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## **DOE Safety Metrics Indicator Program (SMIP)**

### **Fiscal Year 2001 Fourth Quarter Report of Packaging- and Transportation-related Occurrences**

**October 2001**

**Final**

**U.S. Department of Energy  
National Transportation Program  
Albuquerque, New Mexico**

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Date published: October 2001

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## ABBREVIATIONS AND ACRONYMS

ALO	Albuquerque Operations
ANL-E	Argonne National Laboratory-East
ATMS	Automated Transportation Management System
CBFO	Carlsbad Field Office
CH	Chicago Operations
DP	Defense Programs
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy–Idaho Falls Operations Office
DOT	U.S. Department of Transportation
EH	Environmental Safety and Health
EM	Environmental Management
EPA	U.S. Environmental Protection Agency
ER	Energy Research
ETAS	Enterprise Transportation Analysis System
FE	Fossil Energy
FY	Fiscal year
HAZMAT	Hazardous materials
HQ	DOE Headquarters
ID	Idaho Operations
INEEL	Idaho National Engineering and Environmental Laboratory
HSR	Hazard significance rating
LANL	Los Alamos National Laboratory
LL	Lessons learned
LLW	Low-level waste
LMES	Lockheed Martin Energy Systems, Inc.
LSA	Low specific activity
NE	Nuclear Energy
NMMD	Nuclear Materials Management Division
NOC	Nature of occurrence
NTP	DOE National Transportation Program
NTPA	DOE National Transportation Program Albuquerque
NVOO	Nevada Operations
OAK	Oakland Operations
OH	Ohio Field Office
OR	Occurrence report
ORNL	Oak Ridge National Laboratory
ORO	Oak Ridge Operations
ORPS	Occurrence Reporting and Processing System
P&T	Packaging and transportation
PHMC	Project Hanford Management Contractor
RCRA	Resource Conservation and Recovery Act
RFO	Rocky Flats Operations
RL	Richland Operations

RSF	Repetitive significance factor
RW	Radioactive Waste Management
RWMC	Radioactive Waste Management Complex (RWMC)
SC	Office of Science
SMIP	Safety Metrics Indicator Program
SPR	Stakeholder and publicity significance rating
SR	Savannah River Operations
TRAGIS	Transportation Routing Analysis Geographic Information System
TRU	Transuranic
W <sub>EC</sub>	Event consequence measure
W <sub>HC</sub>	Hazard classification measure
WIPP	Waste Isolation Pilot Project
WSRC	Westinghouse Savannah River Company

## EXECUTIVE SUMMARY

The Safety Metrics Indicator Program (SMIP) retrieved 44 packaging- or transportation-related occurrences from the Occurrence Reporting and Processing System (ORPS) during the period from July 1 through September 30, 2001. Only those incidents that occur in preparation for transport, during transport, and during unloading of hazardous material are considered as packaging- or transportation-related occurrences. Other incidents with packaging and transportation (P&T) significance but not involving hazardous material (such as vehicle accidents or empty packagings) are not rated to the SMIP criteria, but are archived in the SMIP Subsidiary Database of occurrences, a sub-database of the main SMIP P&T Occurrence Database.

Thirty-two of the originally-selected 44 occurrences were appropriate for classification to the SMIP criteria, only 7 of which have offsite applicability. Eight of the original 44 reports are archived in a subsidiary database because they either do not involve the transport of hazardous material or do not involve transport by vehicle, plane, boat, or rail. The others either were deleted because more thorough review revealed that they were not strictly related to P&T or were canceled by the reporting site and removed from the ORPS. These occurrences **have not been normalized** as in the Annual Report of Occurrences because the necessary information is not yet available.

The number and severity of the selected occurrence reports (ORs) are consistent with historical reporting. Contamination events continue to be among the most common type of occurrences; however, “Shipping Preparation” events decreased this quarter to only 4 events from the 21 reported last quarter.

None of the 32 ORs that were rated had event consequence measures ( $W_{EC}$ ) greater than 2; 14 of them were categorized as having a  $W_{EC}$  of 1. This means that all of the fourth-quarter FY 2001 ORs had only *slight* consequences at worst (i.e., resulting in minimal safety consequences with little potential for ultimately leading to suspected endangerment of people or environmental contamination). Because the event consequence measure is low, the overall hazard significance ratings (HSRs) are relatively low, indicating that the actual risks posed by the occurrences are not highly threatening. In fact, even the one reported emergency OR and the two unusual ORs had HSRs of 24 or less.

The ORs are summarized in the appendix and listed along with their HSRs and stakeholder interest [currently termed the stakeholder and publicity rating (SPR)]. This enables one to get a feel for how the nature of an occurrence and its P&T significance translate into a severity rating.

During the quarter, it was noticed that the number of events pertaining to either dropping packages or damaging packages while moving material by forklift had increased from previous years. Only four such events were reported in FY 1999 and seven events reported during FY 2000. However, 13 events have been reported during this fiscal year. Therefore a lessons learned (LL) pertaining to minimizing accidents while moving material by forklift was developed and posted to the U.S. Department of Energy LL list server to mitigate this trend.

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## 1. APPLICATION OF SMIP METHODOLOGY

### 1.1 SMIP-RATED ORs FOR FOURTH QUARTER FY 2001

Safety Metrics Indicator Program (SMIP) methodology was used to classify and rate transportation- or packaging-related occurrence reports (ORs) according to severity. Table 1 shows the parameters used to process the 32 packaging and transportation (P&T) occurrences involving hazardous material and their values.

The three right-hand columns of the table are the most significant, representing the top-level measures used in the National Transportation Program (NTP) SMIP for defining the indicators for occurrences involving hazardous material: (1) HSR = hazard significance rating, (2) RSF = repetitive significance factor, and (3) SPR = stakeholder or publicity significance rating.

The measure HSR is intended to indicate the actual risk posed by an occurrence. The measure RSF is then applied to HSR to indicate whether the occurrence has a history of repetitiveness. (The RSF is the number of repeat incidents multiplied by the HSR.) The combination of HSR and RSF can be used by the NTP to identify specific areas needing special attention or identify whether the development of a specific lessons-learned (LL) is warranted. The measure SPR is independent of HSR and RSF and is used to identify the level of significance of the occurrence from a stakeholder or publicity perspective.

