FOH) has completed the coordination of the Phase 3 - Americium 241 Static Eliminator Bar Transfer Project Federal Aviation Administration (FAA) facility located at 14th Street and Constitution Avenue in Washington, DC. The purpose of this project was to coordinate the transfer of 8 Static Eliminator Bars to their respective manufactures in accordance with all Nuclear Regulatory Commission (NRC) requirements and all local, state, federal regulations. The scope of this project included securing the services from a local licensed broker (Ecology Services, Inc.), to package and ship the following Static Eliminator Bars in accordance with Department of Transportation Regulations:

#	DESCRIPTION	SERIAL #	LOCATION
1	NRD Americium-241 Static Eliminator	SA2201	FAA Storage Closet B911
2	NRD Americium-241 Static Eliminator	SA2199	FAA Storage Closet B911
3	3M Polonium-210 Static Eliminator	3M-B00-860	FAA Storage Closet B911
4	3M Polonium-210 Static Eliminator	3M-B00-861	FAA Storage Closet B911
5	3M Polonium-210 Static Eliminator	3M-B00-862	FAA Storage Closet B911
6	3M Polonium-210 Static Eliminator	3M-B00-863	FAA Storage Closet B911
7	3M Polonium-210 Static Eliminator	3M-B00-864	FAA Storage Closet B911
8	3M Polonium-210 Static Eliminator	3M-B00-865	FAA Storage Closet B911

It should be noted that NRD and 3M hold the general NRC licenses for the distribution and sale of these Static Eliminator Bars and at no time were any of these Static Eliminator Bars ever licensed to the FAA or Department of Commerce.

Attached you will find a copy of the chain of custody form. Additionally, FOH has attached pictures depicting the packaging and shipping of the 8 static eliminator bars.

If you have any questions or additional comments please contact me via e-mail or phone (301) 594-4105.

ATTACHMENT A

Chain of Custody

NRD, LLC
2937 ALT BOULEVARD
PO BOX 310
GRAND ISLAND, NY
14072-0310

800-525-8076
716-773-7634
716-773-7744 FAX
service@nrdinc.com

Thursday, April 06, 2006

DEPT OF COMMERCE
14TH CONSTITUTION NW
WASHINGTON, DC 20230

ATTN: SAFETY MANAGER

We are in receipt of the item(s) returned to NRD, LLC for waste disposal.

This letter serves as Proof of Compliance that the device(s) listed below have been disposed, and the service performed under New York State License 1391-1811.

Device/Model	Qty	Serial #	To Serial#	Manufactured	NRD's Sales Order#
A-2003	1	SA2199		6/81	07653
A-2003	1	SA2201		6/81	07653

Isotope: Americium 241

Total Curies: 0.04607

Your Original Po #

NRD's Original Sales Order # 07653

Very truly yours,

Douglas Davis
Safety Officer

NRD, LLC
2937 ALT
PO BOX 310
GRAND ISLAND, NY
14072-0310

800-525-8076
716-773-7634
716-773-7744 FAX
service@nrdinc.com

Friday, March 10, 2006

APPLIED HEALTH PHYSICS INC
2986 INDUSTRIAL BLVD
BETHAL PARK, PA 15102

ATTN: SAFETY MANAGER

We are in receipt of the item(s) returned to NRD, LLC for waste disposal. This letter serves as Proof of Compliance that the device(s) listed below have been disposed, and the service performed under New York State License 1391-1811

Device/Model	Qty	Serial #	To Serial #	Manufactured	NRD's Sales Order #
A2003	1	SA2200		06-29-81	07653
A2003	1	SA2202		06-29-81	07653

These devices were originally distributed to U.S. Dept. of Commerce/NOAA.

Isotope:	Americium 241
Total Curies:	0.04050
Your Original Po #	
NRD's Original Sales Order	07653

Very truly yours,

Douglas Davis
Safety Officer

The following chain of custody is in e-mail format. This correspondence details the conversation between the licensed broker who removed the 3M Static Eliminator Bars and the manufacturer (3M). Please read the e-mail correspondences and please feel free to contact me with any questions or comments.

Frances Eddy

From: Greg Keck [gkeck@ecologyservices.com]
Sent: April 21, 2006 9:27 AM
To: michaelterpilak@speakeasy.net
Subject: Fwd: Fw: Arcat.com Lead for 3M Electronic Solutions Division, Static Control Products

Below is all the correspondence regarding the decayed Po-210 bars.
-----Original Message-----
From: Greg Keck [mailto:gkeck@ecologyservices.com]
Sent: Tuesday, April 4, 2006 04:06 PM
To: jtgosselin@mmm.com, gkeck@ecologyservices.com
Cc: ggkoss@mmm.com, john@arcat.com, fbentwistle@mmm.com
Subject: Re: Fw: Arcat.com Lead for 3M Electronic Solutions Division, Static Control Products

Thank you for your response. I will properly dispose of the bars as conventional waste. My main concern was any interest in tracking the serial numbers. Should anyone need them for records, they are listed here:

B00860	96mCi	9/14/79
B00861	96mCi	9/14/79
B00862	96mCi	9/14/79
B00863	96mCi	9/14/79
B00864	200mCi	9/14/78
B00865	36mCi	9/14/78

Thank you again.

Greg Keck
Ecology Services, Inc.
10220 Old Columbia Rd.
Columbia, MD 21046

office 410-381-2600
fax 410-381-2602

-----Original Message-----
From: jtgosselin@mmm.com [mailto:jtgosselin@mmm.com]
Sent: Monday, April 3, 2006 05:50 PM
To: gkeck@ecologyservices.com
Cc: ggkoss@mmm.com, john@arcat.com, fbentwistle@mmm.com
Subject: Re: Fw: Arcat.com Lead for 3M Electronic Solutions Division, Static Control Products

Dear Mr. Keck,

The discontinued products, 3M Static Eliminator Bars, contained radioactive Polonium-210 (Po-210), which decays rapidly to a nonradioactive form. The radioactive half-life is 138.4 days. The Po-210 activity in the maximum activity 3M static eliminator (168 millicuries in an 84 inch long Model 210

or 315 bar) will decay to 0.1 microcuries in 7.9 years from the date of manufacture. The Po-210 activity in the minimum activity 3M static eliminator (4 millicuries in a 2 inch long Model 210 bar) will decay to 0.1 microcuries in 5.9 years from the date of manufacture.

In accordance with the provisions of NRC regulations found in Title 10 of the Code of Federal Regulations, Part 30.18, any device containing less than 0.1 microcuries of Po-210 is exempt form licensing. Further in accordance with the provisions of NRC regulations found in Title 10 of the Code of Federal Regulations, Part 20.1905(a) a container containing less than 0.1 microcuries of P0-210 is exempt form labeling.

Since the 3M Static Eliminator Bars have not been manufactured since 1988 (approximately 18 years ago) any devices that you would have in your possession would have decayed to less than 0.1 microcuries almost ten years ago. At this point there are two options you can consider:

1. Dispose of the device(s) in conventional waste, making sure to completely remove or obscure any remaining radioactive material labels prior to disposal.
or
2. Contact 3M Corporate Health Physics Department (located in St. Paul, MN) to request information for the return of the devices to 3M.
Please contact one of the following personnel: Fred Entwistle 651-736-0740 or Rich Hedlund 651-736-4156

Best regards,
Jerry Gosselin
512-984-3149

3M
Electronic Solutions Division
Austin, TX
Technical Service
Static Group
Visit us at: http://www.3m.com/electronics

Gilbert G.
Koss/AT-Austin/3M
/US To
Jerry T.
04/03/06 11:05 AM Gosselin/AT-Austin/3M/US@3M-Corpora
te
cc

Subject
Fw: Arcat.com Lead for 3M
Electronic Solutions Division,

Static Control Products

Jerry, could you give the gentleman below some direction on how to return 6 old 3M static eliminator bars?

Gil Koss
Static Control Business Unit Manager
ggkoss@mmm.com
3M Electronic Solutions Division
Tel. 512-984-3108
Fax 512-984-6741

Visit us at http://www.3m.com/electronics
----- Forwarded by Gilbert G. Koss/AT-Austin/3M/US on 04/03/2006 11:04 AM -----

gkeck@ecologyserv ices.com
To
04/03/2006 10:24 AM ggkoss@mmm.com
cc
john@arcat.com
info@arcat.com
Subject
Arcat.com Lead for 3M Electronic Solutions Division, Static Control Products

Arcat e-mail lead for 3M Electronic Solutions Division, Static Control Products

From:
Company: Ecology Services, Inc.

Name: Greg Keck
Email: gkeck@ecologyservices.com
Phone: 410-381-2600
Address: 10220 Old Columbia Road
Columbia, MD 21046
Profession: contractor

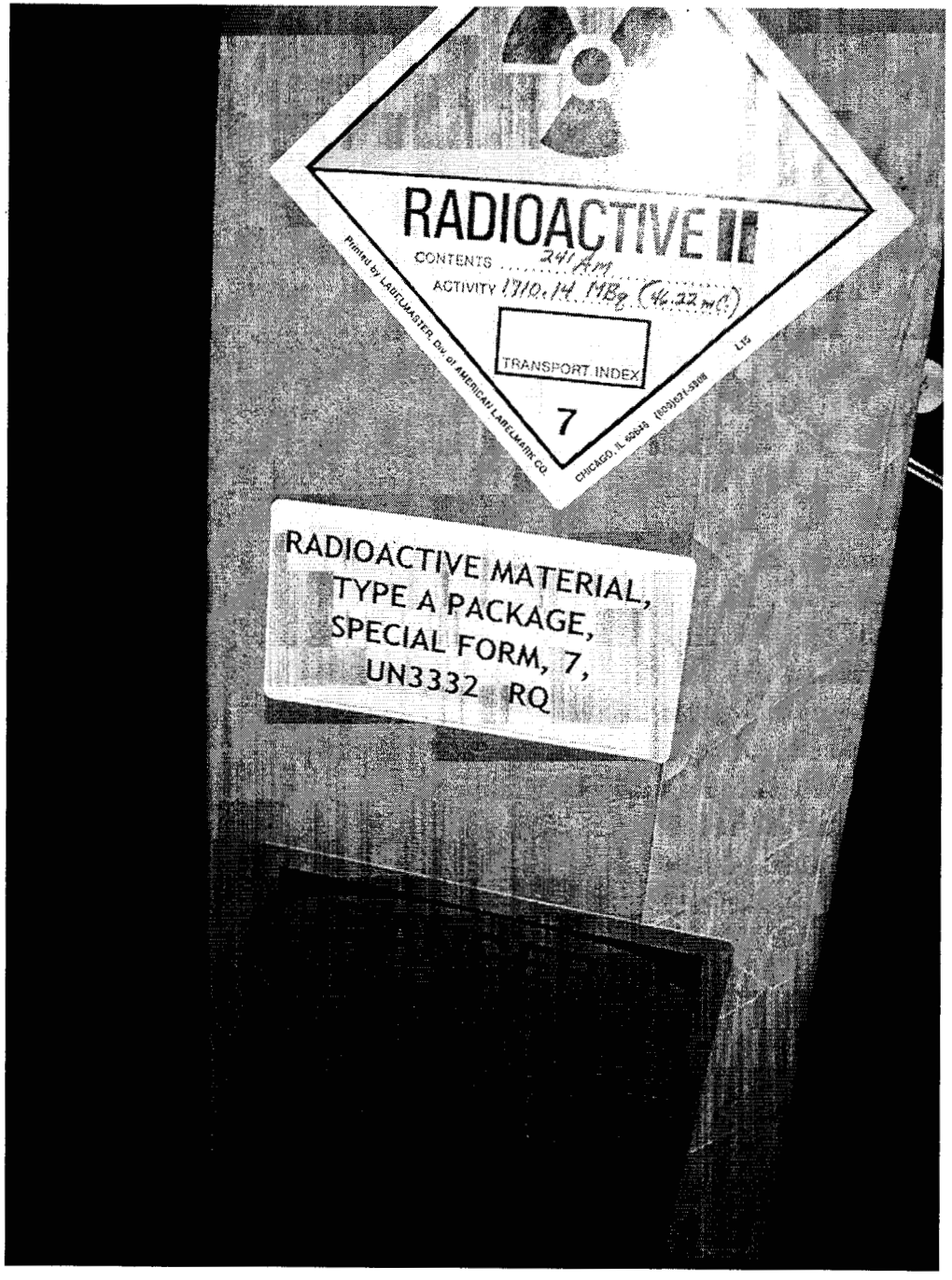
Request:
I am trying to return six 3M static eliminator bars from the Dept. of Commerce/NOAA. The original address for return is New Brighton, MN Twin Cities Army Ammunition Plant. They are no longer radioactive (Po-210 from 1979). Assistance would be appreciated. Thank you

