

NOTICE OF VIOLATION

ADCO Services, Inc.

License No. 12-11286-01

As a result of the inspection conducted on September 20 and 23, 1985, and in accordance with the "General Policy and Procedures for NRC Enforcement Actions," 10 CFR Part 2, Appendix C (1985), the following violation was identified:

10 CFR 61.55 requires that the concentration of strontium-90 Class A waste for near surface disposal at a licensed waste disposal facility not exceed 0.04 curies per cubic meter (3.475 millicuries per 7.5 cubic feet).

Contrary to the above, your radioactive waste shipment No. 85-062 which arrived at the Richland, Washington burial site on September 20, 1985, included a 7.5 cubic foot drum containing 19.8008 millicuries of strontium-90 marked Class A unstable, which exceeds the concentration limit.

This is a Severity Level IV violation (Supplement V).

Pursuant to the provisions of 10 CFR 2.201, you are required to submit to this office within thirty days of the date of this Notice a written statement or explanation in reply, including for each violation: (1) corrective action taken and the results achieved; (2) corrective action to be taken to avoid further violations; and (3) the date when full compliance will be achieved. Consideration may be given to extending your response time for good cause shown.

Dated

12/13/85

*J. A. Hind for Wayne Shafer for*

Jack A. Hind, Director  
Division of Radiation  
Safety and Safeguards

8512240105 851217

REG-3 LIC30

12-11286-01

PDR

XA 1P.

A. N. SHINPOCH

Secretary



STATE OF WASHINGTON

DEPARTMENT OF SOCIAL AND HEALTH SERVICES

Olympia, Washington 98504-7512

ENCLOSURE 2

Sent to

RH on

Oct. 1, 1985

RECEIVED  
NRC

1985 SEP 30 AM 11:05

REGION V IAF

September 24, 1985

Adco Services, Inc.  
P.O. Box 35  
Tinley Park, Illinois 60477

Attention: R. W. Bassett

Dear Mr. Bassett:

Permit #1300

This letter refers to a shipment of radioactive waste material sent to the commercial low-level radioactive waste disposal site operated by US Ecology, Incorporated, near Richland, Washington. Your shipment number 85-062 was sent on September 16, 1985 and received on September 20, 1985. Inspections revealed the following violations of US Ecology license number WN-I019-2.

Container Number  
or Description

Drum number 850390-007

Summary of  
Violations

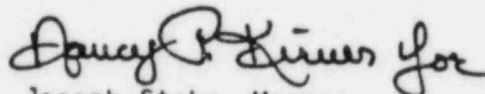
This drum contains,  
19.8008 mCi of Sr-90.  
The Class A limit for  
Sr-90 in a 7.5 cubic foot  
drum is 8.475 mCi. Appendix  
E of US Ecology license  
number WN-I019-2.

Because of the nature of the violation found in this shipment, authorization to use the commercial low-level radioactive waste disposal site by Adco Services, Inc. has been suspended indefinitely. Shipments in transit prior to 12:00 noon PDT will be admitted to the site. Further shipments will be refused pending reinstatement of site use permit.


Adco Services, Inc.  
September 24, 1985  
Page 2

If you wish to reestablish site use privileges, you must respond in writing to: DSHS, Radiation Control Section, Mail Stop LE-13, Olympia, Washington 98504. In your response, please describe the action you have taken or plan to take to bring your activities into full compliance with all applicable state and federal regulations. This should be in the form of a quality assurance program. If no response is received within 90 days, your site use permit will be terminated.

Sincerely,



Joseph Stohr, Manager  
Radioactive Waste Program

  
for Bob Bidstrup  
Health Physicist

JS:BB:pm

cc: US Ecology - Louisville, KY  
US Ecology - Richland, WA  
Joel Lubenau - Nuclear Regulatory Commission  
Bob Bidstrup - DSHS, Radiation Control Section  
Lee Kegely - UTC  
Robert Thomas - Region V, USNRC ✓  
James G. Keppler, Region III, USNRC

## WASTE PACKAGING AND SHIPMENT INSPECTION RECORD

The enclosed inspection formats consisting of SHIPPING DOCUMENTATION, RADIO-LOGICAL SURVEY DATA, and VISUAL FEATURES are to be completed by the State inspector ONLY when an item of noncompliance has been identified, and ONLY when an NRC licensee is involved. ONLY the particular format associated with the item of noncompliance needs to be completed in addition to the shipment identification page.

