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## **Notifications relating to radioactive substances and radiation in 2006 and 2007**





## Summary

This report provides a summary of the notifications relating to radioactive substances and radiation in 2006 and 2007 received by the VROM-Inspectorate (Inspectorate for Housing, Spatial Planning and the Environment), South-West Unit (VI-ZW). The VROM-Inspectorate is responsible for adequate response to the notifications received, as part of the enforcement of the Nuclear Energy Act.

In the years 2006 and 2007, a total of 490 and 475 notifications respectively were received by the VI-ZW. The majority of the notifications concerned declarations of scrap loads with an increased radiation level. Almost 80 other declarations, reports, and tips were dealt with annually. The number of occasions in which the VI-ZW provided support to other government authorities, citizens and others increased to almost 40 in 2007.

In the follow-up of the notifications, a total of 332 and 328 violations were found in 2006 and 2007 respectively. The majority of those violations concerned illegal possession of scrap containing radioactive substances requiring a permit and/or requiring to be reported under the Nuclear Energy Act.

Since 2004, the VI-ZW provides support to Customs when Customs suspect a violation under the Nuclear Energy Act. Until now, no Special Nuclear Material (SMN) or material for manufacturing a 'dirty bomb' has been found. In 2007, the number of requests for support increased to 26 and in almost 70% of the cases, violations of the stipulations of the Nuclear Energy Act were found.

For one specific notification, the VI-ZW found that people working abroad probably had been exposed to relatively high doses of radiation. An INES-report was made to the IAEA. Two notifications concerned a potential danger of exposure for members of the population in the Netherlands. The consumer product that caused the danger was produced in the Far East and was intercepted timely. These cases were reported to the IAEA, as an INES-report.

In a number of cases, the VI-ZW was confronted with serious violations of the Nuclear Energy Act, or refusals to remedy the violation identified. In those cases, the VI-ZW instituted administrative and/or criminal-law proceedings.

Finally, the VI-ZW thanks the staff of the RTD and NRG, who on behalf of third parties, performed a great deal of work in dealing with notifications (especially sorting etc. of scrap loads with increased radiation levels) and often formed an important link between those who submitted the declarations and the staff of the VI-ZW. Employees of the National Institute for Public Health and the Environment (RIVM), who supported the VI-ZW inspectors on-site and performed the necessary analyses, also delivered an important contribution in handling the notifications.



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This report contains a very short and free presentation of some stipulations of the Nuclear Energy Act. In case of a dispute you cannot refer to this short and free presentation. In such a case you have always to consult the Nuclear Energy Act and the decrees, regulations etc. based on that act.



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# 1 Introduction

## 1.1 General

The Nuclear Energy Act contains two articles defining that anyone who, without being authorized, has in their possession or obtains fissile materials or ores (article 22), radioactive substances (article 33), or substances which must reasonably be suspected to be fissile materials or ores or radioactive substances, is obliged to declare this without delay to the mayor of the municipality where those goods are located. The aforesaid articles further determine that the mayor shall without delay report the declarations received to one of the officials designated pursuant to article 58, first subsection. In practice, nearly all declarations are done directly to the officials designated pursuant to article 58, first subsection of the VROM-Inspectorate South-West Region (VI-ZW), with or without the intermediary agency "VROM incident reporting unit". In some cases the declarations as referred to in article 22 and 33 of the Nuclear Energy Act are made to other government authorities. Those authorities (regional environmental services, fire service, etc.) then submit a request to the VI-ZW to take over and deal with the declaration. Also, other government authorities (customs, for instance) sometimes encounter situations giving rise to the suspicion of a violation of the Nuclear Energy Act. Arrangements have been agreed under which the VI-ZW will institute an investigation at the request of those other government authorities. Furthermore, other government authorities (the police for instance) in their investigations can receive indications that potentially fissile materials, ores or radioactive substances are involved that constitute a risk factor in their investigations. In such cases, they will request radiation protection support from the VI-ZW. Citizens likewise sometimes ask for support from the VI-ZW for supposed problems involving radioactive substances and/or radiation. In addition, most permits under the Nuclear Energy Act stipulate, in prescriptions connected with the permit, that incidents or accidents involving the use, loss or missing fissile materials, ores and radioactive substances must be reported without delay to the inspection services, including the VI-ZW. At the VI-ZW, staff members can be reached and are available 365 days a year, 24 hours a day for receiving and assessing declarations, reports and requests. If necessary, the staff member concerned can take or initiate measures immediately after having assessed the declaration, report or request and can start an onsite investigation. Assistance and support from other specialised services and companies, for instance the National Institute for Public Health and the Environment (RIVM), the Röntgen Technische Dienst (RTD) and the Nuclear Research Group (NRG), is an option. The VI-ZW has made the necessary arrangements with those services and companies.