ATTACHMENT B

Packaging Pictures


WEBRIL
WIPES


RADIOACTIVE II
7
RADIOACTIVE MATERIAL,
TYPE A PACKAGE,
SPECIAL FORM, 7,
UN3332 RQ
DANGER


RADIOACTIVE II
CONTENTS 241 Am
ACTIVITY 1710.14 MBq (46.22 mCi)
TRANSPORT INDEX
7
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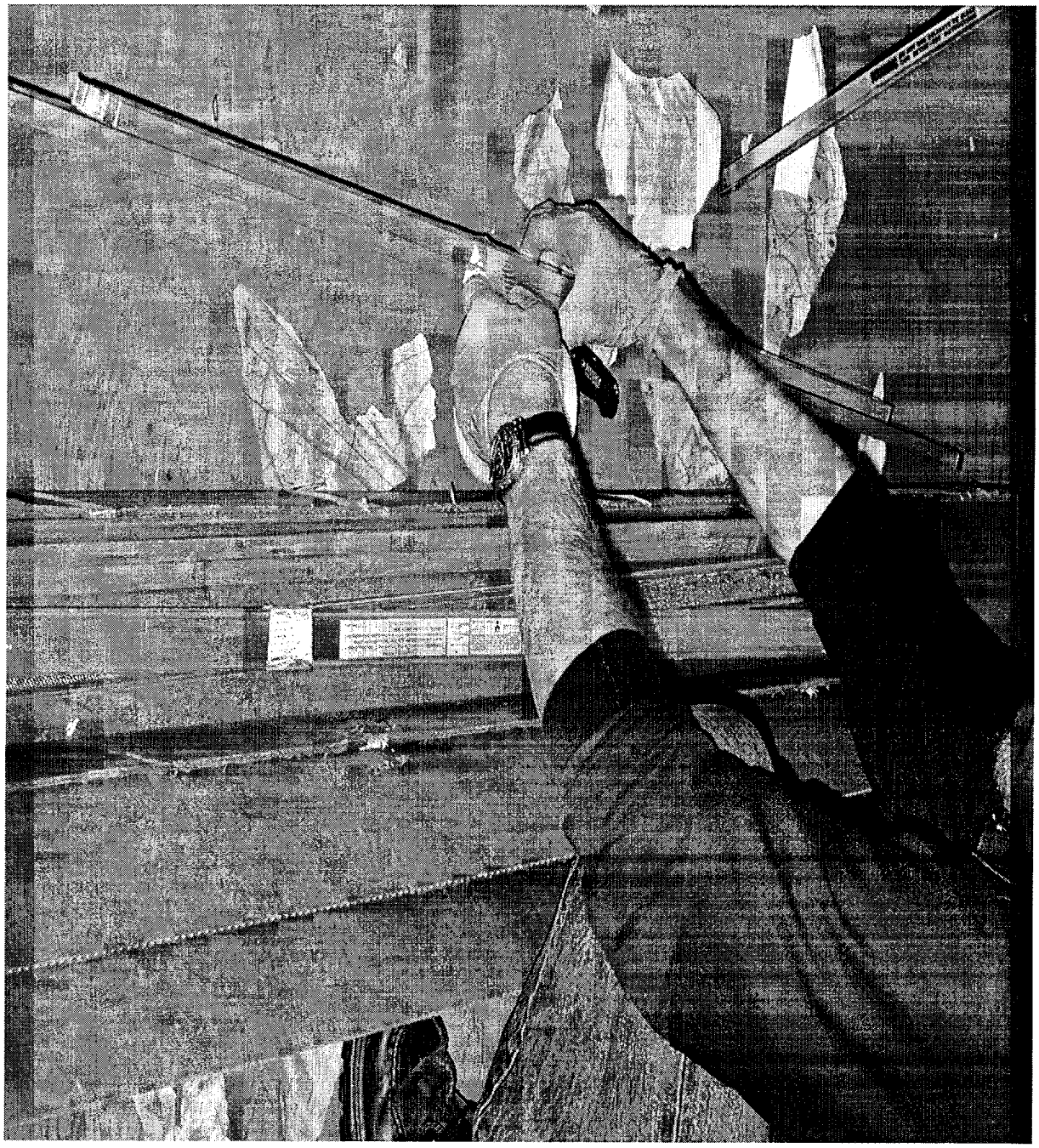
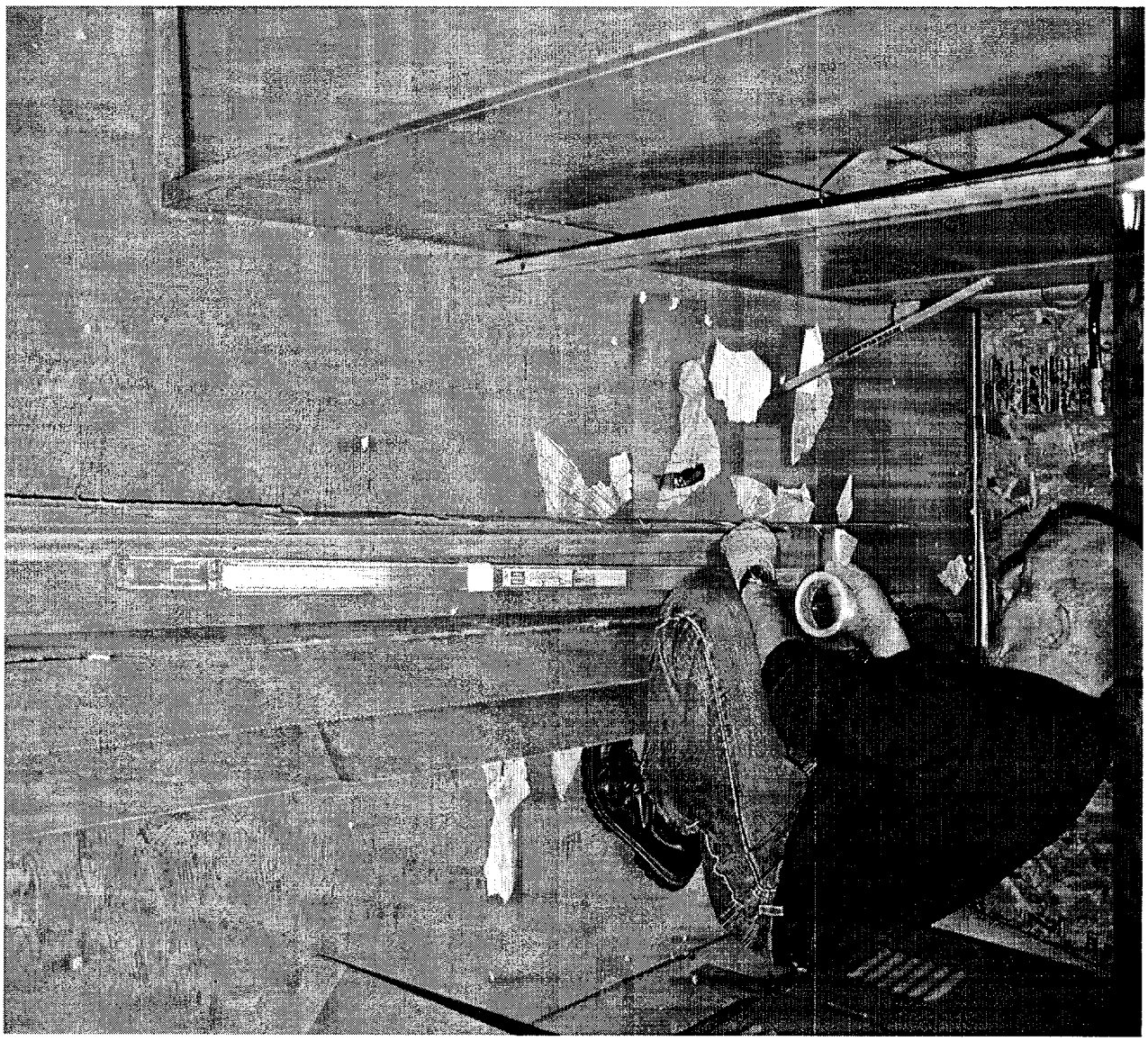
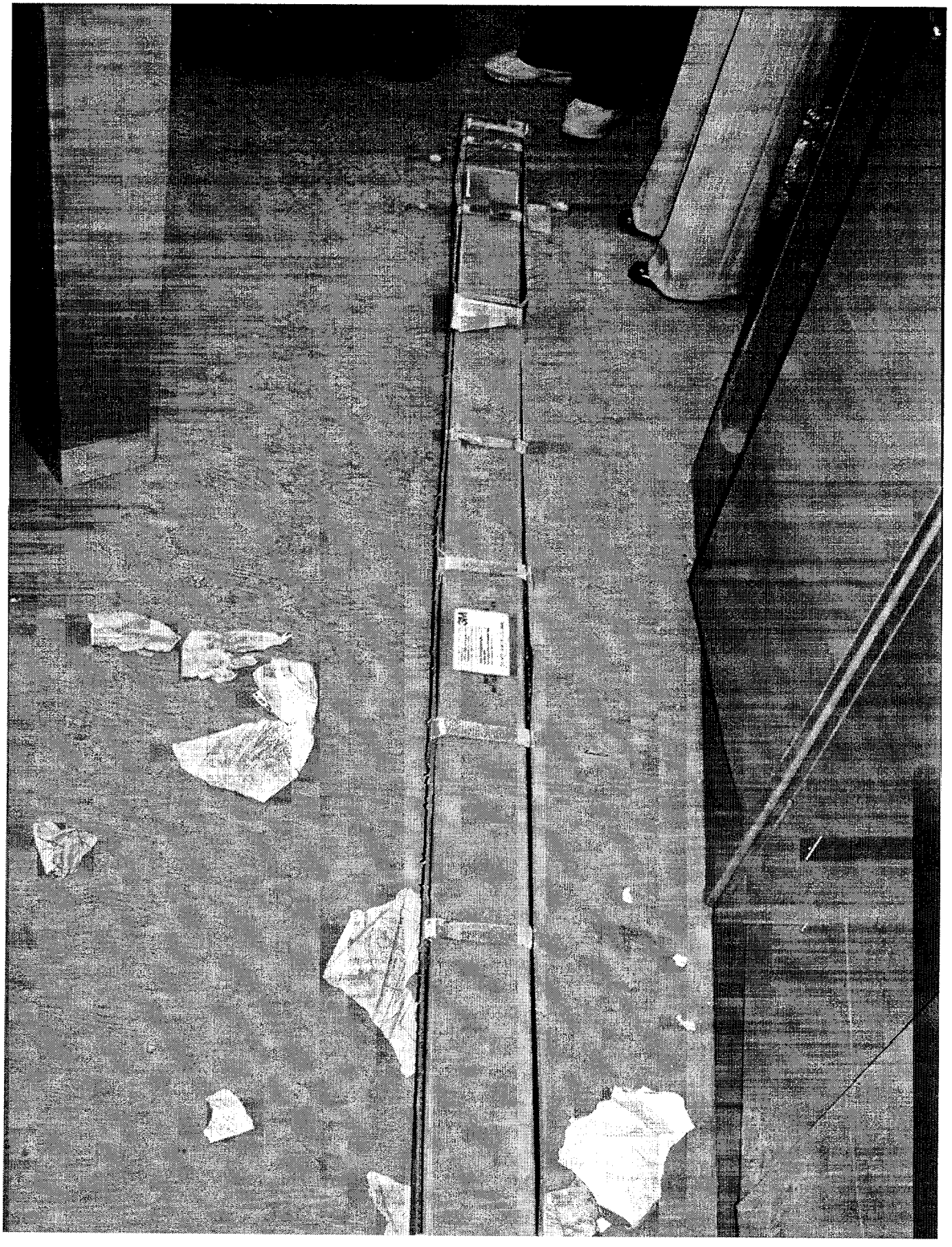
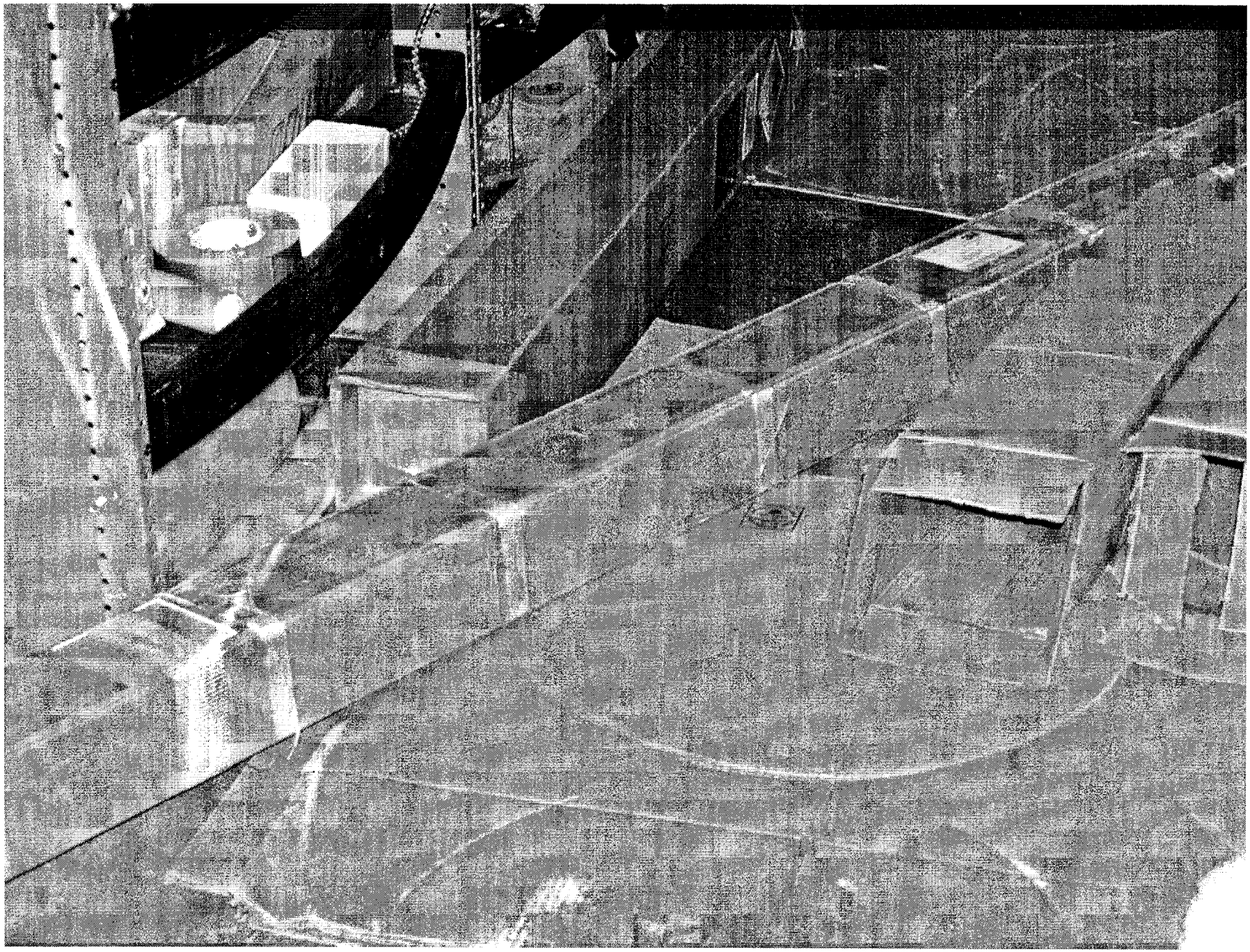
CHICAGO, IL 60646
RADIOACTIVE MATERIAL,
TYPE A PACKAGE,
SPECIAL FORM, 7,
UN3332 RQ









ATTACHMENT C

NRD Certificate for Type "A" Packing Tests

NRD LLC | 800-525-8076
2937 ALT BLVD. | 716-773-7634
PO BOX 310 | 716-773-7744 FAX
GRAND ISLAND, NY | e-mail: sales@nrdinc.com
14072-0310 | website: www.nrdinc.com

CERTIFICATE
FOR
TYPE "A" PACKAGING TESTS

This certifies that NRD shipping containers provided to Ecology Services Inc. Used for the following NRD manufactured models: A001/P001 foils and P2000/A2003 Static Elimination Instruments, are designed and fabricated in compliance with applicable DOT specifications and requirements.

To insure the integrity of this packaging, the containers and their containment are periodically subjected to a series of tests as prescribed by DOT 49 CFR and IAEA Safety Standards.

The results of these tests are satisfactory and demonstrate a high capability to withstand accident conditions in transportation.

Douglas M. Davis, Radiation Safety Officer

NRD, LLC

3·13·06

Date

NRD, LLC
2937 Alt Boulevard
Grand Island, NY 14072-1292

Test 11 – Pass

Packaging

- 1 P-2001 Nuclestat enclosed
- Nylon reinforced tape
- No staples at caps

Test Number	11
NRD Stock Code	Supplier Sample
Box Type	Aim 12725-box, 12726-end caps
Package size (width x depth x height)	5" x 5" x 50 ¾"
Content	1 P-2001, inactive
Weight (lb)	4
Vertically projected area (in.^{2})	253.75
Compressive load resumption (lb)	482.125

Test Description

Test Description	**Result**	**Observations**
Water spray test	Passed	No damage except box was wet
Free Drop Test	Passed	No observable damage
Penetration test	Passed	A dent was made on the penetration point
Stacking Test Comp load applied: 484 lb	Passed	The box was compressed to the height of the product

Product Inspection (6/10/04)

- The styrofoam was broken into pieces
- The Nuclestat was intact

Date of Test: 6/9/2004

Tested by: _____
Tze-Jan Lin
Engineering Intern
NRD, LLC

Reviewed by: _____
Doug Davis
Radiation Safety Officer
NRD, LLC

NRD, LLC
2937 Alt Boulevard
Grand Island, NY 14072-1292

Test 23 – Pass

Packaging

- Wraparound telescoping box with 1 nuclestat
- Hand stapled seamline
- 2 supporting pieces (Temple Inland sample #47798-3) of cardboard instead of styrofoam

Test Number	23
NRD Stock Code	Supplier Sample
Box Type	Temple Inland Tube, 275 psi burst strength
Package size (width x depth x height)	5 5/8" x 5 5/8" x 69" and 6 1/8" x 6 1/8" x 50"
Content	1 Nuclestat P-2001-060
Weight (lb)	6
Vertically projected area (in.^{2})	399
Compressive load resumption (lb)	758.1

Test Description

Test Description	Result	Observations
Water spray test	Passed	No damage except box was wet
Free Drop Test	Passed	No observable damage
Penetration test	Passed	A dent was made on the penetration point
Stacking Test Comp load applied: 760 lb	Passed	The box was compressed to the height of the product

Product Inspection (7/7/04)

- Product was intact

Date of Test: 7/6/2004

Tested by: _____
Tze-Jan Lin
Engineering Intern
NRD, LLC

Reviewed by: _____
Doug Davis
Radiation Safety Officer
NRD, LLC

ATTACHMENT D

U.S. Department of Transportation
Special Form Radioactive Materials

U.S. Department
of Transportation
**Research and
Special Programs
Administration**

400 Seventh St., S.W.
Washington, D.C. 20590

IAEA CERTIFICATE OF COMPETENT AUTHORITY
SPECIAL FORM RADIOACTIVE MATERIALS
CERTIFICATE NUMBER USA/0036/S, REVISION 7

This certifies that the source described has been demonstrated to meet the regulatory requirements for special form radioactive material as prescribed in the regulations of the International Atomic Energy Agency[1] and the United States of America[2] for the transport of radioactive materials.

1. Source Identification - NRD Model A-001.

2. Source Description - This Special Form material is a laminated metallic foil of silver, gold, and americium dioxide, as shown on NRD Inc. Drawing No. 92A071 (attached). The foil may be single or double. The single foil consists of successive layers of plating, gold, Am-241 and gold, gold, silver, and flash plating for identification. In the double foil the flash plating is replaced by gold, Am-241 and gold, gold, and plating. The plating is yellow gold, white gold, or palladium. During transport the material may be in the form of free foils or secured in a variety of holders or mounts.

3. Radioactive Contents - Americium-241 as an oxide with the activity per foil ranging from less than 0.037 MBq (1uCi) to 2.035 GBq (55 mCi). Activity per unit area does not exceed 0.086 MBq per square millimeter (1500 uCi per square inch).

4. Quality Assurance - Records of Quality Assurance activities required by Paragraph 310 of the IAEA regulations[1] shall be maintained and made available to the authorized officials for at least three years after the last shipment authorized by this certificate. Consignors and consignees in the United States exporting or importing shipments under this certificate shall satisfy the requirements of Subpart H of 10 CFR 71.

5. Expiration Date - This certificate expires August 31, 2007.

---

1 "Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1 (ST-1, Revised)," published by the International Atomic Energy Agency (IAEA), Vienna, Austria.