The HSR is the most important of the indicators. It is a weighted measure of the occurrence's hazard significance from a personnel, public safety, and environmental impact standpoint. The hazard portion is itself weighted by a factor indicating the quantity of hazardous material involved. The HSR is composed of the following three factors:

$$\text{HSR} = W_{\text{EC}} \times W_{\text{HC}} \times Q_{\text{ty}}$$

The HSR was subdivided into three factors to allow analysts to break down an event and consistently make judgments on the various elements that contribute to degradation of safety and potential or actual impacts on the environment. The combined HSR has a numeric range of 1 to 100. [HSRs above 48 for nonradiological materials (68 for radioactive materials) are considered significantly high and deserving of additional attention.]

The event consequence measure,  $W_{\text{EC}}$ , assigns a value ranging from 1 to 5 to indicate the seriousness of the event itself.  $W_{\text{EC}}$  ranges from an anomaly (which has a very low significance of consequence relative to safety and the environment and a value of 1) to very serious (which has major significance relative to safety and the environment and a value of 5). A  $W_{\text{EC}}$  weighting factor is assigned to each event based upon actual consequences resulting from the event.

The second factor that is used in developing the HSR is the hazard classification measure,  $W_{\text{HC}}$ . This measure indicates the relative risk to personnel and the environment posed by the general physical contents of the hazardous material involved in the event. The value assigned to  $W_{\text{HC}}$  is

**Table 1. Fourth quarter FY 2001 Safety Metrics Indicator Program classified occurrences**

Report Number	Pkg/Trn	HM/W	Off/On	NOC	HC	WHC	WEC	Qty	HSR	RSF	SPR
ALO-AO-BWXP-PANTEX-2001-0073	T	HM	ON	3	1	4	1	3	12	0	1
ALO-AO-BWXP-PANTEX-2001-0093	P	HM	ON	4	1.4	4	2	3	24	0	1
ALO-LA-LANL-MATWAREHS-2001-0002	P	HM	ON	1A3	7	4	2	2	16	0	1
CH-AA-ANLE-ANLEAPS-2001-0003	P	HM	OFF	7A	7	4	1	2	8	0	3
CH--AMES-AMES-2001-0001	P	HM	OFF	4	7	4	1	4	16	0	3
ID--BBWI-RWMC-2001-0018	T	W	ON	3	9	1	2	2	4	0	1
ID--BBWI-RWMC-2001-0022	T	HM	OFF	4	7	4	1	3	12	0	3
ID--BBWI-RWMC-2001-0024	T	W	ON	3	7	4	2	5	40	0	1
ID--BBWI-RWMC-2001-0025	T	W	ON	2A	7	4	2	4	32	0	1
ID--BBWI-RWMC-2001-0026	T	W	ON	3	7	4	1	5	20	0	1
ID--BBWI-TAN-2001-0015	T	HM	ON	1A3	9	1	2	2	4	0	1
NVOO--LLNV-LLNV-2001-0001	P	HM	ON	5B	1	4	2	3	24	0	1
OAK--LLNL-LLNL-2001-0034	T	HM	OFF	7A	1.4	4	2	3	24	0	3
OH-MB-BWO-BWO06-2001-0003	P	HM	ON	1A3	7	4	2	2	16	0	1
OH-WV-WVNS-HMT-2001-0002	P	W	OFF	2A	7	4	2	2	16	0	3
OH-WV-WVNS-WVNSGEN-2001-0004	P	HM	ON	1A3	7	4	2	1	8	0	1
ORO--BJC-K25WASTMAN-2001-0012	T	W	ON	1A3	7	4	2	3	24	0	3
ORO--BJC-X10ENVRES-2001-0021	P	HM	ON	1A3	7	4	1	2	8	0	1
ORO--BJC-X10ENVRES-2001-0026	T	HM	ON	6A	3	2	1	3	6	0	1
ORO--BJC-Y12WASTE-2001-0008	T	HM	ON	5	7	4	2	2	16	0	2
ORO--BNFL-K32-2001-0006	P	W	ON	1A3	7	4	1	2	8	0	1
ORO--BNFL-K32-2001-0007	P	HM	ON	1A3	7	4	2	2	16	0	1
ORO--ORNL-X10PLEQUIP-2001-0011	P	HM	OFF	4	9	1	2	2	4	0	2
ORO--ORNL-X10REDC-2001-0006	T	HM	ON	1A2	7	4	2	1	8	0	1
RFO--KHLL-PUFAB-2001-0063	P	HM	ON	4	7	4	2	3	24	0	1
RFO--KHLL-WSTMGTOPS-2001-0032	T	HM	ON	5	7	4	1	3	12	0	1
RFO--KHLL-WSTMGTOPS-2001-0036	T	HM	ON	3	9	1	2	2	4	0	1
RL--BHI-ERDF-2001-0005	T	W	ON	6A	9	1	1	2	2	0	1
RL--PHMC-TPLANT-2001-0007	T	HM	ON	4	7	4	1	4	16	0	1
RL--PNNL-PNNLBOPER-2001-0012	T	W	ON	5	9	1	1	2	2	0	1
SR--WSRC-ESH-2001-0003	T	HM	OFF	7A	7	4	1	4	16	0	2
SR--WSRC-SLDHSD-2001-0009	P	HM	ON	1B3	7	4	1	5	20	0	1



based upon the hazardous material classification methodology specified in the U.S. Department of Transportation (DOT) hazardous material regulations and upon pragmatic judgment.

$W_{HC}$  ranges from a low value of 1 for relatively innocuous hazardous materials (Class 9 materials) to a maximum value of 4 for the most hazardous of the hazardous materials (including Class 1 explosives, Class 4.1 wetted explosives, and radioactive materials).

The factor  $W_{HC}$  provides an indication of a materials potential hazard, but it does not provide a measure of the quantity of material involved. The quantity of material in a shipment can significantly affect the actual hazard posed. One indicator of the relative amount or quantity of material in a shipment is the type of package used. For example, with radioactive materials, where a graded approach to packaging is used, the lower-integrity packages are used for either lower quantities of material or the less hazardous of that class of materials.

Thus the factor  $Q_{ty}$  is used to indicate the relative amount and graded hazard within a class.  $Q_{ty}$  is based on the type of packaging used in the shipment, which indicates the relative amount and hazard. For example, for radioactive materials, transport of a very low quantity of material is allowed in an excepted package (indicating a very low risk), and the  $Q_{ty}$  value for these packagings is 1. In contrast, a Type B package is used where the risk posed by the contents is high, and the  $Q_{ty}$  value assigned for a Type B package is 5. In addition, a measure is assigned for  $Q_{ty}$  to account for the presence of contamination.