SHIPMENT IDENTIFICATIONLicensee/ShipperName Adco Services, Inc.City & State Tinley Park, Ill.BrokerName Adco Services, Inc.City & State Tinley Park, Ill.CarrierName Adcom ExpressTrailer No. 520024Shipment InspectedDate 9/20/85 Time \_\_\_\_\_Describe the Shipment (Number of boxes, drums, etc.)☒ LSA☐ Other (DOT I, II, III LABELS)

152 drums

RECEIVED  
1985 NOV -1 AM 10 20  
FBIBdo Bidstrup  
Inspector

SHIPPING DOCUMENTATION

DATE 9/20/85

TIME \_\_\_\_\_

INSPECTOR Bidstrup

Shipping Papers

~~Freight Bill~~ No. 85-062  
Shipment No.

Carrier: Adeco Express

Broker:

Name Adeco Services

City & State Tinley Park, Ill.

Generator:

Name Adeco Services

City & State Tinley Park, Ill.

Certification ☒ YES

☐ NO

Shipment: Exclusive use ☒

Instructions for Exclusive use ☒ YES ☐ NO

Nonexclusive use ☐

Type A Certification of Compliance for Type "B" N/A

Shipment ☐ YES ☐ NO

Proper Shipping Name/Class ☒ YES ☐ NO

REMARKS

Drum Number 850390-007, 7.5 ft<sup>3</sup>  
contains 19.8008 mCi 90Sr, marked:  
The 90Sr Class A limit Class A unstable  
for 7.5 ft<sup>3</sup> drum is 8.475 mCi.

RADIOLOGICAL SURVEY DATADATE 9/20/85

TIME \_\_\_\_\_

INSPECTOR BidstrupINSTRUMENT DATA

	Radiation Levels	Monitor Smears
Make	<u>Ludlum</u>	<u>N/A</u>
Model	<u>3</u>	<u>1</u>
S/N	<u>27735</u>	<u>1</u>
Calib. due date	<u>11/15/85</u>	<u>1</u>

SURVEY RESULTS (mr/hr)Cab No. 798Level < 0.5Sketch in  
Cargo Placement  
and Smear LocationsTrailer No. N/AMaximum at surface 0.6 mr/hr  
Maximum at 2 meters < 0.5 mr/hrSMEAR DATAREMARKS:Identify locations by "x" and  
whether on vehicle surface or  
packages.

1. N/A all O.K.
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

VISUAL FEATURES (As Applicable)

DATE 9/20/85

TIME \_\_\_\_\_

INSPECTOR Bidstrup

TYPE VEHICLE:

☒ Closed  
☐ Open  
☐ Other

PLACARD DATA

Front	<input checked="" type="radio"/> YES	<input type="radio"/> NO
Rear	<input checked="" type="radio"/> YES	<input type="radio"/> NO
Right	<input checked="" type="radio"/> YES	<input type="radio"/> NO
Left	<input checked="" type="radio"/> YES	<input type="radio"/> NO

General Conditions of Package(s) Good

Blocking, Bracing, Tie-Down Adequate? yes

MARKING

Marked Radioactive LSA

YES	NO
<input checked="" type="radio"/>	<input type="radio"/>

LABELING

N/A

Proper Labels  
Label Entries Filled In

<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>

REMARKS:

The only problem with this shipment was the 1, A - unstable drum exceeding the 10CFR61.55 limits for Class 5r-90.

A. N. SHINPOCH  
Secretary



ENCLOSURE 3

RECEIVED  
FIDC

STATE OF WASHINGTON  
DEPARTMENT OF SOCIAL AND HEALTH SERVICES

Olympia, Washington 98504

October 4, 1985

1985 OCT 10 PM 12:19

REGISTRATION

ADCO Services, Incorporated  
P.O. Box 35  
Tinley Park, Illinois 60477

Attention: R. W. Bassett

Dear Mr. Bassett:

Permit #1300

This letter refers to a shipment of radioactive waste material sent to the commercial low-level radioactive waste disposal site operated by US Ecology, Incorporated, near Richland, Washington. Your shipment #85054 was sent on September 18, 1985, and received on September 23, 1985. Inspection revealed the following violation of U.S. Department of Transportation regulations.