2 Title 49, Code of Federal Regulations, Parts 100 - 199, United States of America.

CERTIFICATE USA/0036/S, REVISION 7

This certificate is issued in accordance with paragraph 804 of the IAEA Regulations and Section 173.476 of Title 49 of the Code of Federal Regulations, in response to the petition and information dated January 31, 2002 submitted by NRD LLC, Grand Island, NY, and in consideration of other information on file in this Office.

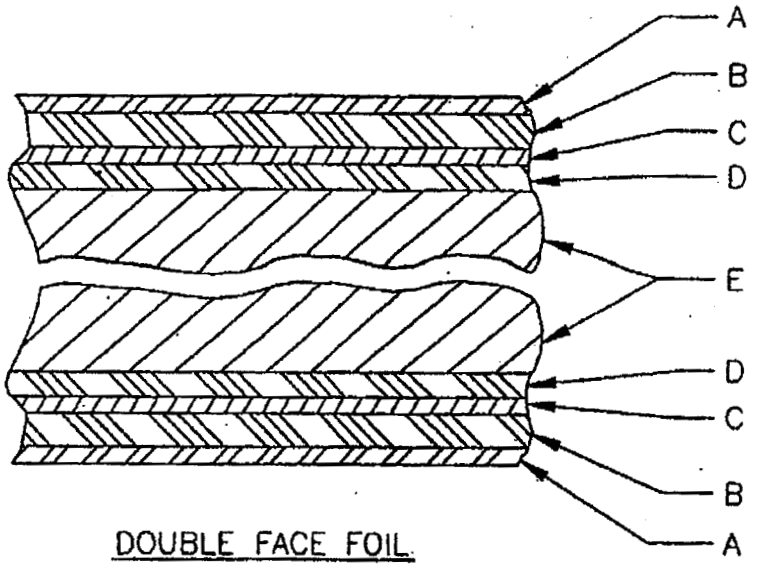
Certified by:

Robert A. McGuire
Associate Administrator for
Hazardous Materials Safety

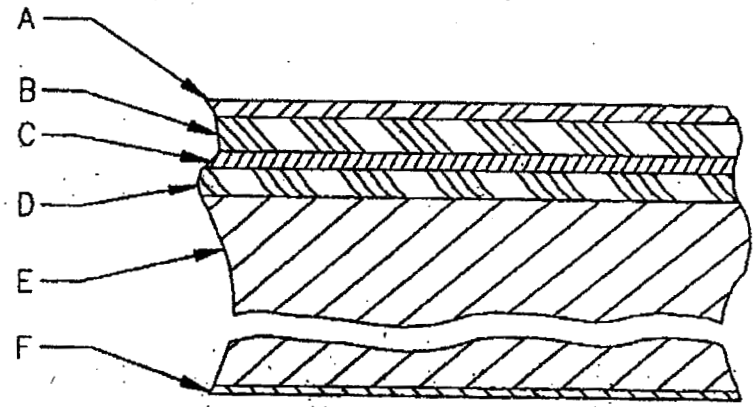
JUL 17 2002
(DATE)

Revision 7 - Issued to reference the 1996 IAEA regulations and to extend the expiration date.

DATE	SYM	REVISION RECORD	AUTH.	DR.	CK.



DOUBLE FACE FOIL
CROSS SECTION



SINGLE FACE FOIL
CROSS SECTION

A. * PLATING 0.00002
B. GOLD 0.00004
C. AMERICIUM 241 & GOLD 0.00002
D. GOLD 0.00003
E. SILVER 0.004 TO 0.009
F. FLASH PLATING FOR IDENTIFICATION

NOTES:

1. * PLATING CAN BE YELLOW GOLD, WHITE GOLD, OR PALLADIUM.
2. ACTIVITY RANGE:
   A. FROM LESS THAN 1 MICROCURIE UP TO 55 MILLICURIES PER FOIL.
   B. NOT TO EXCEED 2.33 MICROCURIES PER SQUARE MILLIMETER. (OR 1500 MICRO-CURIES PER SQUARE INCH)
3. DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED.

NRD INC.
A SUBSIDIARY OF MARK IV INDUSTRIES, INC.
2937 ALT BOULEVARD GRAND ISLAND, NEW YORK 14072

TOLERANCE (EXCEPT AS NOTED)	TITLE: A-001 FOIL GENERAL COMPOSITION		
DECIMAL ±	MATERIAL & FINISH: SEE NOTES	SCALE: NONE	DRAWN BY: C. DUNN
FRACTIONAL ±			APPROVED BY: T. Caffarella
ANGULAR ±	DATE: 10JL92	DWG. NUMBER: 92A071	REVISION:

DEPARTMENT OF HEALTH & HUMAN SERVICES

Program Support Center
U.S. Public Health Service

Federal Occupational Health Service
4550 Montgomery Avenue, Suite 950
Bethesda, Maryland 20814
kfisher@psc.gov (301) 594-9868

MEMORANDUM

DATE: April 22, 2006

TO: Mr. Terry Laydon
Safety & Environmental Operations
Federal Aviation Administration

FROM: Mr. Kiel Fisher
Project Manager
Federal Occupational Health, U.S. Public Health Service

SUBJECT: Phase 2 - Americium 241 Radiological Health Assessment Project
Revised Final Report

CC: Mr. Pete Wixted, DoC
Mr. Bradley Christ, FOH
Mr. Michael Terpilak, FOH

As directed by the Federal Aviation Administration (FAA), Federal Occupational Health (FOH) has completed the Phase 2 - Americium 241 Radiological Health Assessment Project. The purpose of this project was to post signage, complete a thorough swipe sample evaluation of the contaminated storage closet, and to complete a radiological health assessment using field observations and sample results from FOH site work completed during Phase 1 & 4 Sampling Projects at the facility located at 14th Street and Constitution Avenue in Washington, DC. The scope of this project was limited to a radiological health assessment based on the sample data collected by FOH at the FAA print shop space and dock area on 02/22/06 and NACO Printing Plant Maintenance Shop on 03/08/06.

The final deliverable for this project is the attached report. The final report was submitted to the FAA on time and under budget.

If you have any additional questions or comments, please contact me at (301) 594-9868.

RADIOLOGICAL HEALTH AND SAFETY ASSESSMENT

PHASE 2

FOR THE

FEDERAL AVIATION ADMINISTRATION

WASHINGTON D.C.

PROJECT ORDER NO. P117962

Prepared For

SAFETY AND ENVIRONMENTAL OPERATIONS

FEDERAL AVIATION ADMINISTRATION

Prepared By

DEPARTMENT OF HEALTH AND HUMAN SERVICES
U.S. PUBLIC HEALTH SERVICE
DIVISION OF FEDERAL OCCUPATIONAL HEALTH
BETHESDA, MARYLAND FIELD OFFICE

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- APPENDIX D – CALIBRATION CERTIFICATE FOR RADIATION SURVEY INSTRUMENT USED IN SCANNING SURVEY.

- APPENDIX E – CHARACTERISTICS OF TYPICAL STATIC ELIMINATORS USED BY THE FEDERAL AVIATION ADMINISTRATION, PRINTING PLANT, WASHINGTON, D.C.

- APPENDIX F – NATIONAL COUNCIL ON RADIATION PROTECTION AND MEASUREMENTS, REPORT NO. 93 IONIZING RADIATION EXPOSURE OF THE POPULATION OF THE UNITED STATES, SEPTEMBER 1, 1987.

- APPENDIX G – TOTAL DOSE ASSESSMENT OF SPECIFIC RADIONUCLIDES USED AT THE FEDERAL AVIATION ADMINISTRATION PRINTING PLANT, WASHINGTON, D.C.

I. EXECUTIVE SUMMARY AND ACTION ITEMS

A radiological health safety assessment of the United States Federal Aviation Administration (FAA) was conducted on February 22, 24 and 27, 2006. Michael S. Terpilak, Certified Health Physicist (CHP) and Kiel W. Fisher, Industrial Hygienist Technician of Public Health Service (PHS), Division of Federal Occupational Health (DFOH), Bethesda Field Office conducted the Radiological Survey.

The initial request was made by Mr. Peter Wixted, Environmental Manager, Department of Commerce, Office of Real Estate on February 21, 2006. Mr. Terry M. Laydon, Safety and Environmental Manager of the FAA is the present contact person.

The purpose of Phase 1 of this project was to conduct immediate on-site sampling to evaluate the presence of Americium-241 contained in the Static Eliminator at the Herbert C. Hoover Building located at 14th Street and Constitution Avenue, Washington, D.C. The scope of Phase 1 of this project was limited to a survey of the FAA print shop space, dock area and trash compactor.

Phase 2 of the project entailed a more comprehensive radiological survey of the storage closet area Room B911 in the basement.

Phase 3 of this project is to package and ship the contaminated Americium-241 and six additional Polonium-210 static eliminators which have already decayed and pose no health hazard and risk, back to the respective manufacturers of this material.

The radiological safety assessment included radiological surveys using portable radiation detection survey instruments, in addition to specific isotopic radioactive analysis at an accredited radiological laboratory (**APPENDICES A and B**).

A total of 60 swipe samples and 63 instrument measurements were taken for a total of 123 radiological measurements.

In addition, this report reflects the current U.S. Nuclear Regulatory Commission (NRC) Standards, Regulations and Present Guidance as it relates to the release of Facilities for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material.

- Guidelines for Decontamination of Facilities and Equipment Prior to Release for By Product, Source or Special Nuclear Material. U.S. Nuclear Regulatory Commission (NRC), August, 1993. **(APPENDIX C).**

EXECUTIVE SUMMARY AND ACTION ITEMS (continued)

The findings and results of all samples (instrument and swipe surveys) indicated that the FAA printing plant facility, loading dock, trash compactor and storage closet Room B-911 were free of fixed and removable contamination and qualify for "Unrestricted Use" as specified by the Nuclear Commission (NRC) regulations, standards and guidelines.

The results of the Radiological Health Safety Assessment indicate that radiation exposures to personnel are well below the guidelines, recommendations, and radiation standards of currently accepted various state, local, federal and national regulatory agencies and therefore do not pose or represent any health hazard or health risk at this time (APPENDICES F and G).

II. INTRODUCTION

This radiological health and safety assessment was requested by Mr. Terry M. Laydon, Safety and Environmental Manager of the FAA. The date of the request was March 2, 2006. The Radiological Assessment was performed by Michael S. Terpilak, Certified Health Physicist (CHP), and Kiel W. Fisher, Industrial Hygienist Technician of PHS/DFOH on February 22, 24, and 28, 2006.

The objective of the radiological health and safety assessment was to perform a radiological survey for fixed and removable contamination, using portable radiation detection survey instruments and specific isotopic laboratory analyses to assess any radiological impact on the individual workers, personnel and/or printing plant facilities of the FAA at this specific location.

The objective of this report is to present the findings and results of this radiation survey and to indicate whether the facilities surveyed qualify for release for Unrestricted Use in accordance with current U.S. NRC guidelines, regulations, and standards.

III. BACKGROUND

- The National Oceanic and Atmospheric Administration (NOAA) operated a printing plant located in the basement of the Herbert C. Hoover Building (HCHB).
- The operation was transferred to Federal Aviation Administration (FAA) in 2000.
- The FAA printing operation is in the process of moving out of the HCHB.
- The FAA Print Shop, located in the basement of the HCHB, placed a package containing two metal bars, i.e., static eliminators, into the trash and compacted the bars. **(Attachment A, Figures 1, 2, 3, 4 and 5)**.
- The bars were used in the printing process to limit static electricity and dust from the photo machine.
- The trash load was sent to the Mostoller Landfill in Pennsylvania.
- Radiation sensors at the landfill detected radioactive material in the truck on its way in.
- The Pennsylvania Department of Environmental Quality and the Nuclear Regulatory Commission (NRC) were contacted and investigated.
- Radiation source was the two static eliminator metal bars from HCHB.
- The bars were in boxes that appeared to be original packing materials.

- Boxes were labeled for Americium-241.
- The original mailing label identified the receiver as the National Oceanic and Atmospheric Administration (NOAA).
- One box and the bar inside were damaged.
- This damage indicated radioactive particles may have been released.
- Sampling showed results of 0.0037 microcuries.
- The recognized safe limit defined by NRC is below 0.005 microcuries.

IV. EVALUATION METHODS

The radiological health and safety assessment was conducted by Michael S. Terpilak, Certified Health Physicist (CHP) and Kiel W. Fisher, Industrial Hygienist Technician of PHS/DFOH in a manner consistent with and similar to typical radiation surveys of licenses by the Nuclear Regulatory Commission (NRC).

In addition, the following radiological surveys were conducted prior to the release of Facilities for unrestricted use.

- Establishing Background Levels
- Scanning Survey Using Portable Radiation Instruments
- Fixed and removable Surface Contamination Measurements
- Laboratory Analysis and Measurement of Smear (Filter Paper) Samples

ESTABLISHING BACKGROUND LEVELS

Background was determined by conducting survey measurements and/or sampling at locations on the site, which are unaffected by-site operations, i.e., preferable locations for interior background determinations all within on-site buildings of similar construction, or even locations that has had no previous history of licensed operations, i.e., use of radioactive materials. Surveys conducted with portable radiation instruments as well as smear surveys were duplicated in office space similar in dimensions and construction that are presently using licensed materials. Background surveys radiation instrument surveys were in the range of 0.01 mR/hr to 0.020 mR/hr, i.e.,10-20 μR/hr and random smear samples were nondetectable, i.e., Minimum Detectable Activity (MDA).

SCANNING SURVEYS USING PORTABLE RADIATION INSTRUMENTS

These measurements typically consist of surface scanning (moving the detector at a consistent speed and distance near the surface) and measuring levels of direct radiation (surface activity and exposure rate) at representative points.

Before conducting any fixed measurements, surfaces are scanned to identify the presence of elevated direct radiation which might indicate residual gross activity or hot-spots. Scans are conducted for all radiations potentially present, based on the operational history. The scanning detector is kept as close as possible to the surface and moved across the surface at a slow speed. Nominally, the distance between the detector and the surface is maintained at less than two centimeters. For particulate radiations (beta) which may have very limited ranges, the scan speed should not exceed 1 detector width per second; this speed should be reduced to as low as 1/3 detector width per second for those situations when relatively low count rates may be indicative of residual activity exceeding guideline values. For gamma radiation the scanning speed may be greater; the probe is typically moved in a serpentine pattern while advancing at a speed of about 0.5 m per second.

Gamma Field Survey Instrumentation

The following instrument was utilized in the survey.

- FAG Model #FH4046 serial #1202, halogen quenched Geiger-Muller (G-M) instrument, which also reads out in the microroentgens/hour (μR/hr). This is a German manufactured instrument.

The appropriate calibration certificates for the above instrument are enclosed **(APPENDIX D)**.

A complete radiological assessment included a radiation survey utilizing Radiological Instrumentation as identified and specified in **APPENDIX A**.

V. STATIC ELIMINATORS USED BY THE FEDERAL AVIATION ADMINISTRATION.

Manufacturer Information

The manufacturer of the two bars found at the landfill is NRD, LLC of New York.

NRD, LLC sold nine bars to NOAA in June 1981.

In an attempt to locate the remaining seven bars, on February 17, 2006 the FAA conducted a search of the print area.

– Found a total of seven bars in a storage room in the print area.

– Search also revealed no other bars in the print area.

Data on the 7 Bars Found

- NRD Model 2003 ISOTOPE Am-241
  - — Serial Number: SA 2199
  - — 25.87 MIC
  - — 6/81
  - — 57 inches long
- 3M Static Eliminator
  - — Model 210
  - — Serial Number B00860
  - — 14 Sep 79
  - — Po-210 96 mc
  - — 48 inches long
- 3M Static Eliminator
  - — Model 210
  - — Serial Number B00861
  - — 14 Sep 79
  - — Po-210 96 mc
  - — 48 inches long
- 3M Static Eliminator
  - — Model 210
  - — Serial Number B00862
  - — 14 Sep 79
  - — Po-210 96 mc
  - — 48 inches long
- 3M Static Eliminator
  - —Model 210
  - —Serial Number B00863
  - —14 Sep 79
  - —Po-210 96 mc
  - —48 inches long
- 3M Static Eliminator
  - —Model 210
  - —Serial Number B00864
  - —14 Sep 78
  - —Po-210 96 mc
  - —110 inches long
- 3M Static Eliminator
  - —Model 210
  - —Serial Number B00865
  - —14 Sep 78
  - —Po-210 96 mc
  - —18 inches long

One Americium-241 NRD static eliminator bar Serial #SA 1299 was found in the storage closet Room B-911 and was surveyed on Wednesday, February 23, 2006 and the laboratory analysis indicated it was leaking, i.e., contaminated to the level of 800 disintegrations per minute per 100 centimeters square (800 $\frac{\text{DPM}}{100\text{cm}^2}$).