## 1.2 About this report

The general term used here to refer to the declarations, reports and requests mentioned in the preceding section is notifications. This report does not distinguish between fissile materials, ores and radioactive substances, all of which are referred to as radioactive substances, unless a distinction is essential.



This report provides a summary of the notifications relating to radioactive substances and radiation in the years 2006 and 2007 received by the VI-ZW. The structure of this report is generally similar to the report on the notifications in 2003, 2004 and 2005 (ref. 1). In a few places the report has been extended. Where possible and available, tables contain the (more or less) comparable figures for 2003, 2004 and 2005 from ref. 1 for comparative purposes. Bracketed numbers in tables refer to the number of violations found.

### **Types of notifications**

This report provides information on the numbers of notifications received, making a distinction between:

- declarations of scrap loads with increased radiation levels;
- other declarations, reports (of incidents, accidents, loss, missing, etc.) and tips;
- requests for support.

### **Violations**

In addition, the various sections in this report will state, where possible, to what extent the notifications involve a violation under the Nuclear Energy Act. Commonly occurring violations are, specifically:

- holding, without a permit, fissile materials, ores or radioactive substances (article 15 and article 29 of the Nuclear Energy Act) for which licenses are required;
- holding, without having reported them, radioactive substances requiring to be reported (article 32 of the Nuclear Energy Act);
- failure to report (or report in time) the unauthorised holding or obtaining of fissile materials, ores or radioactive substances (article 22 and article 33 of the Nuclear Energy Act);
- failure to comply with a prescription connected with a license granted under the Nuclear Energy Act (article 76a of the Nuclear Energy Act).

For further information on the method of counting violations used in this report, see section 6.

### **Guide to reading**

Section 2 provides a general summary of the notifications in 2006 and 2007 received by the VI-ZW relating to radioactive substances and radiation. Section 3 describes the reports of scrap loads with an increased radiation level from the Netherlands and abroad. Section 4 discusses the other declarations, reports of incidents, accidents, loss and missing and the tips. Next, section 5 zooms in on the requests for support. Sections 3, 4 and 5 contain a discussion of a number of selected, noteworthy notifications. Section 6 discusses enforcement by the VI-ZW. Finally, section 7 presents the conclusions and recommendations.

### **Changes in the legislation**

In 2006 and 2007, no changes were made to the legislation that would significantly influence the number of notifications received by the VI-ZW in that period.

### **Fissile material**

Fissile material as defined in the Dutch regulations on basis of the Nuclear Energy Act means material (not being ore) with more than 0,1% uranium, or more than 0,1% plutonium, or more than 3% thorium (% by weight), independent of the isotopic composition (enrichment).



## 2 Types and number of notifications in 2006 and 2007

### 2.1 Types of notifications

The notifications are divided into three categories in this report.

- “Declarations of scrap loads with an increased radiation level”.  
These are reports by scrap-processing companies that have found, with the aid of gate detectors, crane detectors, gripper detectors and/or hand-held measuring equipment, that a (part of) a scrap load delivered to them or stored on their premises has an increased level of radiation. The procedure to be followed by them in declaring this, is set out in the “Inspection guideline for metal and scrap with radioactive substances” (ref. 2).
- “Other declarations, reports and tips.”  
These are declarations relating to other situations than scrap in which a company holds or obtains, without the required authorisation, radioactive substances or substances which must reasonably be suspected to be radioactive substances. They also include reports by license holders under the Nuclear Energy Act relating to incidents, accidents, loss and missing that they are to make under the prescriptions of their permit. This category includes tips from third parties relating to the suspicions of a violation of the Nuclear Energy Act, incidents involving radioactive substances, etc.
- “Requests for support.”  
These include requests from other government authorities to process declarations, because their own staff members have not been designated as “article 58 officials”. Additionally, some government services suspecting a violation of the Nuclear Energy Act are not sufficiently knowledgeable and/or sufficiently equipped to be able to assess these matters reliably. Finally, citizens sometimes ask for an examination by or on behalf of the VI-ZW if they suspect, in their personal life, problems concerning radiation and/or radioactive substances, or if they wish to dispose of radioactive substances they hold as private persons.

### 2.2 Number of notifications

Table 1 provides an overview of the number of notifications in the period covered by the report. As in the report for 2002, 2003 and 2004, the category referred to as “non-relevant notifications” has not been included in the numbers stated in this report. In the years 2006 and 2007, 116 and 119 notifications respectively were received, which rather swiftly proved not to require immediate follow-up. A few examples of “non-relevant notifications” are: gate detector alarms due to testing materials using ionising radiation (sources and x-ray equipment) in the vicinity of the gate detector, gate detector alarms due to weighing tanks containing potassium hydroxide, rubble with bricks, etc. (the gate detectors are often located right



beside the weigh bridge) and gate detector alarms by persons who have been administered radioactive substances in a hospital for diagnostic or therapeutic purposes. Reports on (temporarily) malfunctioning of a gate detector are also assigned to the category “non-relevant reports”. The operator of the gate detector has however to record these alarms carefully, to be able to explain these alarms, which are included in the gate detector database, in the event of an inspection by the VI-ZW.