Container Number  
or Description

Summary of  
Violations

Trailer #744

Removable radioactive contamination of up to 839,000 dpm per 100 cm<sup>2</sup> was found on the floor of this trailer. This exceeds the limits of 49 CFR 173.443(a).

Because this shipment was in transit prior to your suspension of 12:00 noon September 20, 1985, it was accepted at the site. Further shipments will be refused pending reinstatement of your site use permit. If you wish to reestablish site use privileges, you must respond in writing to this item as well as those that led to your suspension of the above date.

Sincerely,

Joseph S. Stohr, Manager  
Radioactive Waste Program

Bob Bidstrup, Health Physicist  
(509) 545-2313

cc: US Ecology, Louisville, KY  
US Ecology, Richland, WA  
Joel Lubenau, Nuclear Regulatory Commission  
Bob Bidstrup, DSHS Radiation Control  
Lee Kegley, UTC  
Robert Thomas, Region V, USNRC  
James G. Keppler, Region III, USNRC



## WAST PACKAGING AND SHIPMENT INSPECTOR RECORD

The enclosed inspection formats consisting of SHIPPING DOCUMENTATION, RADIO-LOGICAL SURVEY DATA, and VISUAL FEATURES are to be completed by the State inspector ONLY when an item of noncompliance has been identified, and ONLY when an NRC licensee is involved. ONLY the particular format associated with the item of noncompliance needs to be completed in addition to the shipment identification page.

SHIPMENT IDENTIFICATIONLicensee/ShipperName Adco ServicesCity & State Tinley Park, IllBrokerName Adco ServicesCity & State Tinley Park, IllCarrierName Adcom / Ray-TechTrailer No. 744Shipment InspectedDate 9/23 - 24/85 Time \_\_\_\_\_Describe the Shipment (Number of boxes, drums, etc.)☒ LSA☐ Other (DOT I, II, III LABELS)

133 drums

1985 NOV -1 AM 10:26

RECEIVED  
NRCBob Bidstrup  
Inspector

IE-V Form 604

SHIPPING DOCUMENTATION

DATE 9/23-24/85

TIME \_\_\_\_\_

INSPECTOR Bidstrup

Shipping Papers

Shipment  
~~Freight Bill~~ No. 85054

Carrier: Adcom/Ray Tech

Broker:  
Name Adco Services

City & State Tinley Park, Ill

Generator:  
Name Adco Services

City & State Tinley Park, Ill

Certification ☒ YES

☐ NO

Shipment: Exclusive use ☒

Instructions for Exclusive use ☒ YES ☐ NO

Nonexclusive use ☐

Type A Certification of Compliance for Type "B"

N/A

Shipment ☐ YES ☐ NO

Proper Shipping Name/Class ☒ YES ☐ NO

REMARKS

VISUAL FEATURES (As Applicable)

DATE 9/23-24/85

TIME \_\_\_\_\_

INSPECTOR Bidstrup

TYPE VEHICLE:

- ☒ Closed  
☐ Open  
☐ Other

PLACARD DATA

Front	<input checked="" type="radio"/> YES	<input type="radio"/> NO
Rear	<input checked="" type="radio"/> YES	<input type="radio"/> NO
Right	<input checked="" type="radio"/> YES	<input type="radio"/> NO
Left	<input checked="" type="radio"/> YES	<input type="radio"/> NO

General Conditions of Package(s) good

Blocking, Bracing, Tie-Down Adequate? yes

MARKING

Marked Radioactive LSA

YES	NO
<input checked="" type="radio"/>	<input type="radio"/>

LABELING

Proper Labels  
Label Entries Filled In

<input type="radio"/>	<input type="radio"/>
<input type="radio"/>	<input type="radio"/>

REMARKS:

# RADIOLOGICAL SURVEY DATA

DATE 9/23-24/85

TIME \_\_\_\_\_

INSPECTOR Bidstrup

## INSTRUMENT DATA

	Radiation Levels	Monitor Smears
Make	<u>Ludlum</u>	
Model	<u>3</u>	
S/N	<u>27760</u>	
Calib. due date	<u>11/15/85</u>	

↓  
see US Ecology  
Surveys, Attached!