The contaminated Americium-241 static eliminator was double bagged with polyethylene and secured with masking tape. The storage closet Room B-911 was locked, secured and posted with a Radioactive Materials sign.

On Monday February 27, 2006 a complete and thorough radiation instrument and swipe survey was conducted. A total of 37 radiation instrument surveys were taken and a total of 35 swipes were also taken. The swipe samples were delivered to the Radiological Laboratory in Columbia, Maryland.

The six Polonium-210 static eliminators with a radioactive half-life of 138 days have decayed, i.e., the bars have gone through a total of 10 half-lives or 1380 days or 3.8 years.

These static eliminators were purchased from the 3M Company on September 14, 1978 and September 14, 1979 and have been stored by the agency for a period of 26.5 and 27.5 years.

Characteristics of typical static eliminators used by the FAA, printing plant is attached as **APPENDIX E.**

SUMMARY

A current summary of the Static Eliminator bar inventory is presented below:

#	DESCRIPTION	SERIAL #	LOCATION
1	NRD Americium-241 Static Eliminator	SA2200	Transferred to NRD
2	NRD Americium-241 Static Eliminator	SA2202	Transferred to NRD
1	NRD Americium-241 Static Eliminator	SA2201	Storage Closet B911
2	NRD Americium-241 Static Eliminator	SA2199	Storage Closet B911
3	3M Polonium-210 Static Eliminator	3M-B00-860	Storage Closet B911
4	3M Polonium-210 Static Eliminator	3M-B00-861	Storage Closet B911
5	3M Polonium-210 Static Eliminator	3M-B00-862	Storage Closet B911
6	3M Polonium-210 Static Eliminator	3M-B00-863	Storage Closet B911
7	3M Polonium-210 Static Eliminator	3M-B00-864	Storage Closet B911
8	3M Polonium-210 Static Eliminator	3M-B00-865	Storage Closet B911
1	NRD Americium-241 Static Eliminator	SA2203	To be determined
2	NRD Americium-241 Static Eliminator	SA2204	To be determined
3	NRD Americium-241 Static Eliminator	SA2205	To be determined
4	NRD Americium-241 Static Eliminator	SA2206	To be determined
5	NRD Americium-241 Static Eliminator	SA2207	To be determined

VI. RADIATION SURVEYS

The radiation surveys conducted by portable radiation detection instruments in the FAA facilities did not indicate any fixed contamination on the surface areas surveyed. A total of 63 surfaces, areas and locations were surveyed in the HCHB and all instrument surveys indicated no radiation levels above natural background. **[Therefore, an indication of no fixed contamination was identified.]**

As a result of these instrument surveys since there was no fixed contamination identified, there was no need to express results in fixed contamination in dpm/100 cm^2. The specific radionuclides in question have energies similar to the calibration energies of the radiation instruments used for the surveys.

In addition, all 59 swipe surveys in the HCHB were determined to be Minimum Detectable Activity (MDA), i.e., zero Disintegrations per Minute (DPM) which indicates that there was no removable and/or loose surface contamination identified, except for one swipe number #5, the exposed section of the NRD static eliminator Serial # SA 1299 which was bagged with polyethylene and secured with masking tape.

REMOVABLE SURFACE CONTAMINATION MEASUREMENTS

A total of 60 swipe area measurements were conducted in the laboratory.

Swipe samples were conducted over a surface of 100 cm^2.

The 60 swipe samples were analyzed for the following:

- Gross Alpha – Gas filled proportional counter.

LABORATORY ANALYSIS AND MEASUREMENT OF SMEAR (FILTER PAPER) SAMPLES

If any samples were identified with radioactive contamination, then these samples were analyzed for specific radioactivity, i.e., isotopic analysis. The results of the swipe sample analysis are enclosed. **(APPENDIX B)**.

A total of 60 swipe surveys were taken; in addition 63 instrument surveys readings were measured. The external dose rates were reported in units of microroentgen per hour (μ R/hour) and the levels of radioactive materials, including alpha were reported in DPM/100 cm^2 for removable and fixed contamination for surfaces.

VII. ANALYSIS AND COMPARISON OF RADIATION SURVEY RESULTS TO U.S. NUCLEAR REGULATORY COMMISSION (NRC) GUIDELINES

The USNRC guidance document entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material," April 1993 states that depending on the specific radionuclides identified, acceptable surface contamination levels shall be followed.

The alpha emitter nuclide category for acceptable surface contamination levels are as follows:

- Average - 100 dpm $\alpha/100\ cm^2$
- Maximum - 300 dpm $\alpha/100\ cm^2$
- Removable - 20 dpm $\alpha/100\ cm^2$

The Beta-Gamma emitter nuclide category for acceptable surface contamination levels are as follows:

- Average - 5,000 dpm $B\gamma/100\ cm^2$
- Maximum - 15,000 dpm $B\gamma/100\ cm^2$
- Removable - 1,000 dpm $B\gamma/100\ cm^2$

In addition, the average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 1.0 mrad/hr at 1 cm respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

Swipe surveys in all the facilities of HCHB indicated that samples were nondetectable, i.e., Minimum Detectable Activity (MDA), the results were significantly below the average, maximum and removable acceptable surface contamination levels.

In addition, to be consistent and compliance with 10 CFR Part 10, Subpart E - Radiological Criteria for License Termination, i.e.,

> §20.1402 Radiological criteria for unrestricted use. A site will be considered acceptable for unrestricted use if the residual radioactivity that is distinguishable from background radiation results in a TEDE to an average member of the critical group that does not exceed 25 mrem (0.25 mSv) per year including that from groundwater sources of drinking water, and that the residual radioactivity has been reduced to levels that are as low as reasonably achievable (ALARA). Determination of the levels which are (ALARA).

The following calculations indicate that dose assessment from the specific radionuclide was made and is discussed below.

Subsequently the radiation instrument surveys of various locations in the HCHB indicated levels in the range of 0.010 mR/hr and 0.020 mR/hr, i.e., 10-20 μR/hr which indicate natural background radiation and were significantly below the average and maximum radiation levels associated with surface contamination.

VIII. BRIEF SUMMARY OF STANDARDS AND CRITERIA

The U.S. Nuclear Regulatory Commission (NRC), Division of Fuel Cycle, Medical, Academic and Commercial Use Safety, Washington, D.C., has published a technical document entitled "Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source of Special Nuclear Material," dated April 1993. The document delineates specific instructions concerning instrument and swipe surveys and Table 1, specifically states "Acceptable Surface Contamination Levels" that shall be used for decontamination of facilities and equipment prior to release for unrestricted use **(Appendix C)**.

A total dose and health risk assessment for the specific radionuclide Americium-241 was made and is discussed in **APPENDIX F**.

IX. RESULTS AND CONCLUSIONS

Based on the results of the radiological health and safety assessment at the Herbert C. Hoover Building, the areas and the rooms identified in this report can be released for unrestricted use.

The results of the Radiological Health Safety Assessment indicate that radiation exposures to personnel are well below the guidelines, recommendations, and radiation standards of currently accepted various state, local, federal and national regulatory agencies and therefore do not pose or represent any health hazard or health risk at this time (APPENDICES F and G).

X. RECOMMENDATIONS

Conduct a due diligence inventory and accountability report for the five missing NRD Americium-241 Static Eliminators and provide the report to the Nuclear Regulatory Commission (NRC), Region 1, King of Prussia, Pennsylvania.

XI. REFERENCES

- National Council on Radiation Protection and Measurements, Report No. 93, Ionizing Radiation Exposure of the Population of the United States, September 1, 1987.

- Guidelines for Decontamination of Facilities and Equipment Prior to Release for Unrestricted Use or Termination of Licenses for Byproduct, Source or Special Nuclear Material. U.S. Nuclear Regulatory Commission (NRC), April 1993.

- NUREG-1500, Working Draft Regulatory Guide on Release Criteria for the Decommissioning: NRC Staff's Draft for Comment, August 1994.

- Supplemental Information on the Implementation of the Final Rule on Radiological Criteria for License Termination, Federal Register Vol. 63, No. 222, Wednesday, November 18, 1998.

- Title 10 Code of Federal Regulations Part 20, "Standards for Protection Against Radiation," October 29, 1999.

- Radiation Protection Dosimetry, Radionuclide and Radiation Protection Data Handbook, Volume 98, No. 1 2002, Nuclear Technology Publishing.

- Federal Aviation Administration Printing Plant, Radioactive Source Incident, February, 2006.

GLOSSARY

GLOSSARY

Absorbed Dose	The amount of ionizing radiation energy imparted to matter per unit mass of irradiated matter.
Activity	The number of nuclear transformations occurring in a given quantity of radioactive material per unit time, which is a measurement of the source amount.
Alpha Particle	A strongly ionizing particle emitted from the nucleus of an atom during radioactive decay, containing 2 protons and neutrons and having a double positive charge.
Authorized User	An individual who, having satisfied the applicable training and experience requirements, is granted the authority to order radioactive material and accepts responsibility for its safe receipt, storage, use, transfer and disposal.
Beta Particle	An ionizing charged particle emitted from the nucleus of an atom during radioactive decay, equal in mass and charge to an electron.
Bioassay	A determination of the quantity of radioactive material in the human body, either by direct measurement (in vivo counting) or by analysis of excreta.
Biological Half-Life	The length of time required for one-half of a radioactive substance to be biologically eliminated from the body.
Brachytherapy	A treatment with ionizing radiation where the radioactive source is applied to the surface of the body or is located a short distance from the body area being treated.
Bremsstrahlung	Electromagnetic (x-ray) radiation associated with the deceleration of charged particles passing through matter.
Byproduct material	A certain class of radioactive material regulated by the Nuclear Regulatory Commission.
Contamination	The deposition of radioactive material in any place where it is not wanted.
Counts per Minute (cpm)	The number of nuclear transformations from radioactive decay able to be detected by a counting instrument in a one minute time interval.
Curie	A unit of activity, equal to 37 billion disintegrations per second.

Custodian	An individual who is granted the authority over and accepts responsibility for the safe use of a sealed source or radiation-producing device.
Declared Pregnant Woman	A woman who has voluntarily informed her employer, in writing, of her pregnancy and the estimated date of conception, thereby applying a dose limitation to the fetus.
Disintegrations per Minute (dpm)	The number of nuclear transformations from radioactive decay in a one minute time interval.
Dose Equivalent	A quantity of radiation dose expressing all radiation on a common scale for calculating the effective absorbed dose.
Dosimeter	A device used to determine the external radiation dose a person has received.
Effective Half-Life	The length of time required for a radioactive substance in the body to lose one-half of its activity through a combination of biological elimination and radioactive decay.
Exposure	The amount of ionization in air from x-rays or gamma rays.
Film Badge	A dosimeter worn by radiation workers to measure their radiation dose. The badge contains a piece of film that is darkened by radiation, and may contain filters which shield parts of the film from certain types of radiation.
Gamma rays	A very penetrating electromagnetic radiation emitted from a nucleus of an atom during radioactive decay.
Half-Life	The length of time required for a radioactive substance to lose one-half of its activity by radioactive decay.
Health Physicist	A trained specialist in the field of radiation protection.
Individual User	An individual who, having satisfied the applicable training requirements, is granted permission to work with radioactive material under the supervision of an Authorized User.
Isotope	A particular nuclide of an element.
Neutron	An ionizing particle emitted from a nucleus of an atom during radioactive decay, similar in mass to a hydrogen atom and having a charge of zero.

Photon	A type of radiation in the form of an electromagnetic wave, having zero mass and zero charge.
Positron	An ionizing charged particle emitted from a nucleus of an atom during radioactive decay, equal in mass to an electron and having a charge of +1.
Protocol	A written, detailed experimental design, reviewed and approved by the Radiation Safety Branch, for the use of radioactive materials in excess of set limits or the use of volatile radioiodines outside of Building 21.
Rad	A unit of radiation absorbed dose. One rad is equal to 100 ergs per gram.
Radiation	An emission of energy in the form of photons (gamma, x-rays) or particles (alpha, beta, positron, neutron radiation).
Radioactive Decay	The spontaneous process of unstable nuclei in an atom disintegrating into stable nuclei, releasing radiation in the process.
Radionuclide	A nuclide with an unstable ratio of neutrons to protons, which will cause it to undergo radioactive decay.
Rem	A unit of radiation dose equivalent. One rem is equal to one rad of beta, gamma, or x-ray radiation, or 1/20 rad of alpha radiation.
Roentgen	A unit of radiation exposure. One Roentgen is equal to 0.00025 Coulombs of electrical charge per kilogram of air.
Sealed Source	A source of radioactive material that is sealed in a capsule designed to prevent leakage or escape of the material.
Thermo-luminescent Dosimeter (TLD)	A dosimeter worn by radiation workers to measure their radiation dose. The TLD contains a crystalline material which stores a fraction of the absorbed ionizing radiation and releases this energy in the form of light photons when heated.
Total Effective Dose Equivalent	The sum of an internal radiation dose and external radiation dose received by an individual.
X-rays	A penetrating type of photon radiation emitted from outside the nucleus of a target atom during bombardment of a metal with fast electrons.

APPENDICES

APPENDIX A

RADIOLOGICAL ASSESSMENT

RADIATION DETECTION INSTRUMENT SURVEY

OF THE

FEDERAL AVIATION ADMINISTRATION

FACILITIES

WASHINGTON, D.C.

FEBRUARY 22, 27, AND MARCH 8, 2006.

Phase 1
Americum-241 Sampling Project
Radiation Instrument Measurement Locations and Results
02/22/06

INSTRUMENT MEASUREMENT #	INSTRUMENT MEASUREMENT	SAMPLE LOCATION DESCRIPTION	SERIAL NUMBER	MANUFACTURER
1	20 µR/hr	Hallway near elevators - 1st Floor	N/A	N/A
2	14 µR/hr	Inside the Elevator	N/A	N/A
3	15 µR/hr	Floor outside Elevator - Basement Floor	N/A	N/A
4	12 µR/hr	Loading Dock	N/A	N/A
5	10 µR/hr	Below Loading Dock - Ground Level	N/A	N/A
6	12 µR/hr AVG.	Room # B210 Near Entrance	N/A	N/A
7	12 µR/hr AVG.	Room # B210 Middle of Room	N/A	N/A
		Room # B911 Storage Closet		
8	**5.0 mR/hr**	**Americium-241 Bar - Bar Casing - NRD**	**SA2199**	**NRD**
9	**5.0 mR/hr**	**Americium-241 Bar - Bar Itself - NRD**	**SA2199**	**NRD**
10	16-18µR/hr	Polonium-210 Bar 48" - Bar Itself -3M	B00862	3M
11	14-16µR/hr	Polonium-210 Bar 60" - Bar Itself -3M	B00863	3M
12	55-70µR/hr	Polonium-210 Bar 48" - Bar Itself -3M	B00860	3M
13	16-18µR/hr	Polonium-210 Bar 48" - Bar Itself -3M	B00861	3M
14	14-16µR/hr	Polonium-210 Bar 18" - Bar Itself -3M	B00865	3M
15	16-19µR/hr	Polonium-210 Bar 100" - Bar Itself -3M	B00864	3M
		Path From Room #B204 to Trash Compactor		
16	10 µR/hr	Hallway Outside Room # B204	N/A	N/A
17	12 µR/hr	Hallway Outside Room # B211A	N/A	N/A
18	13 µR/hr	Hallway Outside Room # B213	N/A	N/A
19	14 µR/hr	Entrance to Loading Dock	N/A	N/A
20	13 µR/hr	Entrance to Loading Dock Near Bike Port	N/A	N/A
21	13-15 µR/hr	Loading Dock	N/A	N/A
22	13-15 µR/hr	Loading Dock	N/A	N/A
23	13-15 µR/hr	Loading Dock	N/A	N/A
24	13-15 µR/hr	Loading Dock	N/A	N/A
25	18-19 µR/hr	Inside Trash Compactor - Left Side	N/A	N/A
26	14-16 µR/hr	Inside Trash Compactor - Front Side	N/A	N/A
27	11-12 µR/hr	Inside Trash Compactor - Right Side	N/A	N/A
28	8-9 µR/hr	Inside Trash Compactor - Middle Floor	N/A	N/A

*** Background Radiation - 10µR/hr - 20µR/hr in Herbert C. Hoover Building**

Phase 2
Radilogical Health Assessment Project
Radiation Instrument Measurement Locations and Results
Room #B911
02-27-06