Similar arguments were used to establish the weighting factors for non-radioactive hazardous materials. As a result,  $Q_{ty}$  implies the quantity and relative hazard posed by the hazardous material. It is based upon the packaging requirements for hazardous material specified in the DOT hazardous material regulations and upon pragmatic judgment. The factor  $Q_{ty}$  ranges from a low value of 1 for limited-quantity shipments in excepted packages to a maximum value of 5 for the largest quantities in a class and the most hazardous within a class of materials.

The other parameters of the table are chiefly for classification:

1. The parameter Pkg/Trn denotes whether the occurrence is related to packaging, transport, or both.
2. The parameter HM/W identifies whether the occurrence involves hazardous material or waste (e.g., Resource Conservation and Recovery Act waste, low-level waste, transuranic waste, etc.)
3. The parameter On/Off defines whether the occurrence is attributed to onsite or offsite activities.
4. The parameter NOC denotes the nature of occurrence as identified by the NTP, not as identified in the ORPS. The NTP NOC evaluates occurrences from the transportation specialist's perspective, whereas the ORPS-assigned NOC is more generic, including other categories.

5. The parameter HC identifies the hazard class (or classes) of materials involved in the occurrence. This parameter is key in developing the HSR.

The classification of ORs includes other parameters, such as responsibility allocation (or ownership), which assigns the occurrence to the program—rather than the site—that produced it. However, this parameter is not shown in Table 1 because it will not be discussed in this quarterly report. The other parameters used for classification of the ORs and a fuller discussion of the methodology can be found in the September 1999 SMIP publication *DOE Packaging and Transportation Measurement Methodology for the Safety Metrics Indicator Program*.

## 1.2 FY 2001 FOURTH QUARTER ORs ARCHIVED IN THE SUBSIDIARY DATABASE

Eight occurrences were archived in the Subsidiary Database that addressed P&T issues but either did not involve the transport of hazardous material or did not involve transport by truck, boat, plane, or rail. Table 2 presents these occurrences.

The types of incidents that were captured this quarter can be determined by reviewing their titles in Table 2 below.

**Table 2. FY 2001 fourth quarter occurrence reports of subsidiary database**

Report number	Title	NOC	Off/On
ID--BBWI-RWMC-2001-0019	Substandard Filters and Procurement Issues	2B	ON
ID--BBWI-RWMC-2001-0020	Discovery of New Information—Use of Rejected Drum Filters	2B	ON
ORO--BJC-K25GENLAN-2001-0009	Hoisting and Rigging—Dropped Equipment	3	ON
ORO--BJC-K25WASTMAN-2001-0014	Violation of Safety Authorization Basis for K-1036—A Discovery of Unknown in Lab Pack	5C	ON
ORO--BJC-PORTENVRES-2001-0011	Near Miss—Disengagement of Forklift Attachment	3	ON
ORO--ORNL-X10PLEQUIP-2001-0010	Unqualified Driver Operating a Commercial Motor Vehicle on Bethel Valley Road	6A	OFF
ORO--ORNL-X10PLEQUIP-2001-0014	Near Miss When "Headache Ball" Suddenly Dropped to Truck Bed	3	OFF
SR--WSRC-HTANKW-2001-0021	Contamination Identified in Bed of Restricted Use Truckster	1A3	ON

## **2. FY 2001 FOURTH QUARTER SUMMARY OF SELECTED ORs**

### **2.1 CATEGORIZATION OF ORs**

Using the definitions for occurrence types provided by DOE Order 232.1-1A, *Occurrence Reporting and Processing of Operations Information*, the P&T ORs selected for the fourth quarter were categorized as emergency, unusual, or off-normal.

### **2.2 EMERGENCY AND UNUSUAL OCCURRENCES REPORTED**

Two of the 32 occurrences that were retrieved and reviewed from the ORPS during this quarter were categorized as unusual and one was categorized as an emergency. All the other ORs were categorized as off-normal. Following is a brief description of the ORs that were categorized as emergency or unusual. The occurrence number assigned by the ORPS to each report appears in brackets at the end of the description.

While the emergency event was not particularly threatening from a transportation safety standpoint, it was significant politically. The SMIP HSR for this occurrence was determined to be only 16 of a possible 100 severity ranking. But coordination of this event involved West Virginia's Congress, the U.S. Congress, the Nevada Governor, and various emergency responder agencies. So although the event had minimum safety consequences, it attracted national attention.

#### Emergency

West Valley Nuclear Service Company, LLC, was notified that a low-level radioactive waste shipment on its way to the Department of Energy's Nevada Test Site (NTS) was observed to have a foam-like substance on the truck bed under one of two metal waste boxes. The breached waste box in question was a B-25 box (strong-tight container) that contained less than 2000 pounds of contaminated metal debris to which approximately 5 pounds of water-absorbent material had been added (to satisfy NTS waste acceptance criteria). The event occurred at a public truck stop in West Wendover, Nevada, and was discovered by the driver after he hosed off the lower portion of the truck trailer after refueling. [OH-WV-WVNS-HMT-2001-0002]

#### Unusual

1. A shipment of ten H1616 containers were transported from TA-55, where TA-55 served as the transfer agent for the containers, to TA-16-205, the Weapons Engineering Tritium Facility (WETF), the end receiving facility for this shipment. Five of the containers, which were transported by the Packaging and Transportation group, were later found to have external contamination levels in excess of the DOT limit of 2200 disintegrations per minute per 100 cm<sup>2</sup>. Smears for tritium were not performed on the H1616 containers before they were delivered to WETF because this type of survey had not been required in the past. [ALO-LA-LANL-MATWAREHS-2001-0002]

2. Materials delivered to Building 141 were found to contain small quantities of high explosives, which are not allowed in the facility in accordance with the Building 141 Hazards Analysis Report and the Building 141 Facility Safety Plan. The shipment of 50 items arrived from Pantex with only one of them tagged with the 3X hazard classification. It was not realized that the package contained explosives until it was opened. [OAK--LLNL-LLNL-2001-0034]

## **2.3 SIGNIFICANT OFF-NORMAL OCCURRENCES REPORTED**

Only one incident that was categorized as off-normal had an HSR or RSF greater than 32. The event (report number ID--BBWI-RWMC-001-0024 which was rated with an HSR of 40) was caused by not following procedure while loading a TRUPACT-II container, which resulted in the payload's being 2 pounds over the allowable shipping weight.