## SURVEY RESULTS (mr/hr)

Cab No. 99

Level <0.5

Sketch in  
Cargo Placement  
and Smear Locations

Trailer No. 744

Maximum at surface 2.0 mR/hr  
Maximum at 2 meters <0.5 mR/hr

## SMEAR DATA

Identify locations by "x" and whether on vehicle surface or packages.

1. See Attached
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

## REMARKS:

Removable contamination of up to 889,000 dpm/100 cm<sup>2</sup> was found on the floor of this trailer.

49 CFR 173.443 (a)

see attached survey data for details

## VEHICLE DECONTAMINATION RECORD

MANIFEST NUMBER: 45701

BATES NUMBER: 13415

GENERATOR NUMBER: HW-79-001-163

SHIPMENT NUMBER: 85-054

## SHIPPER/GENERATOR

## BROKER

NAME: ARCO Services, Inc.

Same

ADDRESS: P.O. Box 35

Tinley Park Ill. 60477

CONTACT: R.D. Bennett

TRAILER NO.: 744

CARRIER: ARCO Exp. Inc.

SUPPLIES AND MAN-HOURS EXPENDED: 1.5 hrs. None

## DECONTAMINATION CHECKLIST

	REQUIRED		BY WHOM	DATE COMPLETED	INITIALS
	YES	NO			
1. Generator/Broker contacted	✓		T. King	9/24/85	
2. Carrier contacted	✓		T. King	9/24/85	
3. Thyroid count (if required)		✓	N/A	9/24/85	
4. Bioassay (if required)	✓		C. WARD	9-26-85	
5. Carrier informed that decontamination is completed	✓			9/24/85	
6. Updated vehicle survey sheet to indicate decontamination	✓		C. WARD	9/24/85	
7. Billing	✗		Cherry	9-25-85	
8. Other (Specify)					

REMARKS:

PREPARED BY:

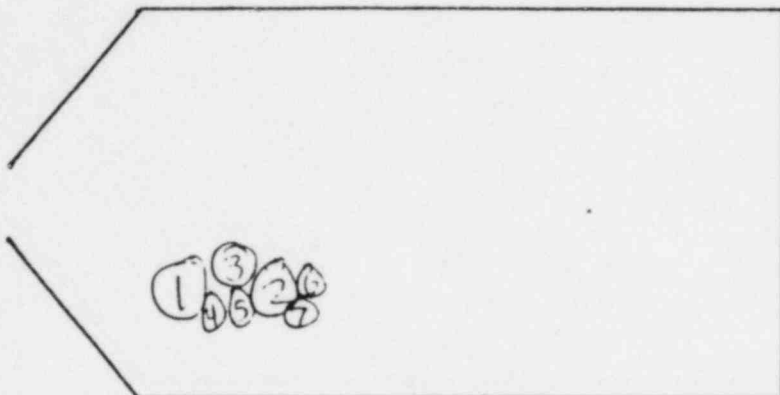
C. WARD RCT57

REVIEWED BY:

Cherry

13445

DATE 9/24/85



RESULTS OF SURVEY (HIGHEST LEVELS)	ISOTOPE(S) OF CONCERN AND ACTIVITY (mCi)
80,000 dpm/100cm <sup>2</sup> $\beta$	<del>H<sub>3</sub>, C-14, I-125</del>
N/D dpm/100cm <sup>2</sup> $\alpha$	N/A
N/A mRem/hr(Fixed)	N/A

DECONTAMINATION METHOD RECOMMENDED

WIPE WITH RAGS

AIR SAMPLE RESULTS

DATE/TIME	RESULTS (uCi/ml)			ANALYZED BY (INITIALS)
	$\beta$	IODINE	$\alpha$	
9/24/85 10:00	2.9E-12	9.8E-13	2.9E-12	C. W. W. III

RESPIRATORY EQUIPMENT REQUIRED (YES/NO) EXPLAIN

PRE-DECON A.R. Sample Indicates  
Levels Below Action Levels.