INSTRUMENT MEASUREMENT #	INSTRUMENT MEASUREMENT	SAMPLE LOCATION DESCRIPTION
Background	10.0µR/hr	Background reading taken outside of the storage closet
25	14.5µR/hr	Outside entrance door knob
26	14.9µR/hr	Inside entrance door knob
27	17.8µR/hr	Floor of entrance - below door
28	19.6µR/hr	Light switch near entrance
29	26.0µR/hr	Floor - middle of room b/t entrance and Kenmore® freezer
30	26.1µR/hr	Kenmore® freezer door handle
31	22.2µR/hr	Kenmore® freezer door shelves
32	25.9µR/hr	Kenmore® freezer main compartment
33	25.0µR/hr	Whirlpool® refrigerator door handle
34	22.2µR/hr	Whirlpool® refrigerator door shelves
35	22.5µR/hr	Whirlpool® refrigerator door main compartment
36	19.6µR/hr	Coldspot® refrigerator door handle
37	18.7µR/hr	Coldspot® refrigerator door shelves
38	16.5µR/hr	Coldspot® refrigerator door main compartment
39	19.5µR/hr	Floor - middle of room b/t Coldspot® refrigerator and box pile #2
40	23.2µR/hr	Floor - middle of room b/t support beam and locker #2
41	19.9µR/hr	Support beam - concrete wall face of support beam
42	20.2µR/hr	Concrete - behind support beam
43	17.7µR/hr	Support beam - room face of support beam
44	15.7µR/hr	Box pile #1
45	15.5µR/hr	Door handles on locker #1
46	14.9µR/hr	Inside locker #1
47	12.9µR/hr	Floor - b/t locker #5/6 and #3/4
48	15.2µR/hr	Door handles on locker #6
49	18.4µR/hr	Inside locker #6
50	16.2µR/hr	Door handles locker #3
51	20.5µR/hr	Inside locker #3
52	29.9µR/hr	Door handles locker #4

Phase 2
Radilogical Health Assessment Project
Radiation Instrument Measurement Locations and Results
Room #B911
02-27-06

53	25.0µR/hr	Inside locker #4
54	51.2µR/hr	On top of locker #4
55	19.5µR/hr	Door handle locker #2
56	19.7µR/hr	Inside locker #2
57	15.0µR/hr	Box pile #2
58	16.1µR/hr	Floor - b/t box pile #2 and entrance
59	23.0µR/hr	Wall - next to locker #4
Avg. Concrete	26 - 32µR/hr	Average of all concrete walls

*** Background Radiation - 10µR/hr - 20µR/hr in HCHB.**

Phase 4
NACO Printing Plant Maintenance Shop Radiation Sampling Project
Radiation Instrument Measurement Locations and Results
03/08/06

INSTRUMENT MEASUREMENT #	INSTRUMENT MEASUREMENT	SAMPLE LOCATION DESCRIPTION	SERIAL NUMBER	MANUFACTURER
1	10.0 µR/ hr	Hallway - Room B220	N/A	N/A
2	10.5 µR/ hr	Push cart - Room B220	N/A	N/A
3	10.7 µR/ hr	Middle of floor - Room B220	N/A	N/A
4	16.2 µR/ hr	Shelves - Room B220	N/A	N/A
5	16.8 µR/ hr	Entrance - Room B222A	N/A	N/A
6	19.8 µR/ hr	Ceiling Shelf - Room B222A	N/A	N/A
7	18.5 µR/ hr	AVG - Room B222A	N/A	N/A
8	17.4 µR/ hr	Ceiling Shelf - Room B222A	N/A	N/A
9	15.5 µR/ hr	Entrance floor - Room B224	N/A	N/A
10	16.1 µR/ hr	Desk - Room B224	N/A	N/A
11	13.1 µR/ hr	Entrance floor near hallway - Room B224	N/A	N/A
12	12.8 µR/ hr	Desk on hallway wall - Room B224	N/A	N/A
13	13.2 µR/ hr	Entrance from Room B224A	N/A	N/A
14	15.6 µR/ hr	Desk in middle of floor - Room B224	N/A	N/A
15	11.2 µR/ hr	Shop floor - Room B200A	N/A	N/A
16	17.5 µR/ hr	Desk in shop - Room B220A	N/A	N/A
17	14.5 µR/ hr	Work Bench in Shop - Room B220A	N/A	N/A
18	15.4 µR/ hr	Work Bench in Shop - Room B220A	N/A	N/A
19	13.7 µR/ hr	Work Bench in Shop - Room B220A	N/A	N/A
20	13.5 µR/ hr	Work Bench in Shop - Room B220A	N/A	N/A
21	14.2 µR/ hr	Middle of shop floor - Room B220A	N/A	N/A
22	19.2 µR/ hr	Shop side entrance - Room B220A	N/A	N/A
23	22.2 µR/ hr	Shop front entrance - Room B220A	N/A	N/A
24	**3.28 mR/hr**	**Label side of bar - 1st 1/4 of bar in Room B911 - Am241**	**A2201**	**NUCLESTAT**
25	**6.09 mR/hr**	**2nd 1/4 of bar in Room B911 - Am241**	**A2201**	**NUCLESTAT**
26	**7.05 mR/hr**	**3rd 1/4 of bar in Room B911 - Am241**	**A2201**	**NUCLESTAT**
27	**7.32 mR/hr**	**Side opposite label of bar - 4th 1/4 of bar in Room B911 - Am241**	**A2201**	**NUCLESTAT**

*** Background Radiation - 10µR/hr - 20µR/hr in Herbert C. Hoover Building**

APPENDIX B

RADIOLOGICAL ASSESSMENT

SWIPE SAMPLE LOCATIONS & RESULTS

OF THE

FEDERAL AVIATION ADMINISTRATION

FACILITIES

WASHINGTON, D.C.

FEBRUARY 22, 27, AND MARCH 8, 2006.

ECOLOGY SERVICES, INC.

REPORT OF SAMPLE ANALYSIS

Rev 1.3

For:	Ray-Safe & Associates
Job:	Wipes
Sample Type:	Gross Alpha

Date:	24-Feb-06
By:	CW
Sample Date:	22-Feb-06
Counting Parameters:	Gross Alpha

Equipment Description:
Counter: Ludlum 2200
Detector: EIC FP-2 GFPC

Input Background Data:

Background Cts	Ct Time (m)	Background Cf	% Error
1	2	0.50	196.00%

Input Efficiency Data:

Isotope	Gross Counts	Time (m)	DPM	Efficiency (4 Pi)	% Error
239Pu	10517	2	1.05E+04	49.92%	4.00%

MDA Calculation:

MDA (CPM)	MDA (DPM)	MDA (uCi)
4	8	3.456E-06

Sample Data: Note: A zero reading for DPM or pCi/gm values indicates only that the sample activity was less than the MDA.

Sequence Number	Sample ID	Gross Counts	Ct Time (m)	CF	Decay Factor	DPM/Sample	Error at 95% C.L.
1	Wipe # 1	2	2	1	1.00	<MDA	169.86%
2	Wipe # 2	0	2	1	1.00	<MDA	#DIV/0!
3	Wipe # 3	1	2	1	1.00	<MDA	277.26%
4	Wipe # 4	7	2	1	1.00	<MDA	79.45%
5	Wipe # 5	801	2	1	1.00	801	9.44%
6	Wipe # 6	1	2	1	1.00	<MDA	277.26%
7	Wipe # 7	2	2	1	1.00	<MDA	169.86%
8	Wipe # 8	3	2	1	1.00	<MDA	130.82%
9	Wipe # 9	4	2	1	1.00	<MDA	109.75%
10	Wipe # 10	3	2	1	1.00	<MDA	130.82%
11	Wipe # 11	5	2	1	1.00	<MDA	96.23%
12	Wipe # 12	3	2	1	1.00	<MDA	130.82%
13	Wipe # 13	1	2	1	1.00	<MDA	277.26%
14	Wipe # 14	1	2	1	1.00	<MDA	277.26%
15	Wipe # 15	1	2	1	1.00	<MDA	277.26%
16	Wipe # 16	1	2	1	1.00	<MDA	277.26%
17	Wipe # 17	1	2	1	1.00	<MDA	277.26%
18	Wipe # 18	0	2	1	1.00	<MDA	#DIV/0!
19	Wipe # 19	3	2	1	1.00	<MDA	130.82%
20	Wipe # 20	2	2	1	1.00	<MDA	169.86%
21	Wipe # 21	3	2	1	1.00	<MDA	130.82%
22	Wipe # 22	3	2	1	1.00	<MDA	130.82%
23	Wipe # 23	2	2	1	1.00	<MDA	169.86%
24	Wipe # 24	2	2	1	1.00	<MDA	169.86%

$$MDA(dpm) = \frac{4.65\sqrt{R_b/T_b} + 3}{T_s \cdot Efficiency}$$

Health Physicist

ECOLOGY SERVICES, INC.

REPORT OF SAMPLE ANALYSIS

Rev 1.3

For:	Ray- Safe & Associates
Job:	Wipes
Sample Type:	Gross Alpha

Date:	1-Mar-06
By:	CW
Sample Date:	27-Feb-06
Counting Parameters:	Gross Alpha

Equipment Description:
Counter: Ludlum 2200
Detector: EIC FP-2 GFPC

Input Background Data:

Background Cts	Ct Time (m)	Background Cf	% Error
2	2	1.00	138.59%

Input Efficiency Data:

Isotope	Gross Counts	Time (m)	DPM	Efficiency (4 PI)	% Error
239Pu	10503	2	1.05E+04	50.00%	4.00%

MDA Calculation:

MDA (CPM)	MDA (DPM)	MDA (uCi)
5	10	4.320E-06

Sample Data: Note: A zero reading for DPM or pCi/gm values indicates only that the sample activity was less than the MDA.

Sequence Number	Sample ID	Gross Counts	Ct Time (m)	CF	Decay Factor	DPM/Sample	Error at 95% C.L.
1	Wipe #25	2	2	1	1.00	<MDA	196.10%
2	Wipe #26	2	2	1	1.00	<MDA	196.10%
3	Wipe #27	0	2	1	1.00	<MDA	#DIV/0!
4	Wipe #28	2	2	1	1.00	<MDA	196.10%
5	Wipe #29	2	2	1	1.00	<MDA	196.10%
6	Wipe #30	1	2	1	1.00	<MDA	339.54%
7	Wipe #31	4	2	1	1.00	<MDA	120.20%
8	Wipe #32	1	2	1	1.00	<MDA	339.54%
9	Wipe #33	1	2	1	1.00	<MDA	339.54%
10	Wipe #34	3	2	1	1.00	<MDA	146.23%
11	Wipe #35	0	2	1	1.00	<MDA	#DIV/0!
12	Wipe #36	1	2	1	1.00	<MDA	339.54%
13	Wipe #37	4	2	1	1.00	<MDA	120.20%
14	Wipe #38	6	2	1	1.00	<MDA	92.62%
15	Wipe #39	4	2	1	1.00	<MDA	120.20%
16	Wipe #40	2	2	1	1.00	<MDA	196.10%
17	Wipe #41	2	2	1	1.00	<MDA	196.10%
18	Wipe #42	3	2	1	1.00	<MDA	146.23%
19	Wipe #43	2	2	1	1.00	<MDA	196.10%
20	Wipe #44	0	2	1	1.00	<MDA	#DIV/0!
21	Wipe #45	0	2	1	1.00	<MDA	#DIV/0!
22	Wipe #46	1	2	1	1.00	<MDA	339.54%
23	Wipe #47	2	2	1	1.00	<MDA	196.10%
24	Wipe #48	1	2	1	1.00	<MDA	339.54%
26	Wipe #49	1	2	1	1.00	<MDA	339.54%
27	Wipe #50	2	2	1	1.00	<MDA	196.10%
28	Wipe #51	2	2	1	1.00	<MDA	196.10%
29	Wipe #52	1	2	1	1.00	<MDA	339.54%
30	Wipe #53	0	2	1	1.00	<MDA	#DIV/0!
31	Wipe #54	1	2	1	1.00	<MDA	339.54%
32	Wipe #55	2	2	1	1.00	<MDA	196.10%
33	Wipe #56	2	2	1	1.00	<MDA	196.10%
34	Wipe #57	1	2	1	1.00	<MDA	339.54%
35	Wipe #58	4	2	1	1.00	<MDA	120.20%
36	Wipe #59	3	2	1	1.00	<MDA	146.23%

$$MDA(dpm) = \frac{4.65\sqrt{R_b/T_b} + 3}{T_s \cdot Efficiency}$$

Health Physicist

ECOLOGY SERVICES, INC.

REPORT OF SAMPLE ANALYSIS

Rev 1.3

For:	Ray- Safe & Associates
Job:	Wipes
Sample Type:	Gross Alpha

Date:	9-Mar-06
By:	CW
Sample Date:	8-Mar-06
Counting Parameters:	Gross Alpha

Equipment Description:
Counter: Ludlum 2200
Detector: EIC FP-2 GFPC

Input Background Data:

Background Cts	Ct Time (m)	Background Cf	% Error
1	2	0.50	196.00%

Input Efficiency Data:

Isotope	Gross Counts	Time (m)	DPM	Efficiency (4 PI)	% Error
239Pu	10435	2	1.05E+04	49.53%	4.00%

MDA Calculation:

MDA (CPM)	MDA (DPM)	MDA (uCi)
4	8	3.483E-06

Sample Data: Note: A zero reading for DPM or pCi/gm values indicates only that the sample activity was less than the MDA.

Sequence Number	Sample ID	Gross Counts	Ct Time (m)	CF	Decay Factor	DPM/Sample	Error at 95% C.L.
1	Wipe #50	0	2	1	1.00	< MDA	N/A
2	Wipe #51	2	2	1	1.00	< MDA	N/A
3	Wipe #52	2	2	1	1.00	< MDA	N/A
4	Wipe #53	2	2	1	1.00	< MDA	N/A
5	Wipe #54	2	2	1	1.00	< MDA	N/A
6	Wipe #55	1	2	1	1.00	< MDA	N/A
7	Wipe #56	2	2	1	1.00	< MDA	N/A
8	Wipe #57	3	2	1	1.00	< MDA	N/A
9	Wipe #58	1	2	1	1.00	< MDA	N/A
10	Wipe #59	3	2	1	1.00	< MDA	N/A
11	Wipe #60	1	2	1	1.00	< MDA	N/A
12	Wipe #61	1	2	1	1.00	< MDA	N/A
13	Wipe #62	0	2	1	1.00	< MDA	N/A
14	Wipe #63	4	2	1	1.00	< MDA	N/A
15	Wipe #64	1	2	1	1.00	< MDA	N/A
16	Wipe #65	2	2	1	1.00	< MDA	N/A
17	Wipe #66	1	2	1	1.00	< MDA	N/A
18	Wipe #67	0	2	1	1.00	< MDA	N/A
19	Wipe #68	0	2	1	1.00	< MDA	N/A
20	Wipe #69	3	2	1	1.00	< MDA	N/A
21	Wipe #70	1	2	1	1.00	< MDA	N/A
22	Wipe #71	1	2	1	1.00	< MDA	N/A
23	Wipe #72	2	2	1	1.00	< MDA	N/A
24	Wipe #73	732	2	1	1.00	738	9.67%

$$MDA(dpm) = \frac{4.65\sqrt{R_b/T_b} + 3}{T_s \cdot Efficiency}$$

Clayton N. Watson
Health Physicist

Phase 1
Americum-241 Sampling Project
Wipe Sampling Locations and Results
02/22/06

WIPE SAMPLE #	WIPE SAMPLE RESULTS (DPM)	SAMPLE LOCATION DESCRIPTION		
1	<MDA *	Below Loading Dock - Ground Level	N/A	N/A
2	<MDA	Room # B210 Near Entrance	N/A	N/A
3	<MDA	Room # B210 Middle of Room	N/A	N/A
		Room # B911 Storage Closet	**SERIAL NUMBER**	**MANUFACTURER**
4	<MDA	Americium-241 Bar - Bar Casing - NRD	SA2199	NRD
5	**801**	**Americium-241 Bar - Bar Itself - NRD**	**SA2199**	**NRD**
6	<MDA	Polonium-210 Bar 48" - Bar Itself -3M	B00862	3M
7	<MDA	Polonium-210 Bar 60" - Bar Itself -3M	B00863	3M
8	<MDA	Polonium-210 Bar 48" - Bar Itself -3M	B00860	3M
9	<MDA	Polonium-210 Bar 48" - Bar Itself -3M	B00861	3M
10	<MDA	Polonium-210 Bar 18" - Bar Itself -3M	B00865	3M
11	<MDA	Polonium-210 Bar 100" - Bar Itself -3M	B00864	3M
		Path From Room #B204 to Trash Compactor		
12	<MDA	Hallway Outside Room # B204	N/A	N/A
13	<MDA	Hallway Outside Room # B211A	N/A	N/A
14	<MDA	Hallway Outside Room # B213	N/A	N/A
15	<MDA	Entrance to Loading Dock	N/A	N/A
16	<MDA	Entrance to Loading Dock Near Bike Port	N/A	N/A
17	<MDA	Loading Dock	N/A	N/A
18	<MDA	Loading Dock	N/A	N/A
19	<MDA	Loading Dock	N/A	N/A
20	<MDA	Loading Dock	N/A	N/A
21	<MDA	Inside Trash Compactor - Left Side	N/A	N/A
22	<MDA	Inside Trash Compactor - Front Side	N/A	N/A
23	<MDA	Inside Trash Compactor - Right Side	N/A	N/A
24	<MDA	Inside Trash Compactor - Middle Floor	N/A	N/A