The weight discrepancy was quickly detected before the container was transported, but high SMIP-rating numbers were assessed on two of its safety measures. It had an event consequence measure of slight (which is a numerical assignment of 2) because it resulted in "minimal safety consequences with little potential for ultimately leading to suspected endangerment of people ... contamination of property ... or pollution of the environment." However, because it was a radioactive shipment necessitating a Class B packaging, it had a hazard classification measure of 4 and a quantity classification measure of 5.

Only one other OR had a HSR of 32:

While 55-gallon drums of transuranic waste were being moved by forklift to a flatbed truck for transport to a Type II Storage Module, the drum-handling attachment of the forklift struck a stanchion. The drum was dented and deformed by the impact with the stanchion, and the rear of the drum was punctured when it was pushed back into a part on the drum-handler mechanism. [ID--BBWI-RWMC-2001-0025]

Though this incident by itself was not threatening, throughout the fiscal year it was noticed that incidents that involved movements conducted by forklift have been increasing. In fact, there has been a 75% increase in these incidents from FY 1999 to FY 2000 and an 86% increase from FY 2000 to FY 2001. (Four events were reported in FY 1999; 7 events in FY 2000; and 13 events in FY 2001.)

The DOE National Transportation Program--Albuquerque recognized that these events could eventually lead to more serious repercussions and decided an LL needed to be immediately developed to address these occurrences. So the LL entitled "Minimizing Accidents while Conducting Movements by Forklift" (Identifier No. NTPA LL 3720-01-01) was distributed over the DOE LL list server to raise awareness and mitigate this negative trend.

### 3. DISTRIBUTION BY ORGANIZATION AND PARAMETERS

#### 3.1 DISTRIBUTION BY SMIP PARAMETERS

Application of the SMIP severity ratings allows the true significance of the events to be seen. Instead of providing a simple count, these measures allow the threat and severity of an occurrence to be weighed and compared with each other. Considering the type of material that is being shipped can indicate the magnitude of the problems that could arise. Hence the number of ORs by hazard class is given in Table 3. Note that about two-thirds of the ORs are hazard class 7; class 7 material constitutes most of the material being shipped, as is consistent with past shipping practices. Hazard Class 9, miscellaneous material, also includes many shipments that involve radioactive waste or material, albeit at a lesser activity level.

Even though many of the occurrences involve radioactive material, all of the ORs have event consequence measures ( $W_{EC}$ ) of 2 or less. Fourteen of the 32 ORs were categorized as having a  $W_{EC}$  of 1, and the others had a  $W_{EC}$  of 2. This means that all of the fourth-quarter FY 2001 ORs had only *slight* consequences at worst (i.e., resulting in minimal safety consequences with little potential for ultimately leading to suspected endangerment of people or environmental contamination). Because the event consequence measures are low, the overall HSRs are relatively low, indicating that the actual risks posed by the occurrences are not highly threatening. In fact, none of the ORs reached the SMIP alarm threshold of 48 for ORs involving non-radioactive material and 60 for occurrences involving radioactive material. See Table 4 for a listing of the number of ORs by HSRs attained.

**Table 3. Distribution of occurrence reports by hazard class**

Hazard class	Number of occurrence reports
1	4
2	0
3	1
4	0
5	0
6	0
7	21
8	0
9	6
Total	32

**Table 4. Distribution of occurrence reports by hazard significance rating**

Hazard significance rating	Number of occurrence reports
1	0
2	2
4	4
6	1
8	5
12	3
16	8
20	2
24	5
32	1
40	1
<hr/>	
Total	32

### 3.2 DISTRIBUTION OF ORs BY ORGANIZATION

Table 5 presents the DOE program offices and the number of ORs that were reported to them. (Figure 1 is a graphical representation of this distribution.) Environmental Management programs reported over 68.7% of the ORs generated during this quarter, although one of the occurrences was caused by others (non-DOE sites or non-DOE contractors). Defense Programs accounted for about 15.6% of the ORs reported, and the Office of Science accounted for about 9.4%. Reporting a combined 27 ORs, EM and DP reported about 84% of the P&T-related ORs filed this quarter, which is consistent with past fiscal year reporting profiles.

Non-DOE contractor “others” account for three of the occurrences reported this quarter. Violations attributed to “others” have been separated from the ORs that are clearly the full responsibility of the reporting group so that such occurrences are not charged to the reporting DOE program office, the operations office, or the contractor. ORPS makes no distinction between reporter and violator.

Table 6 presents the operations offices and the number of ORs that were reported to them; Figure 2 graphically shows this distribution.

**Table 5. Occurrence report distribution by DOE program office**

Code	Description	No. of occurrence reports	
		Owner	Others
DP	Defense Programs	4	1
EH	Environmental Safety and Health	0	0
EM	Environmental Management	21	1
ER	Energy Research	0	0
FE	Fossil Energy	0	0
NE	Nuclear Energy	1	0
RW	Radioactive Waste Management	0	0
SC	Office of Science	3	1
Total		29	3
Grand total			32