REMARKS

Energy analysis using Tri Carb  
eliminated presence of H<sub>3</sub> + I-125

SMEAR RESULTS (DPM/100cm<sup>2</sup>)

No.	BETA/GAMMA	ALPHA
1	838760	N/A
2	15660	N/A
3	13430	N/A
4	26660	N/A
5	24670	N/A
6	10070	N/A
7	5660	N/A
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

INSTRUMENT DATA

TYPE	TRI CARB
SERIAL NO.	31247
CAL DUE DATE	
SOURCE CHECK	SAT 12/85
TYPE	M-14C
SERIAL NO.	39311
CAL DUE DATE	3-3-86
SOURCE CHECK	SAT 12/85
TYPE	E-140N
SERIAL NO.	628
CAL DUE DATE	12-5-85
SOURCE CHECK	SAT 12/85
TYPE	M-3
SERIAL NO.	18561
CAL DUE DATE	12-5-85
SOURCE CHECK	SAT 12/85

Radiation readings are logged  
in mRem/hr unless otherwise  
noted, smear locations are  
circled, radiation readings  
are uncircled, direct frisk  
readings are boxed.

SURVEYED BY:

C. W. W. III RCHT

REVIEWED BY:

[Signature]

7/24/85

BATES NUMBER

1-145

## 1. PERSONNEL PERFORMING DECONTAMINATION

NAME	TITLE	RESPIRATOR WORN (TYPE OR NA)	THYROID ASSAY YES/NO/NA	BIOASSAY YES/NO/NA
Calward	RCIST	N/A	N/A	YES

## 2. RESULTS OF PORTABLE AIR SAMPLES PERFORMED

DATE/TIME	Results (uCi/ml)			ANALYZED BY (INITIALS)
	$\alpha$	Iodine	$\alpha$	
see Pre-Run				Calward

## 3. DESCRIPTION OF DECONTAMINATION METHODS

Wiped down all areas with PADS to achieve  
desired effects. After PADS all areas  
surveyed  $\leq$  BKGD on E-140N. BKGD = 100CPM.

## INSTRUMENT DATA

Type	M-14C	Type	E-140N	Type	
Serial No.	39311	Serial No.	628	Serial No.	
Cal Due Date	3-3-86	Cal Due Date	12-5-85	Cal Due Date	
Source Check	SATISFI	Source Check	SATISFI	Source Check	

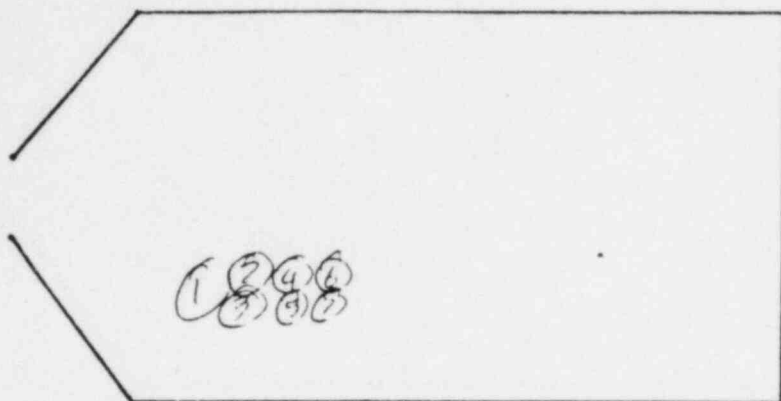
Surveyed by:

Calward

Reviewed by:

[Signature]





SURVEYS SHALL BE PERFORMED, AT A MINIMUM, IN  
AREAS REQUIRING DECONTAMINATION.

REMARKS:

SMEAR RESULTS (DPM/100cm<sup>2</sup>)

No.	BETA/GAMMA	ALPHA
1	1220	None
2		
3		
4		
5		
6		
7	1220	None
8		
9		
10		
11		
12		
13		
14		
15		
16		
17		
18		
19		
20		

INSTRUMENT DATA

TYPE	TRICAM
SERIAL NO.	31347
CAL DUE DATE	
SOURCE CHECK	5/12/81
TYPE	E-140N
SERIAL NO.	625
CAL DUE DATE	12-5-85
SOURCE CHECK	8/12/81
TYPE	
SERIAL NO.	
CAL DUE DATE	
SOURCE CHECK	
TYPE	
SERIAL NO.	
CAL DUE DATE	
SOURCE CHECK	

Radiation readings are logged  
in mRem/hr unless otherwise  
noted, smear locations are  
circled, radiation readings  
are uncircled, direct frisk  
readings are boxed.