*** MDA - Minimal Detectable Activity**

Phase 2
Radilogical Health Assessment Project
Wipe Sampling Locations and Results
Room #B911
02-27-06

WIPE SAMPLE #	WIPE SAMPLE RESULTS (DPM)	SAMPLE LOCATION DESCRIPTION
Background	N/A	Background reading taken outside of the storage closet
25	<MDA	Outside entrance door knob
26	<MDA	Inside entrance door knob
27	<MDA	Floor of entrance - below door
28	<MDA	Light switch near entrance
29	<MDA	Floor - middle of room b/t entrance and Kenmore® freezer
30	<MDA	Kenmore® freezer door handle
31	<MDA	Kenmore® freezer door shelves
32	<MDA	Kenmore® freezer main compartment
33	<MDA	Whirlpool® refrigerator door handle
34	<MDA	Whirlpool® refrigerator door shelves
35	<MDA	Whirlpool® refrigerator door main compartment
36	<MDA	Coldspot® refrigerator door handle
37	<MDA	Coldspot® refrigerator door shelves
38	<MDA	Coldspot® refrigerator door main compartment
39	<MDA	Floor - middle of room b/t Coldspot® refrigerator and box pile #2
40	<MDA	Floor - middle of room b/t support beam and locker #2
41	<MDA	Support beam - concrete wall face of support beam
42	<MDA	Concrete - behind support beam
43	<MDA	Support beam - room face of support beam
44	<MDA	Box pile #1
45	<MDA	Door handles on locker #1
46	<MDA	Inside locker #1
47	<MDA	Floor - b/t locker #5/6 and #3/4
48	<MDA	Door handles on locker #6
49	<MDA	Inside locker #6
50	<MDA	Door handles locker #3
51	<MDA	Inside locker #3
52	<MDA	Door handles locker #4

Phase 2
Radilogical Health Assessment Project
Wipe Sampling Locations and Results
Room #B911
02-27-06

53	<MDA	Inside locker #4
54	<MDA	On top of locker #4
55	<MDA	Door handle locker #2
56	<MDA	Inside locker #2
57	<MDA	Box pile #2
58	<MDA	Floor - b/t box pile #2 and entrance
59	<MDA	Wall - next to locker #4
Avg. Concrete	N/A	Average of all concrete walls

*** MDA - Minimal Detectable Activity**

Phase 4
NACO Printing Plant Maintenance Shop Radiation Sampling Project
Wipe Sampling Locations and Results
03/08/06

WIPE SAMPLE #	WIPE SAMPLE RESULTS (DPM)	SAMPLE LOCATION DESCRIPTION	SERIAL NUMBER	MANUFACTURER
50	<MDA	Shelf near ceiling - Room B222 (location of bar)	N/A	N/A
51	<MDA	Push cart - Room B220	N/A	N/A
52	<MDA	Entrance floor - Room B222	N/A	N/A
53	<MDA	Middle of room floor - Room B222	N/A	N/A
54	<MDA	Doorway floor adj. to entrance - Room B222	N/A	N/A
55	<MDA	Dooway floor perp. to entrance - Room B222	N/A	N/A
56	<MDA	Entrance floor - Room B224	N/A	N/A
57	<MDA	Desk - Room B224	N/A	N/A
58	<MDA	Entrance floor near hallway - Room B224	N/A	N/A
59	<MDA	Desk on hallway wall - Room B224	N/A	N/A
60	<MDA	Desk in middle of floor - Room B224	N/A	N/A
61	<MDA	Shop floor - Room B200A	N/A	N/A
62	<MDA	Desk in shop - Room B220A	N/A	N/A
63	<MDA	Work Bench in Shop - Room B220A	N/A	N/A
64	<MDA	Work Bench in Shop - Room B220A	N/A	N/A
65	<MDA	Work Bench in Shop - Room B220A	N/A	N/A
66	<MDA	Work Bench in Shop - Room B220A	N/A	N/A
67	<MDA	Middle of shop floor - Room B220A	N/A	N/A
68	<MDA	Shop side entrance - Room B220A	N/A	N/A
69	<MDA	Shop front entrance - Room B220A	N/A	N/A
70	<MDA	Label side of bar - 1st 1/4 of bar in Room B911 - Am241	A2201	NUCLESTAT
71	<MDA	2nd 1/4 of bar in Room B911 - Am241	A2201	NUCLESTAT
72	<MDA	3rd 1/4 of bar in Room B911 - Am241	A2201	NUCLESTAT
73	738	Side opposite label of bar - 4th 1/4 of bar in Room B911 - Am241	A2201	NUCLESTAT

*** MDA - Minimal Detectable Activity**

APPENDIX C

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL

U.S. Nuclear Regulatory Commission

Division of Fuel Cycle, Medical, Academic, and Commercial Use Safety

Washington, DC 20555

April 1993

GUIDELINES FOR DECONTAMINATION OF FACILITIES AND EQUIPMENT PRIOR TO RELEASE FOR UNRESTRICTED USE OR TERMINATION OF LICENSES FOR BYPRODUCT, SOURCE, OR SPECIAL NUCLEAR MATERIAL

U.S. Nuclear Regulatory Commission
Division of Fuel Cycle, Medical, Academic,
and Commercial Use Safety
Washington, DC 20555

April 1993

The instructions in this guide, in conjunction with Table 1, specify the radionuclides and radiation exposure rate limits which should be used in decontamination and survey of surfaces or premises and equipment prior to abandonment or release for unrestricted use. The limits in Table 1 do not apply to premises, equipment, or scrap containing induced radioactivity for which the radiological considerations pertinent to their use may be different. The release of such facilities or items from regulatory control is considered on a case-by-case basis.

1. The licensee shall make a reasonable effort to eliminate residual contamination.

2. Radioactivity on equipment or surfaces shall not be covered by paint, plating, or other covering material unless contamination levels, as determined by a survey and documented, are below the limits specified in Table 1 prior to the application of the covering. A reasonable effort must be made to minimize the contamination prior to use of any covering.

3. The radioactivity on the interior surfaces of pipes, drain lines, or ductwork shall be determined by making measurements at all traps, and other appropriate access points, provided that contamination at these locations is likely to be representative of contamination on the interior of the pipes, drain lines, or ductwork. Surfaces of premises, equipment, or scrap which are likely to be contaminated but are of such size, construction, or location as to make the surface inaccessible for purposes of measurement shall be presumed to be contaminated in excess of the limits.

4. Upon request, the Commission may authorize a licensee to relinquish possession or control of premises, equipment, or scrap having surfaces contaminated with materials in excess of the limits specified. This may include, but would not be limited to, special circumstances such as razing of buildings, transfer of premises to another organization continuing work with radioactive materials, or conversion of facilities to a long-term storage or standby status. Such requests must:

   a. Provide detailed, specific information describing the premises, equipment or scrap, radioactive contaminants, and the nature, extent and degree of residual surface contamination.

   b. Provide a detailed health and safety analysis which reflects that the residual amounts of materials on surface areas, together with other considerations such as prospective use of the premises, equipment, or scrap, are unlikely to result in an unreasonable risk to the health and safety of the public.

5. Prior to release of premises for unrestricted use, the licensee shall make a comprehensive radiation survey which establishes that contamination is within the limits specified in Table 1. A copy of the survey report shall be filed with the Division of Fuel Cycle Safety and Safeguards, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555, and also the Administrator of the NRC Regional Office having jurisdiction. The reports should be filed at least 30 days prior to the planned date of abandonment. The survey report shall:

   a. Identify the premises.

   b. Show that reasonable effort has been made to eliminate residual contamination.

   c. Describe the scope of the survey and general procedures followed.

   d. State the findings of the survey in units specified in the instructions.

Following review of the report, the NRC will consider visiting the facilities to confirm the survey.

\BLE I

ACCEPTABLE SURFACE CONTAMINATION LEVELS

NUCLIDES[a]	AVERAGE[b,c,f]	MAXIMUM[b,d,f]	REMOVABLE[b,e,f]
U-nat, U-235, U-238, and associated decay products	5,000 dpm α/100 cm^2	15,000 dpm α/100 cm^2	1,000 dpm α/100 cm^2
Transurancies, Ra-226, Ra-228, Th-230, Th-228, Pa-231, Ac-227, I-125, I-129	100 dpm/100 cm^2	300 dpm/100 cm^2	20 dpm/100 cm^2
Th-nat, Th-232, Sr-90, Ra-223, Ra-224, U-232, I-126, I-131, I-133	1,000 dpm/100 cm^2	3,000 dpm/100 cm^2	200 dpm/100 cm^2
Beta-gamma emitters (nuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 and other noted above.	5,000 dpm $\beta\Upsilon$/100 cm^2	15,000 dpm $\beta\Upsilon$/100 cm^2	1,000 dpm $\beta\Upsilon$/100 cm^2

[a] Where surface contamination by both alpha- and beta-gamma-emitting nuclides exists, the limits established for alpha- and beta-gamma-emitting nuclides should apply independently.

[b] As used in this table, dpm (disintegrations per minute) means the rate of emission by radioactive material as determined by correcting the counts per minute observed by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

[c] Measurements of average contaminant should not be averaged over more than 1 square meter. For objects of less surface area, the average should be derived for each such object.

[d] The maximum contamination level applies to an area of not more than 100 cm^2.

[e] The amount of removable radioactive material per 100 cm^2 of surface area should be determined by wiping that area with dry filter or soft absorbent paper, applying moderate pressure, and assessing the amount of radioactive material on the wipe with an appropriate instrument of known efficiency. When removable contamination on objects of less surface area is determined, the pertinent levels should be reduced proportionally and the entire surface should be wiped.

[f] The average and maximum radiation levels associated with surface contamination resulting from beta-gamma emitters should not exceed 0.2 mrad/hr at 1 cm and 2.0 mrad/hr at 1 cm, respectively, measured through not more than 7 milligrams per square centimeter of total absorber.

APPENDIX D

CALIBRATION CERTIFICATES

FOR

RADIATION SURVEY INSTRUMENTS

UTILIZED IN

SCANNING SURVEY

ECOLOGY SERVICES, INC.

10220 Old Columbia Road
Columbia, Maryland 21046
(410) 381-2600
1-800-932-7299
Fax (410) 381-2602

Certificate of Calibration

Calibrated On: 28-Jul-05
Calibration Due: 28-Jul-06

Job Number: 50664

Issued To: **Ray-Safe Associates**
Mike Terpilak
1916 Grayslake Drive
Silver Spring, MD 20906
301-598-5633

Instrument Identification:
FAG model FH40F6 S/N: 001202

Calibration Data: **mR/hr**
Equipment: J.L. Shepherd model 28-5A Source Calibrator (SN: 10245, 137Cs) 40 mRHM

Scale/Range	Actual (Test pt.)	As Found Reading	Indicated Reading	Correction Factor
µR/hr	80	80	80	1.00
	100	99	99	1.01
	200	195	195	1.03
	800	798	798	1.00
mR/hr	1.00	0.99	0.99	1.01
	2.00	2.00	2.00	1.00
	8.00	8.02	8.02	1.00
	10.0	10.1	10.1	0.99
	20.0	19.9	19.9	1.01
	80.0	80.0	80.0	1.00
	100	99	99	1.01
	200	195	195	1.03
	800	798	798	1.00

Precalibration Checks:

Battery Reading:	No Indication
Detector Shield:	N/A
Condition Received:	Fair
Contamination Levels	[X] < 100 DPM [ ] > 100 DPM
Audio Response:	Sat
Meter deflection/response:	Sat
Light:	Sat
Overrange:	Sat

Environmental Conditions:

Temperature (C):	N/A
Pressure (mmHg):	N/A
Relative Humidity (%):	N/A

Detector Response:

Detector Orientation:	**Perpendicular/Front End**
Nuclide:	N/A
Nuclide S/N:	N/A
Efficiency (4π):	N/A
Source Uncert. (+/-):	N/A
Correction Factors	
a) Temp/Pressure:	1.000
b) Branching Ratio:	1.000
c) Geometry:	1.000
d) Total:	1.000

Check Source:

Nuclide:	N/A
Scale/Range:	N/A
Indication:	N/A

Serviced By: Clayton A. Watson

ESI QC 1

Reviewed By:

Comments:

Over-range limit is 999mR/hr.

Maryland License: MD-27-061-01

Ecology Services, Inc. certifies that the above instrument has been calibrated by standards traceable to the National Institutes of Standards and Technologies (NIST), has been derived from accepted values of natural physical constants or has been derived by the ratio type of calibration techniques. The calibration system conforms to the requirements of MIL-STD-45662A, ANSI N323-1978, NCRP Report No. 112, NRC Reg Guide 10.8 Rev. 2, 1987 and 10 CFR Part 35.

APPENDIX E

CHARACTERISTICS OF TYPICAL STATIC ELIMINATORS USED BY THE FEDERAL AVIATION ADMINISTRATION PRINTING PLANT WASHINGTON, D.C.

Americium - 241

$^{241}Am_{95}$

Half life: 432.7 years
Specific activity: 1.27E+11 Bq.g^{-1}

Risk group: 1
Risk colour: Red

	Gamma or X		Beta (Emax)		Electrons		Alpha	
	E	%	E	%	E	%	E	%
E1	14	13					5388	1.4
E2	18	18					5443	12.8
E3	60	36					5486	85.2
% omitted		8.2						<1

Quantity (Bq)	1E+04
Concentration (Bq.g^{-1})	1E+00

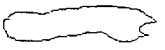
IAEA ST1 A_1 value	1E+1
IAEA ST1 A_2 value	1E-3

Point source (30 cm)

Betas, electrons (skin dose): 0.00E+0

Gammas, X rays (deep tissue dose): 1.49E-4

Infinite plane source



Betas, electrons (skin)

10 cm	0.0E+00
1 m	0.0E+00

Photons (skin)

10 cm	1.2E-03
1 m	5.1E-04

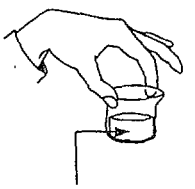
Photons (deep dose)

10 cm	3.8E-04
1 m	1.9E-04

10 ml glass vial

100 cm: 5.65E-6

Contact with 50 ml glass beaker



1.81E-2

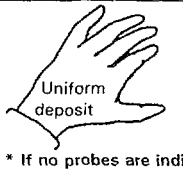
Contact with 5 ml plastic syringe

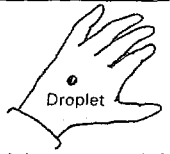
8.80E-2

The values above do not include Bremsstrahlung radiation.