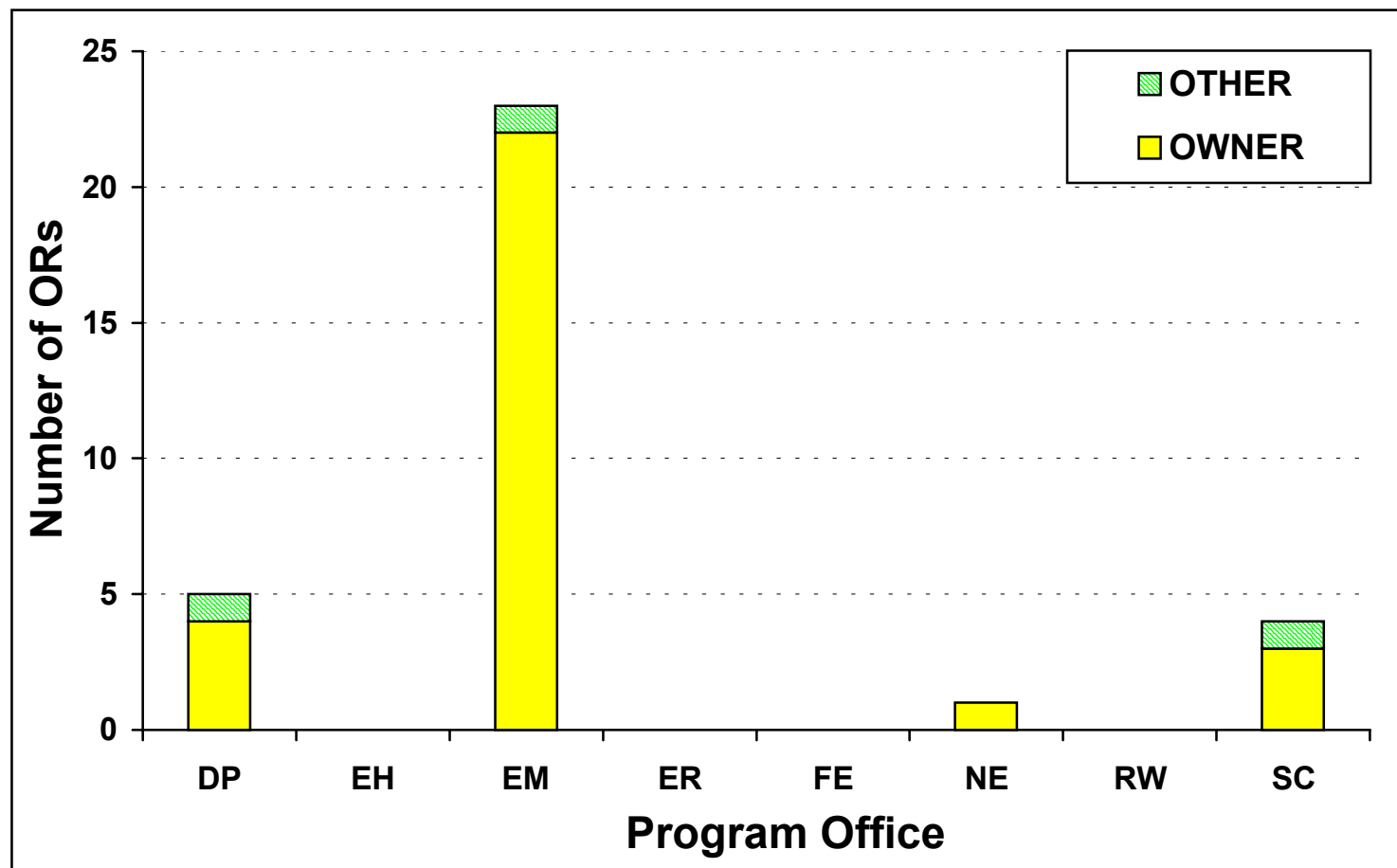


Fig. 1. Occurrence report distribution by DOE program office.



**Table 6. Occurrence report distribution by DOE operations office**

Code	Description	No. of occurrence reports	
		Owner	Others
ALO	Albuquerque Operations	3	0
CH	Chicago Operations	1	1
HQ	DOE Headquarters	0	0
ID	Idaho Operations	6	0
NVOO	Nevada Operations	1	0
OAK	Oakland Operations	0	1
OH	Ohio Field Office	3	0
ORO	Oak Ridge Operations	8	0
RFO	Rocky Flats Operations	3	0
RL	Richland Operations	3	0
SR	Savannah River Operations	1	1
Total		29	3
Grand total			32

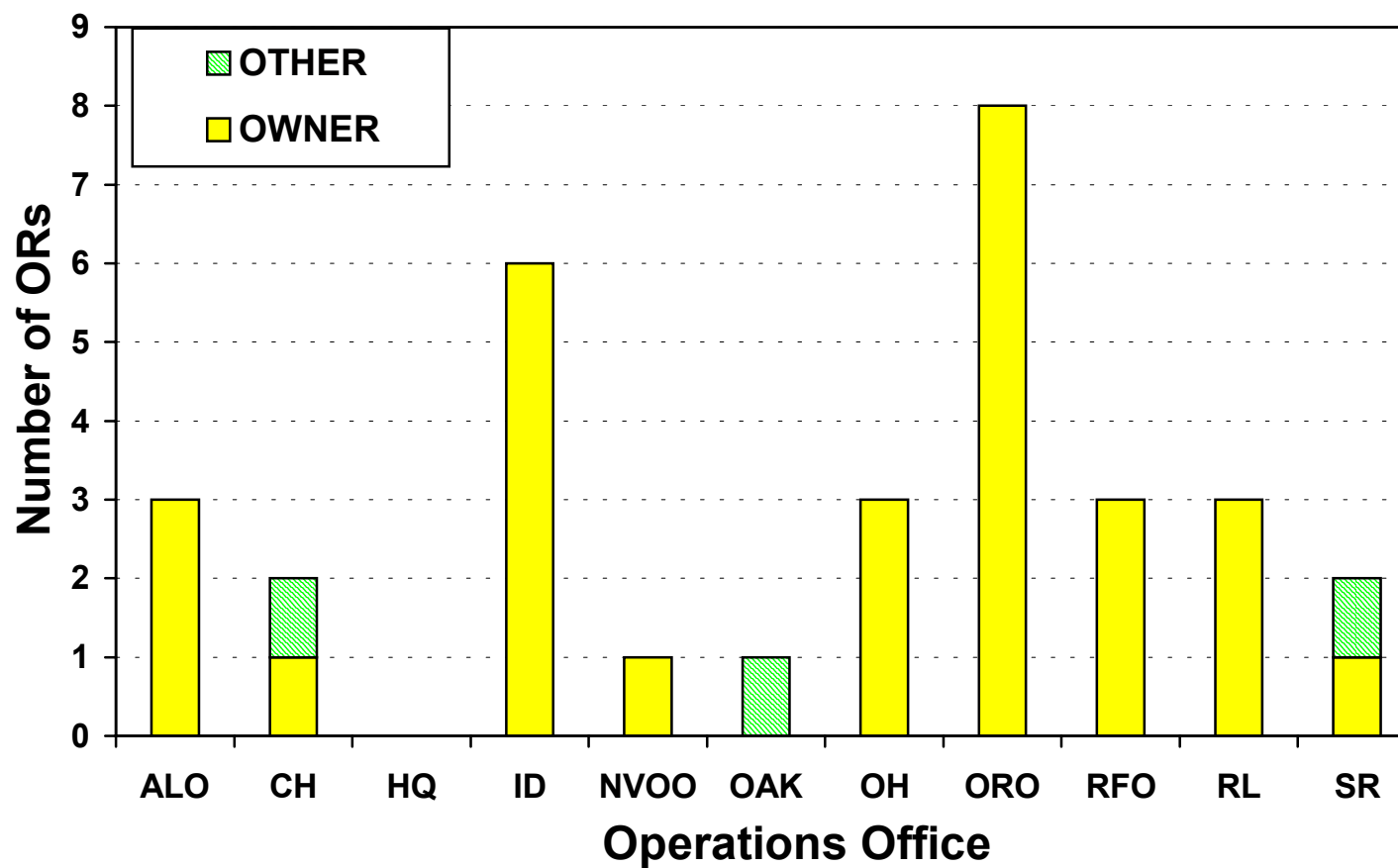


Fig. 2. Occurrence report distribution by DOE operations office.