SURVEYED BY: CHAD A. RICH

REVIEWED BY: [Signature]



70  
SSINS No.: 6835  
IN 85-46UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
OFFICE OF INSPECTION AND ENFORCEMENT  
WASHINGTON, D.C. 20555

June 10, 1985

IE INFORMATION NOTICE NO. 85-46: CLARIFICATION OF SEVERAL ASPECTS OF REMOVABLE  
RADIOACTIVE SURFACE CONTAMINATION LIMITS FOR  
TRANSPORT PACKAGESAddressees:

All nuclear power reactor facilities holding an operating license (OL).

Purpose:

This information notice is provided to clarify the application of the U.S. Department of Transportation (DOT) requirements pertaining to the control and monitoring of removable radioactive surface contamination on packages and transport vehicles. It is expected that recipients will review this information for applicability to their transportation activities, and consider actions, if appropriate, to preclude any problems from arising due to inappropriate applications of the DOT requirements. However, suggestions contained in this notice do not constitute NRC requirements; therefore, no specific action or written response is required. Specific clarification and guidance is provided in the Attachments on:

1. Averaging of Wipe Samples
2. Use of Higher Efficiency Wipe Sampling Methods
3. "Wrapping" of Packages
4. Exclusive-use Vehicle Surveys for Surface Contamination

Background:

The recent resumption of transportation of commercial power reactor spent fuel in the U.S. has focused renewed attention on the chronic problem of cask "weeping." This is a phenomena whereby certain casks, after their removal from underwater storage basins (pools) and decontamination, subsequently exhibit an increase in the level of removable radioactive surface contamination during and after transport. This increase is believed to be the result of a "weeping" or "sweating" of previously entrapped activity within surface pores, fissures, etc. Its occurrence and magnitude appear to be dependent on such variables as cleanup methods, surface porosity, types of detergents used, surface treatment history, duration of and temperature during transport, and the period of time between completion of transportation and performance of a contamination survey. Although the levels of contamination which have been observed in cask "weeping" episodes do not present a significant health and safety problem, the levels have been

8566060707 8pp.

8506060707

technically above the regulatory limits, particularly when no further consideration is given to determining the wiping efficiency more precisely than the ten percent efficiency that is assumed within the regulatory limit. Recent changes to DOT regulations as promulgated in Docket HM-169 (48 FR 10218, March 10, 1983, and 48 FR 31214, July 7, 1983) have also raised a question because of an apparent unintended revision in the regulatory language relating to averaging of wipe samples. Notwithstanding the guidance in this notice, shippers of radioactive packages, particularly spent fuel casks, are reminded of the continuing need for improving cask decontamination methods and spent fuel pool techniques, so as to maintain removable radioactive surface contamination levels as low as practicable.

#### Current Regulatory Requirements:

The DOT regulations in 49 CFR 173.443 prescribe limits for control of removable (nonfixed) radioactive contamination. The level of such contamination on the external surfaces of each transport package offered for shipment must be kept as low as practicable. Determination of the nonfixed contamination may be made by wiping (e.g., "smears") an area of 300 cm<sup>2</sup> of the surface concerned with an absorbent material, using moderate pressure, and measuring the activity on the wiping material. Sufficient wipe samples should be taken in the most appropriate locations so as to yield a representative assessment of the nonfixed contamination levels. The limits of §173.443, Table 10, are restated below:

TABLE 10 - REMOVABLE EXTERNAL  
RADIOACTIVE CONTAMINATION - WIPE LIMITS

Contaminant	Maximum Permissible limits	
	uCi/cm <sup>2</sup>	dpm/cm <sup>2</sup>
Beta-gamma emitting radionuclides; all radionuclides with half-lives less than ten days; natural uranium; natural thorium, uranium-235; ura- nium-238; thorium-232; thorium-228 and thorium-230 when contained in ores or physical concentrates.....	10 <sup>-5</sup>	22
All other alpha emitting radionuclides..	10 <sup>-6</sup>	2.2

The above limits apply to packages transported as nonexclusive use, e.g., mixed freight. For packages shipped as exclusive-use by rail or public highway, the provisions of §173.443(b) provide that the removable (nonfixed) radioactive surface contamination at any time during transport may not exceed 10 times the limits stated above. At the beginning of transport, however, the levels may not exceed those stated above. Further, pursuant to §173.443(c), any transport

vehicle in which packages are transported within the "factor of 10" higher values, e.g., above the Table 10 limits, must be surveyed with appropriate radiation detection instruments after each use and shall not be returned to service until the radiation dose rate is below 0.5 mrem/hr and the removable contamination is below the limits stated in the above table. (An exception to this vehicle survey requirement is provided by §173.443(d) for closed transport vehicles (highway) which are dedicated solely to the transport of radioactive materials packages and are appropriately marked on the exterior of the vehicle. Also, in such cases the removable surface contamination on packages within such vehicles may be at the "factor of 10" limits at the start of transport).