Contamination skin dose (mSv.h^{-1})

Uniform deposit (1kBq.cm^{-2})	1.95E-2
0.05 ml droplet (1 kBq)	6.05E-3





Detection

Recommended probes*	
Alpha	+ +
Beta	
Gamma	
X rays	+ +

Derived limits (Bq.cm^{-2})

Removable contamination: 4E-2

Fixed contamination: 2E+0

* If no probes are indicated the recommended technique is to use a wipe test in association with a probe or liquid scintillation technique

Betas and electrons (Total absorption)

Glass	-
Plastic	-

Gamma and X rays (half and tenth value thickness)

	½	1/10
Lead	<1	<1
Steel	1	3

COMMITTED EFFECTIVE DOSE PER UNIT INTAKE (Sv.Bq^{-1})

Ingestion	f_1	
All compounds	0.0005	2.0E-07

Inhalation		1 µm	5 µm
	F		
All compounds	M	3.9E-05	2.7E-05
	S		

Highest dose organ: Bone surfaces — **20 mSv ALI$_{ingestion}$**: 1.0E+05 (Bq) **20 mSv ALI$_{inhalation}$**: 5.1E+02 (Bq)

PHYSICOCHEMICAL STATE	*Subject to external exposure requirements which may be more restrictive*					
	Volatility factor (k)	Supervised area		Controlled area		
		Bench	Fume hood	Bench	Fume hood	Glove box
All compounds	0.001	Forbidden	2E+04	Forbidden	5E+04	5E+06

Polonium - 210

$^{210}Po_{84}$

Half life: 138.4 days
Specific activity: 1.66E+14 Bq.g^{-1}

Risk group: 1
Risk colour: Red

	Gamma or X		Beta (Emax)		Electrons		Alpha	
	E	%	E	%	E	%	E	%
E1	803	<1					5304	100
E2								
E3								
% omitted		0						0

Quantity (Bq)	1E+04
Concentration (Bq.g^{-1})	1E+01

IAEA ST1 A_1 value	4E+1
IAEA ST1 A_2 value	2E-2

Point source (30 cm)

Betas, electrons (skin dose): -

Gammas, X rays (deep tissue dose): 1.51E-8

Infinite plane source

Betas, electrons (skin)

10 cm	0.0E+00
1 m	0.0E+00

Photons (skin)

10 cm	5.7E-08
1 m	3.7E-08

Photons (deep dose)

10 cm	5.3E-08
1 m	3.4E-08

10 ml glass vial

100 cm: 1.30E-9

Contact with 50 ml glass beaker

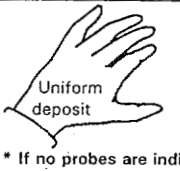
4.70E-6

Contact with 5 ml plastic syringe

2.23E-5

Contamination skin dose (mSv.h^{-1})

Uniform deposit (1kBq.cm^{-2})	6.90E-7
0.05 ml droplet (1 kBq)	0.00E+0



Detection

Recommended probes*	
Alpha	+ +
Beta	
Gamma	
X rays	

Derived limits (Bq.cm^{-2})

Removable contamination	
3E-1	
Fixed contamination	
3E+1	

* If no probes are indicated the recommended technique is to use a wipe test in association with a probe or liquid scintillation technique

Betas and electrons (Total absorption)

Glass	-
Plastic	-

Gamma and X rays (half and tenth value thickness)

	½	1/10
Lead	11	31
Steel	31	78

COMMITTED EFFECTIVE DOSE PER UNIT INTAKE (Sv.Bq^{-1})

Ingestion	f_1	
All compounds	0.100	2.4E-07

Inhalation		1 µm	5 µm
All unspecified compounds	F	6E-07	7.1E-07
Oxides, hydroxides and nitrates	M	3.0E-06	2.2E-06
	S		

Highest dose organ Whole body **20 mSv ALI$_{ingestion}$** 8.3E+04 (Bq) **20 mSv ALI$_{inhalation}$** 6.7E+03 (Bq)

PHYSICOCHEMICAL STATE	*Subject to external exposure requirements which may be more restrictive*					
	Volatility factor (k)	Supervised area		Controlled area		
		Bench	Fume hood	Bench	Fume hood	Glove box
All compounds	0.01	2E+03	2E+04	7E+03	7E+04	7E+06

APPENDIX F

NATIONAL COUNCIL ON RADIATION PROTECTION AND MEASUREMENTS

REPORT NO. 93

IONIZING RADIATION EXPOSURE OF THE POPULATION OF THE UNITED STATES

SEPTEMBER 1, 1987

NCRP REPORT No. 93

IONIZING RADIATION EXPOSURE OF THE POPULATION OF THE UNITED STATES

NCRP

National Council on Radiation Protection and Measurements

NCRP REPORT No. 93

IONIZING RADIATION EXPOSURE OF THE POPULATION OF THE UNITED STATES

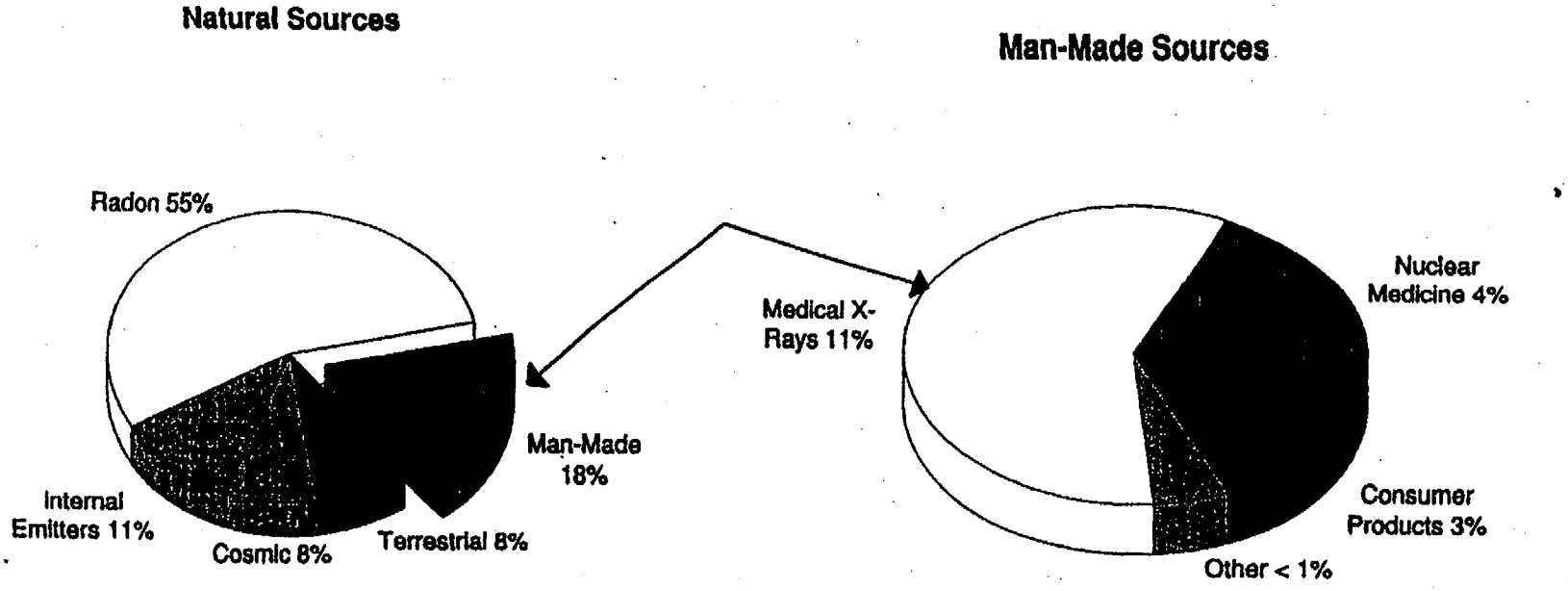
Recommendations of the
NATIONAL COUNCIL ON RADIATION PROTECTION AND MEASUREMENTS

Issued September 1, 1987

National Council on Radiation Protection and Measurements
7910 WOODMONT AVENUE / BETHESDA, MD 20814

Ionizing Radiation Exposure
of the Population
of the United States,
September 1, 1987.

Figure 1.0



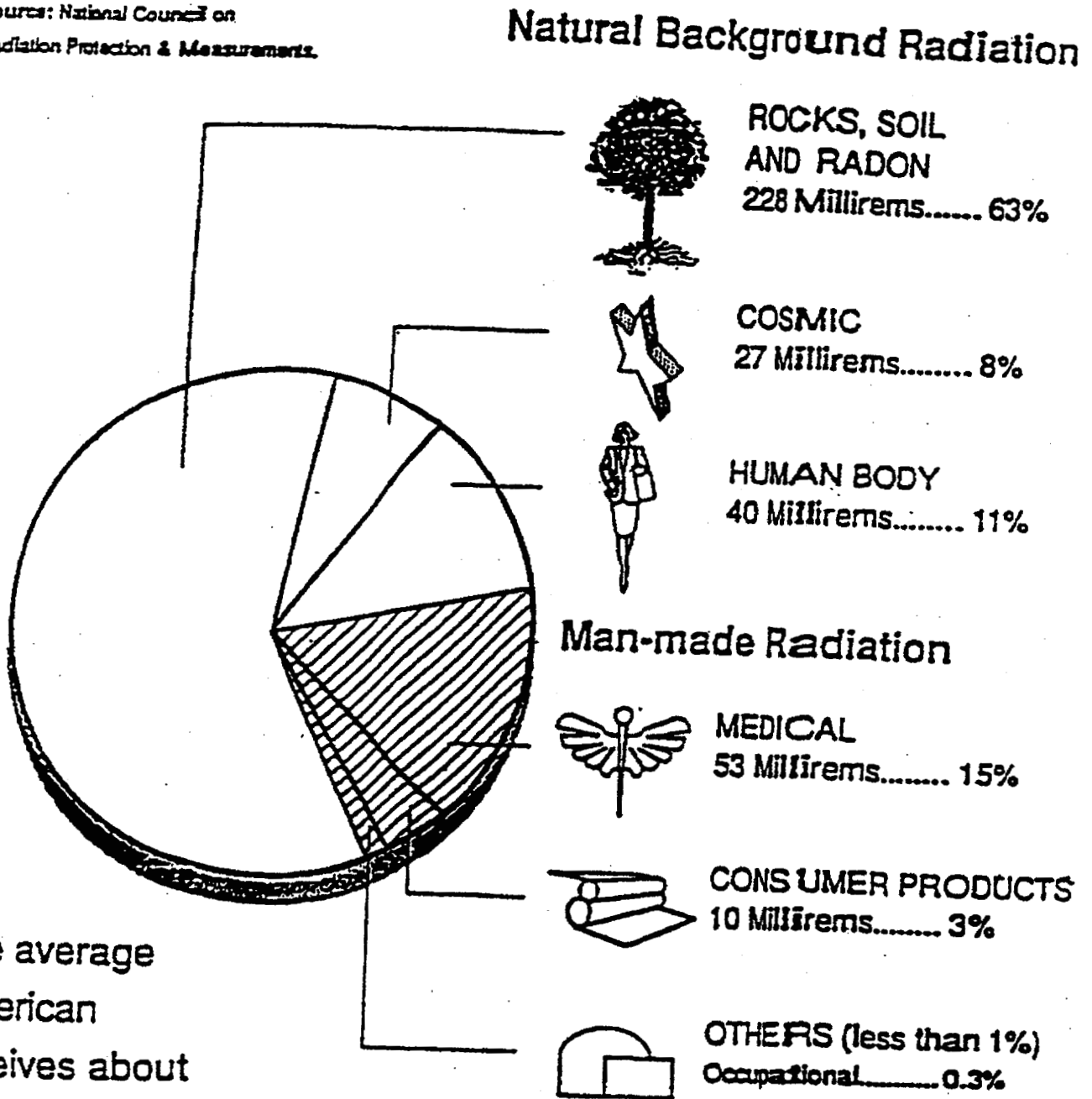
Based on an average annual effective dose equivalent of 3.6 mSv (360 mrem) and a ground level radon concentration of about 40 Bqm^{-3} (1 pCi/l)

Radiation Exposure in the United States (Percentage of Total Effective Dose)

(After NCRP 93, 1987)

Sources and Doses of Radiation

Source: National Council on Radiation Protection & Measurements.



The average American receives about **360 millirems** of radiation per year from all sources.

National Council on Radiation Protection and Measurements; (NCRP), Report No. 93,

TABLE 1.0

AVERAGE DOSE EQUIVALENT TO THE U.S. POPULATION (mrem)

SOURCES	DOSE
NATURAL	
Inhaled (Radon)	200
Cosmic	27
Terrestrial	28
Internal	39
CONSUMER PRODUCTS	5-13
MEDICAL	
Diagnostic X-ray	39
Nuclear Medicine	14
	~350

Ref: NCRP 93 (1987)

APPENDIX G

TOTAL DOSE ASSESSMENT

CALCULATIONS

ON SPECIFIC RADIONUCLIDE

AMERICIUM-241

USED AT THE

FEDERAL AVIATION ADMINISTRATION

PRINTING PLANT

WASHINGTON, D.C.

TOTAL DOSE ASSESSMENT

Since all results of radiation surveys swipes and instrument measurements indicate no removable, residual or fixed radioactivity on all surfaces, floor, walls, doors, etc., in addition to all instrument surveys indicating no measurements above natural background, the HCHB meets all the criteria for unrestricted use.

Using NUREG-1500, the following assumptions have been made.

If the storage closet Room B-911 average surface contamination from Americium-241 was 800 DPM/100 cm^2, the dose associated with the building occupancy scenario would be as follows: using Table A-2 Building Occupancy ScenarioDose in First Year following unrestricted use based on 800 DPM/100 cm^2 initial activity.

Activity of Americium-241		External Dose 1 mrem/year Americium-241		Total External Dose mrem/year
800 $\frac{DPM^*}{100\ cm^2}$	X	3.29×10^{-2}	=	0.026

If we now compare this external dose to that that an individual member of the general public receives from natural background radiation which is approximately 295 mrem/year and the combined annual dose from natural background radiation and man-made radiation is approximately 360 millirem/year, then the 0.026 mrem/year exposure from the Americium-241 is approximately 4-5 orders of magnitude lower than the annual total natural background and man-made radiation to the average individual in the United States (APPENDIX F).

This dose rate is then in full compliance with 1- CFR Part 20 Subpart E — Section 20.1402 Radiological Criteria for Unrestricted Use which states that the Total Effective Dose Equipment (TEDE) to an average member of the critical group does not exceed 25 mrem (0.25 mSV) per year above national background radiation.

*The 800 $\frac{DPM^*}{100\ cm^2}$ is calculated to be 0.00176 microcuries (μCi). The recognized safe limit Defined by the NRC is below 0.005 microcuries (μCi) on such leak testing.

ATTACHMENT A

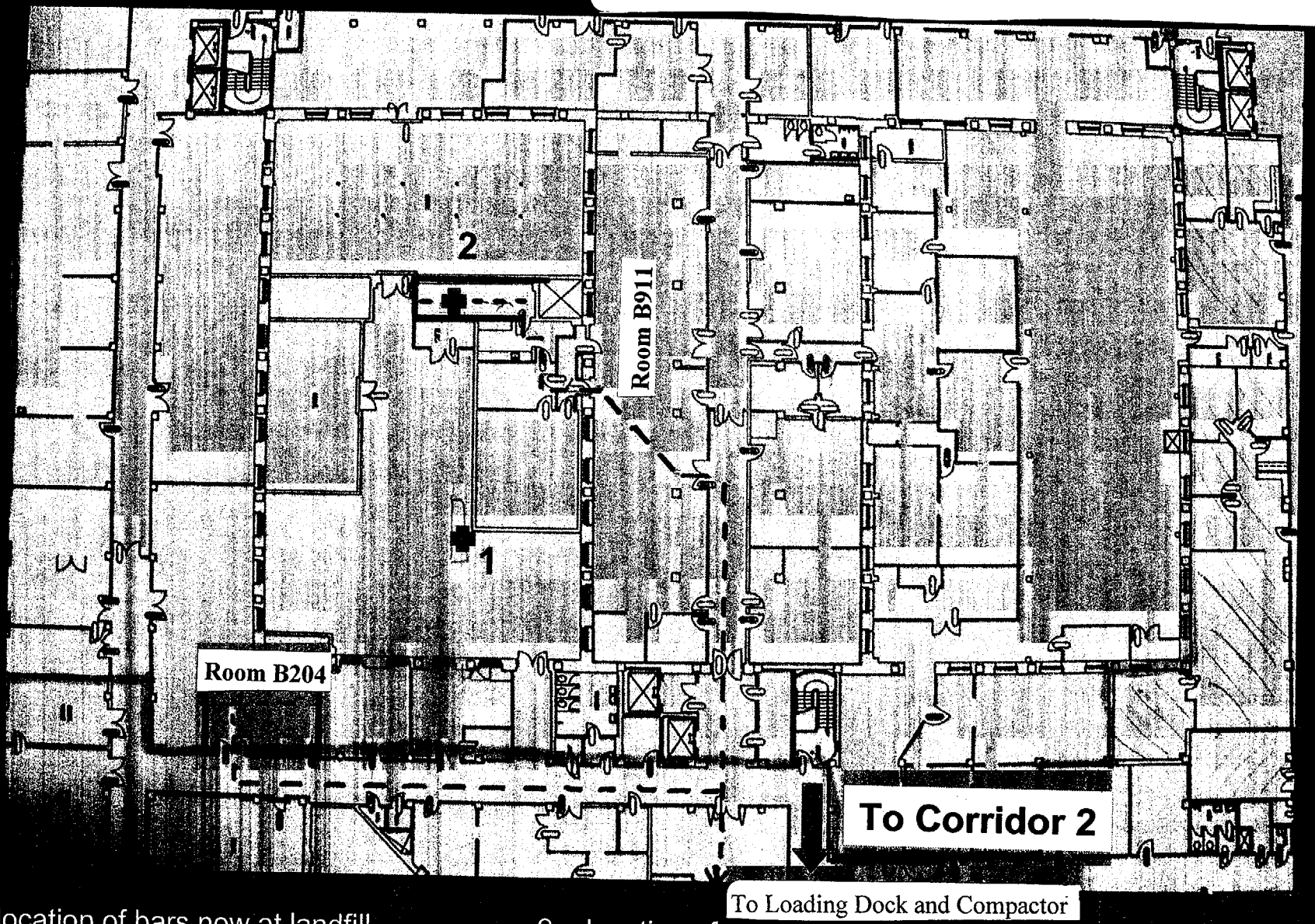
- LOCATION OF BARS
- LOCATION OF TWO BARS SENT TO LANDFILL
- TRASH COMPACTOR
- AMERICUM-241 BAR TYPE 1
- AMERICUM-241 BAR TYPE 2
- CORRESPONDENCE FOR DISPOSAL OF TWO NRD AMERICAM-241 STATIC ELIMINATOR BARS

MARCH 10, 2006

Location of Bars

Solid black lines designate location of storage rooms,

Dotted black lines designate swipe surveys and removal of static eliminator bars to loading dock and trash compactor.