### 3.3 DISTRIBUTION BY NATURE OF OCCURRENCE

The SMIP categories for coding the nature of the P&T events are presented along with the quarter's distribution of ORs by code in Table 7. Figure 3 lists the NOCs in a bar-chart format. Contamination events, with 31.2% (10 of 32) events, continue to be among the most frequently occurring types of occurrences. This quarter, however, only 12.5% (4 of 32) of the occurrences pertained to shipping preparation, a category that generally represents the most frequently reported type of event. Events involving "storage incident to transport" (NOC 3) accounted for 15.6% of the ORs reported. Improper hazardous material characterization (NOC 4) events accounted for a higher percentage of reports than shipping preparation events this quarter with 18.75% (6 of 32). As usual, though, none of the NOC 4 events had HSRs of greater than 24, and their event consequences were slight.

**Table 7. Occurrence report distribution by nature of occurrence**

Code and description	No. of occurrence reports
1. Contamination/Release	
1A. Radioactive	0
1A1. Environmental	0
1A2. Personnel	1
1A3. Equipment	8
1B. Hazardous Materials	
1B1. Environmental	0
1B2. Personnel	0
1B3. Equipment	1
Total	10
2. Packaging	0
2A. Damaged	2
2B. Incorrect Selection	0
2C. Incorrect Procedures	0
Total	2
3. Storage Incident to Transport	5
Total	5

**Table 7. Occurrence report distribution by nature of occurrence (continued)**

Code and description	No. of occurrence reports
4. Improper Hazardous Material Characterization	6
Total	6
5. Shipment Preparation	3
5A. Shipping Papers	0
5B. Marking	0
5C. Labeling	1
5D. Loading and Tie-downs	0
5E. Placards	0
5F. Radiation Survey	0
Total	4
6. Modal Safety	
6A. Motor or Driver Safety	2
6B. Aircraft Safety	0
6C. Rail Safety	0
6D. Barge Safety	0
6E. Pipeline	0
Total	2
7. Occurrences Created by Others (non-DOE or DOE/Contractor)	0
7A. Shipping Preparation	3
7B. Packaging	0
7C. Reserved	0
7D. Vehicle or Driver Safety	0
7E. Contamination	0
7F. Not otherwise specified	0
Total	3
Grand Total	<u>32</u>

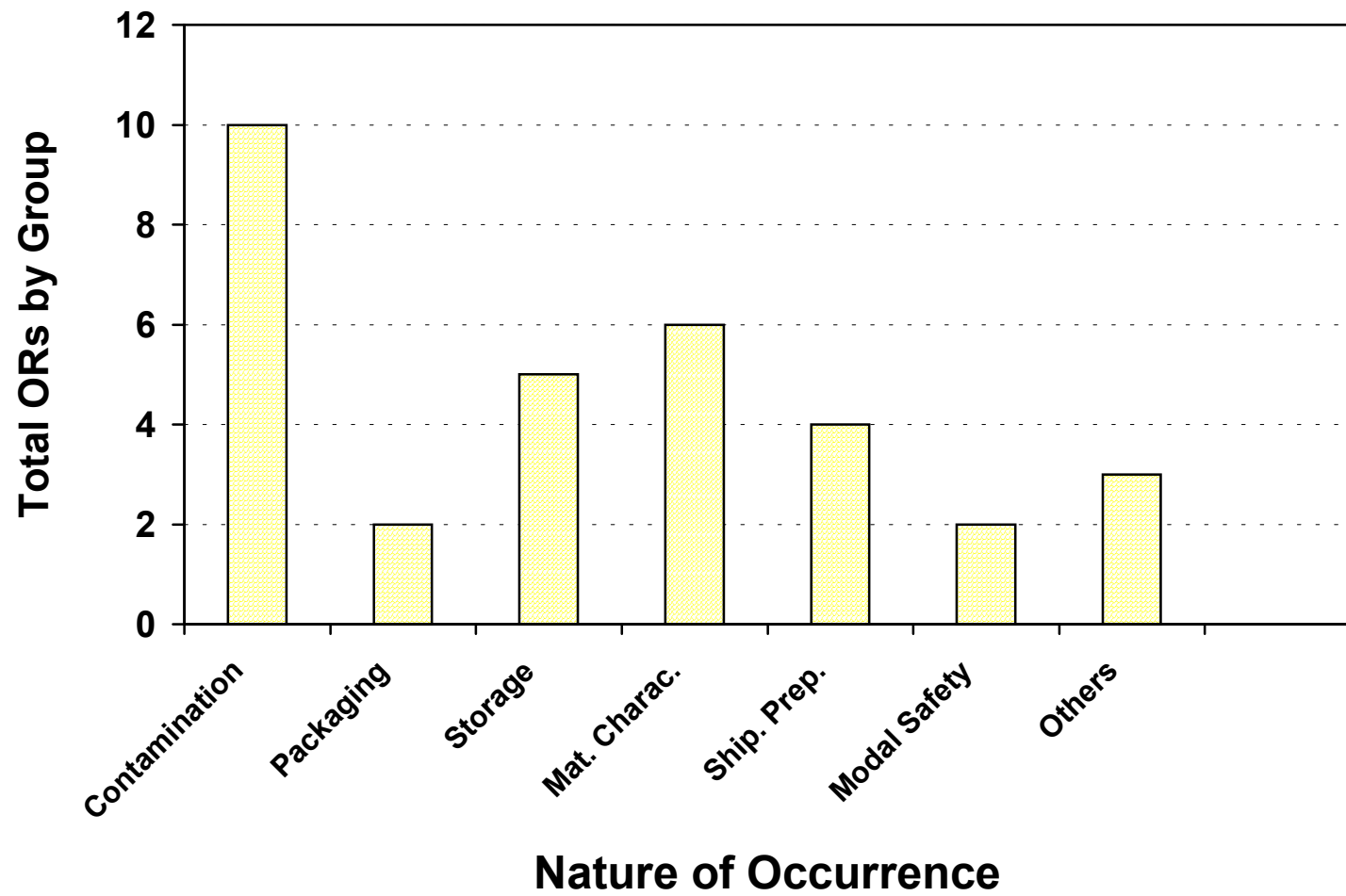


Fig. 3. Occurrence report distribution by nature of occurrence.