No specific action or written response to this information notice is required. If you have any questions on this matter, please contact the appropriate NRC Regional office or the technical contact listed below.



Edward L. Jordan, Director  
Division of Emergency Preparedness  
and Engineering Response  
Office of Inspection and Enforcement

Contact: A. W. Grella, IE  
(301) 492-7746

Attachments:

1. Averaging of Wipe Samples
2. Use of Higher Efficiency Wipe Samples
3. "Wrapping" of Packages (Casks)
4. Exclusive-use Vehicle Surveys for Surface Contamination
5. List of Recently Issued IE Information Notices

### AVERAGING OF WIPE SAMPLES

The DOT regulations currently state in §173.443(a) that "... the amount of radioactivity measured on any single wiping material when averaged over the surface wiped ..." shall not exceed the Table 10 values. Prior to the regulatory amendments by DOT in 1983 (see Docket HM-169, 48 FR 10238, March 10, 1983), formerly applicable §173.397(a) provided that wipe samples could be "... averaged over any area of 300 square centimeters of any part of the package surface." A February 21, 1984 query was made by NRC to DOT to clarify this matter. It read as follows:

The language of §173.443(a) has been modified somewhat from that contained in the previous §173.397(a). The new language no longer specifically addresses averaging of multiple wipe samples within any given 300 cm<sup>2</sup> area of a package surface. We understand that it was not DOT's intention to disallow such averaging and further that DOT will consider processing a future rule change to restore such a provision to §173.443. A suggested text for such a modification is enclosed. In the interim, until the text has been formally modified, we will continue to consider that averaging of multiple wipe samples over any 300 cm<sup>2</sup> area of a package surface is an acceptable practice.

In their March 19, 1984, reply to NRC the DOT stated:

It was not our intent to disallow averaging of wipe samplings over a 300 cm<sup>2</sup> area. Consequently, we believe this is an acceptable practice and will take the necessary action to clarify this in §173.443(a)....

## USE OF HIGHER EFFICIENCY WIPE SAMPLES

As is stated in §173.443(a): "Other methods of assessment of equal or greater efficiency may be used. When other methods are used, the detection efficiency of the method used shall be taken into account and in no case shall the nonfixed contamination on the external surfaces of the package exceed ten times the limits listed in Table 10." NRC also queried DOT on this matter, as follows:

We understand that DOT considers that the reference in §173.443(a) stating that 'other methods of assessment of equal or greater efficiency may be used,' may include other wipe sampling methods wherein the efficiency has actually been demonstrated to be greater than 10 percent. Therefore, in effect, the wipe sample limits stated in §173.443(a) and (b) and Table 10 therein, are limits "by default," which do not take advantage of utilizing an efficiency which has been demonstrated to be greater than 10 percent. In our evaluations of licensees' package surveys, we therefore plan to accept assessments based on efficiencies which have been appropriately demonstrated to have a higher than 10 percent efficiency.

The reply by DOT on the usage of higher efficiency wipe samples was as follows:

It is our interpretation of this section that wiping methods with a demonstrated efficiency greater than 10 percent may take this greater efficiency into account. As you point out, the higher efficiency must be documented and in no case may the removable levels exceed 10 times the values in Table 10.

It should be understood that where the term "detection efficiency" is used, it refers to the efficiency of alternate methods for quantifying the amount of removable contamination on a package surface. It does not refer to the laboratory term relating to instrument effectiveness for counting analyses.

An additional clarification also was received from DOT relative to use of contamination assessment techniques with greater than 10% efficiencies in exclusive-use vs nonexclusive-use shipments. It stated that "the provision for using higher efficiency techniques, described in 49 CFR 173.443(a) may also be used when operations are being performed in accordance with §173.443(b)."