1 = location of bars now at landfill

2 = location of seven additional bars on top of 6 foot high locker

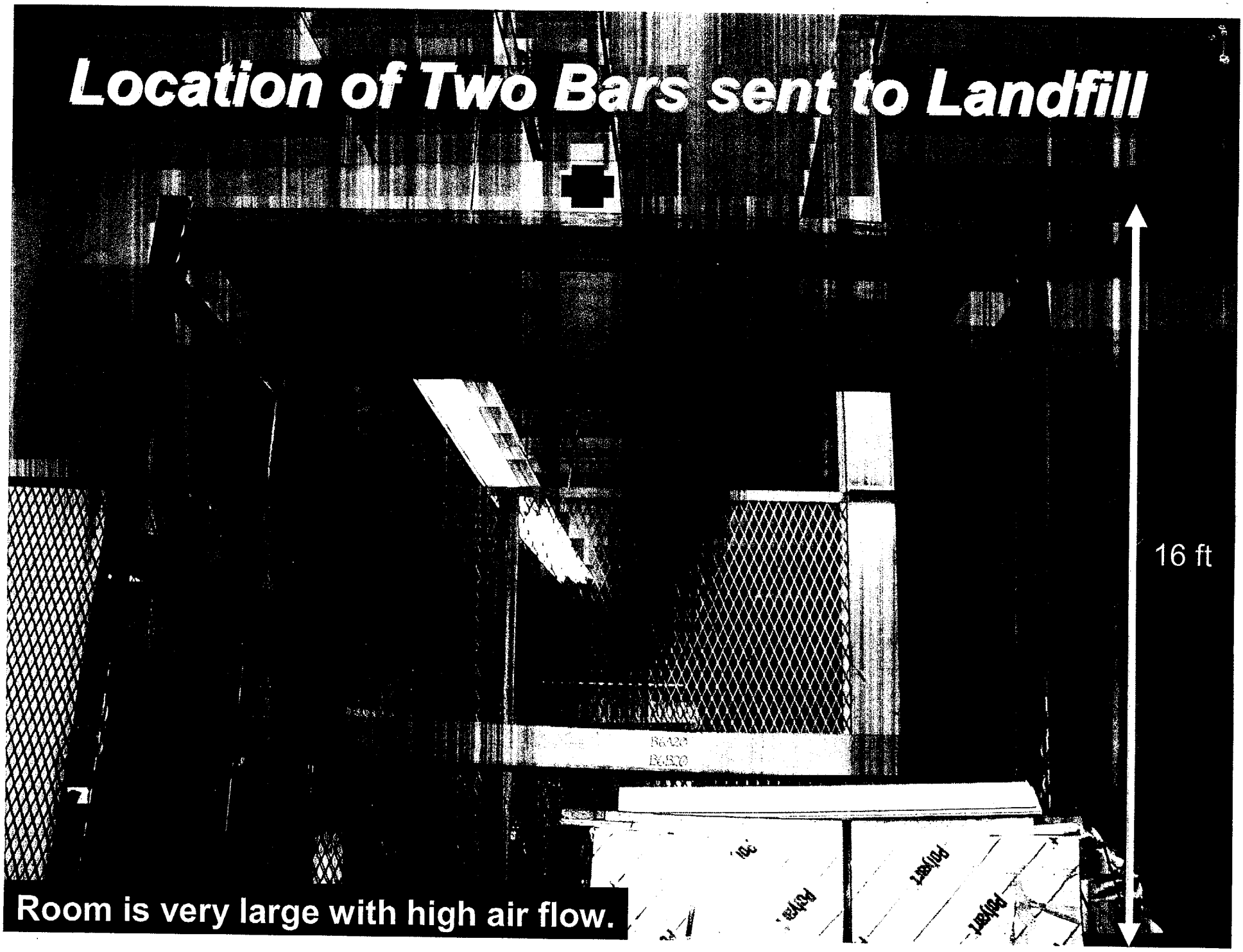

Location of Two Bars sent to Landfill
16 ft
Room is very large with high air flow.

Figure 2

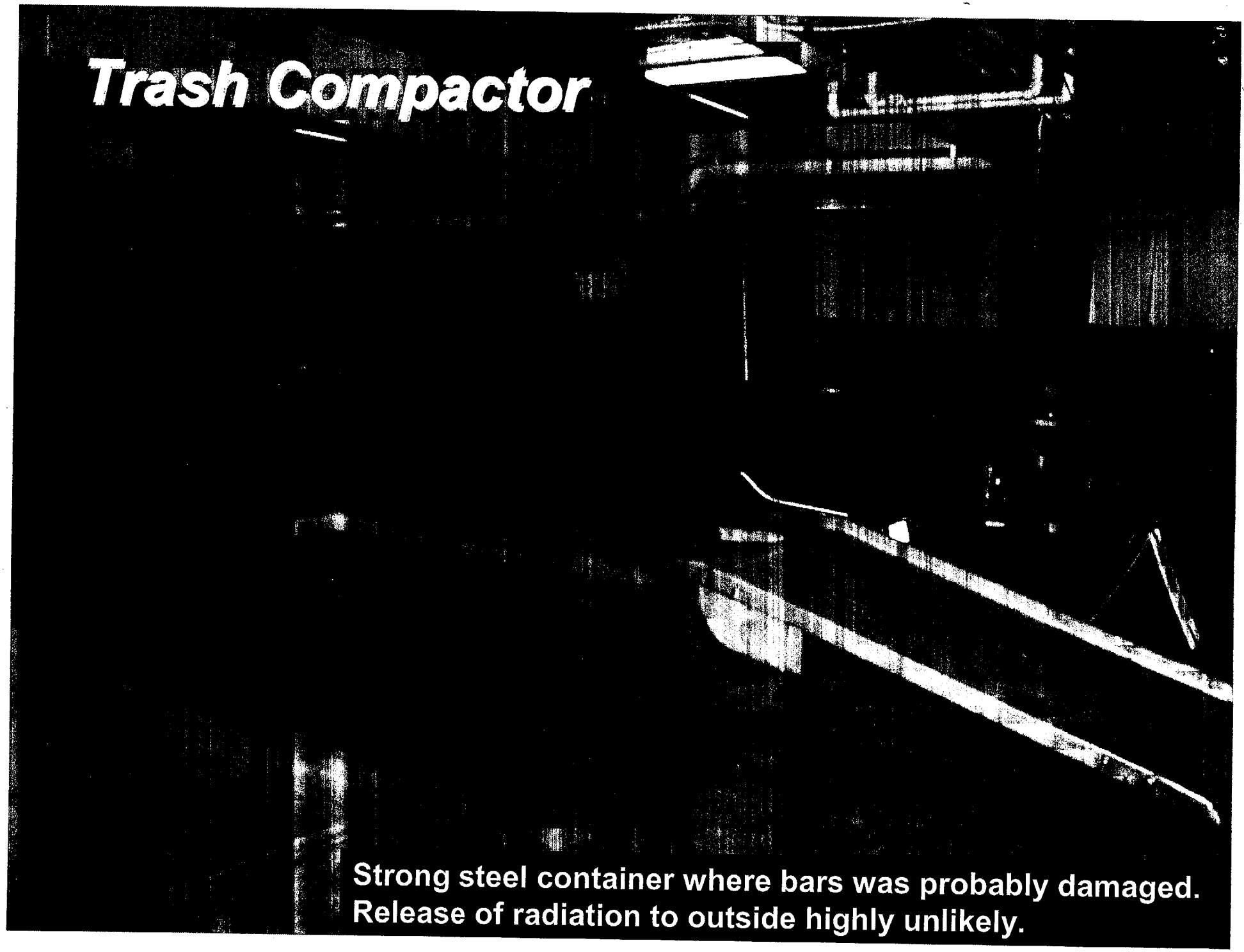

Trash Compactor
Strong steel container where bars was probably damaged.
Release of radiation to outside highly unlikely.

Figure 3

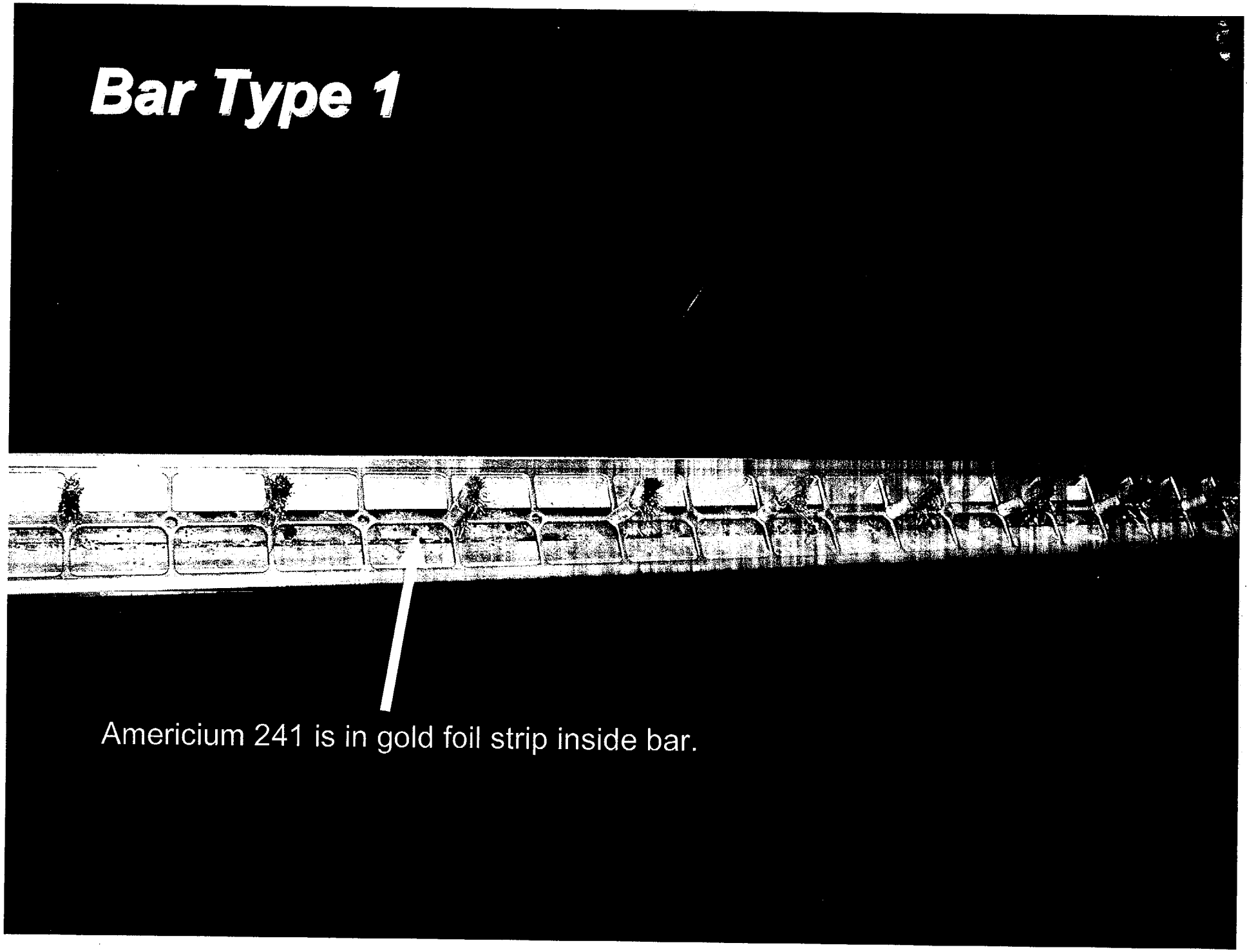


Figure 4

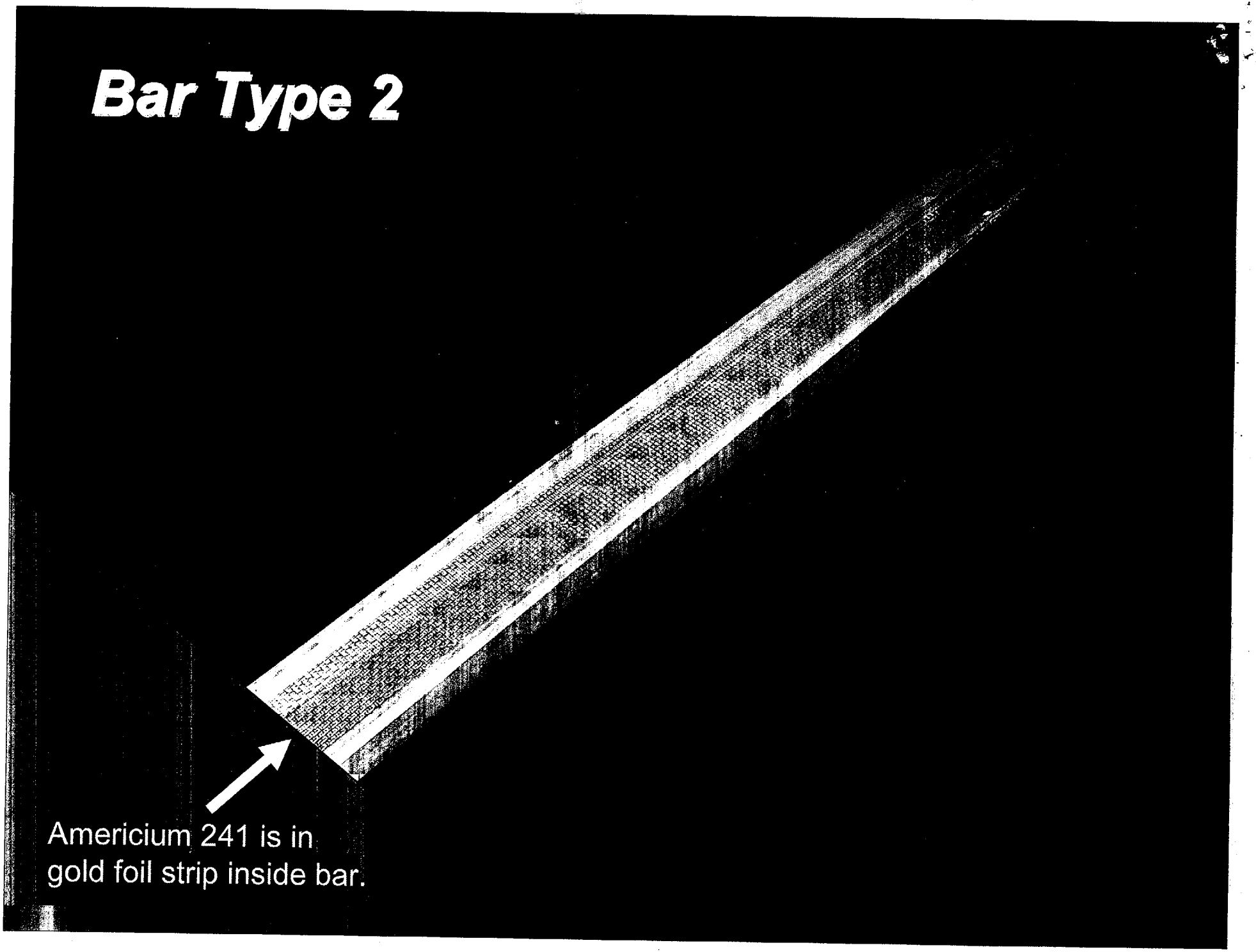


Figure 5

NRD, LLC
2937 ALT
PO BOX 310
GRAND ISLAND, NY
14072-0310

800-525-8076
716-773-7634
716-773-7744 FAX
service@nrdinc.com

Friday, March 10, 2006

APPLIED HEALTH PHYSICS INC
2986 INDUSTRIAL BLVD
BETHAL PARK, PA 15102

ATTN: SAFETY MANAGER

We are in receipt of the item(s) returned to NRD, LLC for waste disposal. This letter serves as Proof of Compliance that the device(s) listed below have been disposed, and the service performed under New York State License 1391-1811

Device/Model	Qty	Serial #	To Serial #	Manufactured	NRD's Sales Order #
A2003	1	SA2200		06-29-81	07653
A2003	1	SA2202		06-29-81	07653

These devices were originally distributed to U.S. Dept. of Commerce/NOAA.

Isotope:	Americium 241
Total Curies:	0.04050
Your Original Po #	
NRD's Original Sales Order	07653

Very truly yours,

Douglas Davis
Safety Officer