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#### **4. FUTURE DIRECTION**

The quarterly report for the first quarter of FY 2002 will be completed in January. Presently, the occurrences selected for FY 2001 are being processed and rated according to severity for inclusion into the FY 2001 Annual Report of Occurrences. Because the annual report for FY 2001 is dependent upon obtaining shipping mileage estimates from contract carriers, who sometimes do not compute their mileage until April 15, the FY 2001 Annual Report of Occurrences will not likely be published until May 2002.

The drop in occurrences that was experienced this quarter (from 51 to 32 ORs) is noteworthy but not statistically significant. What is significant to SMIP is that we had a greater number of occurrences reported this fiscal year than in the recent past. Historically, we have averaged about 1.6 ORs per 100 shipments. It appears that we had more than 2 ORs per 100 shipments this fiscal year. This total is high, but it may not be alarming since we had 1.8 ORs per 100 shipments as late as FY 1999. SMIP will closely monitor this increase in occurrences to ensure that a negative trend is not developing and will look closely at the actual severity of the ORs to ensure that our P&T activities are consistently safe.

This report will be posted electronically on the NTPA website at <http://www.ntp.doe.gov/>. While keeping in mind that the fiscal year annual report is much more detailed, with analysis, suggestions from the DOE field on how to make the report more comprehensive would be appreciated.

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**Appendix A**

**SUMMARY TABLE OF FOURTH QUARTER FY 2001 OCCURRENCES**

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**Table A.1. Summary of fourth quarter FY 2001 occurrences**

<b>Report Number</b>	<b>Summary of Occurrence</b>	<b>HSR</b>	<b>SPR</b>
ALO-AO-BWXP-PANTEX-2001-0073	While a convoy of forklifts was being used to move nuclear explosives from a loading dock to various delivery locations onsite, a forklift hit the one in front of it when the one in front of it slowed.	12	1
ALO-AO-BWXP-PANTEX-2001-0093	A procedure violation occurred when it was discovered that the component of a velostat bag was not the component the label indicated on the package received from production stores.	24	1
ALO-LA-LANL-MATWAREHS-2001-0002	Five of ten H1616 containers being transported were later found to have external contamination levels in excess of the DOT limit of 2200 disintegrations per minute (dpm) per 100 centimeters squared (100 cm <sup>2</sup> ). An onsite smear for tritium should have been performed after receipt of the shipment.	16	1
CH-AA-ANLE-ANLEAPS-2001-0003	Two improperly packaged vials of uranyl acetate were brought onsite to conduct an experiment. It was determined that the activity levels of the samples were in excess of the DOT threshold requirement of 2 nCi/gram; therefore, the vials should not have been considered exempt from packaging requirements.	8	3
CH--AMES-AMES-2001-0001	Two barrels and two B-25 boxes were shipped offsite to Fluor Hanford. Later analysis by Fluor Hanford determined that one of the boxes was noncompliant because its high radiation reading required that it be labeled.	16	3
ID--BBWI-RWMC-2001-0018	While being placed on a flatbed trailer for transport, a 55-gallon drum containing transuranic (TRU) waste was punctured with a drum handler attached to a forklift. Although the drum was pierced, the 90-mil polyethylene drum liner was not punctured; therefore, no waste material escaped from the drum.	4	1
ID--BBWI-RWMC-2001-0022	The computer program (RadCalc) used by Idaho National Engineering and Environmental Laboratory to classify the contents of a shipment and to determine the proper shipping name fails to recognize U-235 in the conversion from TBq to grams for total fissile content of a radioactive material package. Because U-235 is not recognized in the software calculations, the assignment of an improper shipping name ("fissile excepted" rather than "fissile") and an incorrect UN number may be assigned to a shipment by the program.	12	3

**Table A.1. Summary of fourth quarter FY 2001 occurrences (continued)**

<b>Report Number</b>	<b>Summary of Occurrence</b>	<b>HSR</b>	<b>SPR</b>
ID--BBWI-RWMC-2001-0024	During loading of a payload assembly into a TRUPACT-II container, several steps of the governing loading procedure were worked concurrently with other steps that are listed subsequently in the procedure. As a result of performing some steps in the loading sequence out of order, a payload that was 2 pounds over the allowable shipping weight was placed into one of the TRUPACT containers, and a container inner lid was put in place before the weight discrepancy was identified.	40	1
ID--BBWI-RWMC-2001-0025	While 55-gallon drums of transuranic (TRU) waste were being moved by forklift to a flatbed truck for transport to a Type II Storage Module, the drum-handling attachment of the forklift struck a stanchion. The drum was dented and deformed by the impact with the stanchion, and the rear of the drum was punctured when it was pushed back into a part on the drum handler mechanism.	32	1
ID--BBWI-RWMC-2001-0026	TRUPACT-II #156 was removed from a trailer scheduled for shipment on the following day, and was placed onto a different trailer scheduled for shipment at a later time. After the TRUPACT-II container was placed onto the trailer, it was discovered that the total combined payload weight was now 57,545 pounds, which exceeded the operating procedure limit of 52,000 pounds for the total combined payload.	20	1
ID--BBWI-TAN-2001-0015	During a survey of four boxes of miscellaneous metal/electrical material that had been designated for excess, contamination levels of 10,000 cpm (100,000 dpm beta/gamma) were found. The area where the material was located was not designated as a Radioactive Material Area (RMA).	4	1
NVOO--LLNV-LLNV-2001-0001	A hazardous material shipment containing explosive squib valve actuators was made with the shipping package missing the required markings for explosives.	24	1
OAK--LLNL-LLNL-2001-0034	Materials delivered from offsite were found to contain small quantities of high explosives after they had been placed in a facility that is not authorized for these types of explosives. Only one of the 50 items was tagged with the 3X hazard classification.	24	3