An acceptable method of demonstrating wipe (smear) efficiency is repetitive wiping of a portion of the package surface. The demonstrated wipe efficiency is the ratio of the initial smear activity to the summation of activity on all the wipes of the designated portion of the package surface. For the purpose of this calculation, one can assume all activity is removed when two consecutive wipes show less than 10% of the activity of the initial wipe. Because of variations in package surfaces and contamination characteristics, care should be



taken to ensure that the demonstrated wipe efficiency is representative of the wipes to which it is applied. This will normally require delaying package decontamination until after conduct of wipe efficiency determinations if an efficiency greater than 10% is used. In no case, however, may the removable contamination levels exceed ten times the Table 10 limits for packages in exclusive-use shipments when no consideration is given to a demonstrated higher wiping efficiency. Upon such an appropriate demonstration, however, removable contamination limits may not exceed 100 times the Table 10 limits, as would be the case for a wiping method demonstrated to have been 100% efficient.

In general, licensees may only utilize demonstrations of high smear collection efficiencies which have been determined by smear results taken on the same cask for which the initial smears (using the assumed 10% efficiency) indicated the regulatory limit was exceeded. Licensees will not be allowed to use the generic collection efficiencies obtained on one specific cask for other future cask shipments.

### "WRAPPING" OF PACKAGES (CASKS)

The question of "wrapping" the exterior of transport packages has been raised on several occasions, particularly in instances where "weeping" of contamination has occurred on casks that have been immersed in spent fuel storage pools prior to transport. DOT also was queried on this matter by NRC as follows:

The issue of whether exterior "wrapping" of casks can be used to achieve compliance with removable contamination limits has been raised on a number of occasions. Our position on this, with which I understand you also concur, is as follows:

- ° The addition of "wrapping" to an NRC-certified package would not be permissible without obtaining prior authorization of the modification in the applicable NRC certificate. In proposing such a provision, an applicant's safety analysis obviously would have to address heat retention since the contents are a heat source.
- ° The "wrapping" of a non-NRC certified package would not relieve the shipper from compliance with the removable contamination limits applicable to the exterior surface of the unwrapped package unless the wrapping constituted an integral part of a DOT Specification 7A, Type A, package design. In such cases, the shipper's documented package safety evaluation would need to address whether the wrapping would maintain its closure integrity during the normal conditions of transport.

The reply to NRC by DOT on this matter read as follows:

For both NRC-certified and non-NRC-certified packages, any wrapping must be addressed in the package design evaluation. For NRC-certified packages this would include specific mention in the certificate of compliance. For DOT Specification 7A, Type A, packages, the shipper's package safety evaluation would have to document the ability of the wrapping to successfully pass the Type A tests.

## EXCLUSIVE-USE VEHICLE SURVEYS FOR SURFACE CONTAMINATION

The exact requirements of §173.443 are sometimes misunderstood as they relate to quantitative limits on the vehicle surface during the survey required by §173.443(c). For this purpose, the vehicle surface is meant to be those surfaces wherein or on which packages are stowed during transport. That paragraph does not actually set forth any quantitative limit on the surface of the vehicle itself during the survey which is performed to return the vehicle to service. The important subtlety therein is that the quantified limit of §173.443(b) applies to the packages in the vehicle. The "bottom line" of §173.443(b) and (c), considered collectively, is as follows:

- The packages within an exclusive-use vehicle may have up to 22,000 d/m/100 cm<sup>2</sup> during and at the completion of transport but must be limited to 2,200 d/m/100 cm<sup>2</sup> at the start of transport, unless the vehicle is dedicated to radioactive materials service only, and so marked, pursuant to §173.443(d), in which case the 22,000 d/m/100 cm<sup>2</sup> limit applies at the start of transport.
- §173.443(c) requires a survey of an exclusive-use vehicle (and also, presumably the dedicated vehicles) after transport of packages that indicate removable contamination above the Table 10 limits, but within the "factor of ten" higher limit of 22,000 d/m/100 cm<sup>2</sup>.
- §173.443(c) does not address quantitative limits on the surface of the vehicle during the survey, however, the vehicle may not be released for other service until the 2,200 d/m/100 cm<sup>2</sup> and 0.5 mrem/hr limits are met.
- Noncompliance with §173.443(c) would therefore exist if the survey to return a vehicle to service was not performed, and/or the contamination or radiation dose rate on the vehicle exceeded the stated limits upon its release for other service.