**Table A.1. Summary of fourth quarter FY 2001 occurrences (continued)**

<b>Report Number</b>	<b>Summary of Occurrence</b>	<b>HSR</b>	<b>SPR</b>
OH-MB-BWO-BWO06-2001-0003	In preparation for shipment of drums containing tritium-contaminated waste, routine surveys completed upon receipt indicated results for removable tritium contamination in excess of levels indicated on the Radioactive Material Transfer tags. A recount of the swipes confirmed that one drum had removable contamination of approximately 194,000 dpm/100 cm <sup>2</sup> and the second drum had removable contamination of approximately 143,000 dpm/100 cm <sup>2</sup> .	16	1
OH-WV-WVNS-HMT-2001-0002	West Valley Nuclear Service Company, LLC, was notified that a low-level radioactive waste shipment on its way to the Department of Energy's Nevada Test Site (NTS) was observed with a foam-like substance on the truck bed under one of two metal waste boxes. The breached waste box in question was a B-25 box that contained contaminated metal material.	16	3
OH-WV-WVNS-WVNSGEN-2001-0004	After a radiation control technician had completed taking radiological survey smears of a spent fuel shipping cask on a rail car that was awaiting shipment, he discovered that he his clothing had become contaminated (11,250 dpm/100 cm-sq beta/gamma, no detectable alpha).	8	1
ORO--BJC-K25WASTMAN-2001-0012	While subcontractor personnel were transporting empty drums onsite, no more than two drums tipped over in the box van, spilling approximately one-half pint of residual liquid waste on the floor. Contamination levels were 420,000 dpm/100 cm <sup>2</sup> total beta-gamma.	24	3
ORO--BJC-X10ENVRES-2001-0021	Project personnel removed an old air-conditioning and heating unit (two pieces) and loaded both pieces onto a flatbed truck. Because the building was located in a high-background area, the units were transported to a building in a low-background area for radiological surveying. Fixed contamination of 88,500 dpm/cm <sup>2</sup> beta gamma was discovered on the feet of the equipment.	8	1
ORO--BJC-X10ENVRES-2001-0026	During an onsite check, the project transportation specialist discovered that a subcontractor—who did not have the DOT authority to operate the class of vehicle used—brought a fuel truck to the Copper Ridge Barrow Area to fuel heavy equipment.	6	1

**Table A.1. Summary of fourth quarter FY 2001 occurrences (continued)**

<b>Report Number</b>	<b>Summary of Occurrence</b>	<b>HSR</b>	<b>SPR</b>
ORO--BJC-Y12WASTE-2001-0008	A subcontractor inappropriately marked, labeled, packaged, and transported a radioactive source (9.72 micro curies, Cs-137) regulated as DOT Limited Quantity Radioactive Material. Additionally, the subcontractor was not trained in accordance with the requirements of 40 CFR 172, Subpart H.	16	2
ORO--BNFL-K32-2001-0006	Flatbed trailers loaded with B-Barrels were discovered to be leaking water from B-Barrel packaging. The B-Barrels were wrapped in "Burrito Bags" that allowed rain water to enter and collect in the bottom of the bags. Subsequently, the water leached through bags and dripped onto the flatbed trailers and the ground.	8	1
ORO--BNFL-K32-2001-0007	Two intermodal shipping containers on separate rail cars were found to not be sealed properly. Contaminated material fell from the containers onto the rail cars, which resulted in contamination levels greater than specified levels.	16	1
ORO--ORNL-X10PLEQUIP-2001-0011	A scrap metal recycle vendor questioned some non-metallic material on electrical equipment sent from Oak Ridge National Laboratory to them for recycle. An Industrial Hygiene technician confirmed that the non-metallic material did contain asbestos.	4	2
ORO--ORNL-X10REDC-2001-0006	A specimen that had been plated with Californium-252 was transferred to another building for welding of the assembly in a contamination-free hot cell. Later, though, contamination of 533 dpm was found on an employee's fingers.	8	1
RFO--KHLL-PUFAB-2001-0063	An empty 55-gallon drum was opened to verify the contents against the traveler. A 2-liter container of leached resin containing 11 grams of uranium was discovered inside the drum. Further review determined that the tamper-indicating device procedure had not been followed when the tamper-indicating device was removed from the drum.	24	1
RFO--KHLL-WSTMGTOPS-2001-0032	A material control and accountability anomaly was identified relating to the onsite shipment of 27 drums. The pre-transfer paperwork included all 27 drums on the Nuclear Material Drum Transfer Reports (NMDTRs). Prior to shipment, however, one of the drums was eliminated and removed from the original NMDTR and placed on another NMDTR. All drums were subsequently shipped under the original NMDTR, though.	12	1

**Table A.1. Summary of fourth quarter FY 2001 occurrences (continued)**

<b>Report Number</b>	<b>Summary of Occurrence</b>	<b>HSR</b>	<b>SPR</b>
RFO--KHLL-WSTMGTOPS-2001-0036	During shipping operations, a low-level waste (LLW) crate tipped off of a forklift and fell approximately 12 inches to the floor without being damaged.	4	1
RL--BHI-ERDF-2001-0005	During transport of 20-ton containers of waste into the Environmental Restoration Disposal Facility (ERDF) by shuttle truck, the subcontractor driver took a break for lunch. As he was backing the truck into the parking area, the truck struck a light pole.	2	1
RL--PHMC-TPLANT-2001-0007	A shipment of 28 transuranic (TRU) waste drums was received at T-Plant and placed in Building 2706-T. Building 2706 has a limit of 177 fissile grams equivalent (FGE). The drums had been mischaracterized on their original assay, and it was later confirmed by another assay that the building limit had been barely exceeded when the shipment was totaled with the prior building inventory.	16	1
RL--PNNL-PNNLBOPER-2001-0012	It was discovered that a staff member had signed 10 manifests for hazardous waste shipments after his training qualifications had mistakenly lapsed.	2	1
SR--WSRC-ESH-2001-0003	General Engineering Labs, Inc. (GEL) shipped a drum of radioactive back to Westinghouse Savannah River Company (WSRC) because WSRC exceeded the Rad Level I Contract limits with GEL. However, GEL's repackaged shipment was not in compliance with DOT requirements.	16	2
SR--WSRC-SLDHSD-2001-0009	Approximately two tablespoons of mercury was discovered during inspections of a Sealand container. The mercury was located beneath the door seal of the waste container.	20	1