Table 1: Overview of the number of notifications per year and per category for the years 2003 -2007.

	2003	2004	2005	2006	2007
Declarations of scrap loads with increased radiation levels	210	343	336	388	358
Other declarations, reports and tips	70	67	566	76	80
Requests for support	9	19	22	26	37
Total	289	429	414	490	475
Increase in the number notifications versus prior year (%)	6	48	-4	18	-3

Table 1 shows that the number of declarations of scrap loads with an increased radiation level was higher again in the years 2006 and 2007 than in the years 2004 and 2005. The number of other declarations, reports and tips also shows again an increasing trend. The number of requests for support is still clearly increasing.

In addition, the number of “non-relevant notifications” in 2006 and 2007 changed little from the average over the years 2003 - 2005.



## 3 Declarations of loads metal scrap with an increased radiation level

This section discusses the declarations of scrap loads with an increased radiation level. Declarations by scrap traders are usually made following an alarm by a gate detector. Nearly all large and medium-sized scrap traders now use gate detectors. In addition, a number of large scrap traders also have detectors fixed to cranes and grippers. A few smaller scrap traders use hand-held-detectors to check the loads.

### 3.1 General

Table 2 provides an overview of the number of declarations of scrap loads with an increased radiation level. The table draws a distinction between the following sub-categories:

- scrap loads coming from the Netherlands. For 2002, 2003 and 2004, this category also includes the declarations of identifying radioactive substances on/from a company's own premises (after more detailed checks using hand-held-detectors, with crane detectors when blending and moving scrap and of outgoing loads that caused a gate detector alarm), when it was not possible to establish unambiguously that the radioactive substances originated from a load from abroad.
- scrap loads from a company's own premises. These numbers are only available/noted separately for the years 2006 and 2007.
- scrap loads that have come from abroad and have been sent back abroad without separating out the materials causing the increased radiation level;
- scrap loads coming from abroad whereby the materials causing the increased radiation level have been separated out at the receiving Dutch company and the separated materials are examined. As part of the examination, the radionuclides were qualified and quantified as accurately as possible. Quantifying them was particularly difficult at times and sometimes had to be done using estimates.

Table 2 shows the total number of declarations of scrap loads with an increased radiation level was higher again in the years 2006 and 2007 than in the years 2004 and 2005. The increase is smaller (by percentage) than in previous years. The number of scrap loads sent back to the sender abroad is somewhat lower than in the previous reporting period. An explanation for the slight decrease in the number of declarations in 2007 compared with 2006 could be the temporary vulnerability of the scrap market in 2007. The percentage of declarations of scrap loads from abroad remained fairly constant in the period 2003 - 2007.



Table 2: Overview of the number of scrap loads with an increased radiation level per year and per sub-category for the years 2003 - 2007.

	2003	2004	2005	2006	2007
Declarations of scrap loads from the Netherlands *	121	177	186	138	102
Declarations of scrap loads from a company's own premises	-	-	-	74	87
Declarations of scrap loads from abroad and sent back	15	29	30	23	16
Declarations of scrap loads from abroad that were examined	74	137	120	153	153
Total	210	343	336	388	358
Share of scrap cargoes from abroad (%)	42	48	45	45	47

\* For 2003, 2004 and 2005 this number includes the declarations of scrap loads from a company's own premises.

A majority of the number of declarations of scrap loads comes from two large stainless steel scrap traders, who have not only a gate detector but also crane detectors and gripper detectors and who regularly perform additional checks using hand-held detectors on stocks of scrap in storage. Objects with increased radiation levels are regularly found during those checks using hand-held detectors and during loading and blending of scrap using grippers and cranes. In view of the fact that a large proportion of the scrap at those companies comes from abroad, it is reasonable to assume that a large proportion of those declarations relate to scrap from abroad.

To illustrate and substantiate the above, table 3 shows the number of scrap loads with an increased radiation level declared by the two large stainless steel scrap traders and the other scrap traders, also indicating the numbers concerned with scrap loads from the company's own premises.

Table 3: Overview of the number of scrap loads with increased radiation levels per year and broken down into companies, for the years 2003 - 2007.

	2003	2004	2005	2006	2007
Stainless steel scrap-processing company A	68	133	73	128	96
Of which from own premises	-	-	-	21	12
Stainless steel scrap-processing company B	17	52	67	59	98
Of which from own premises	-	-	-	38	63
Other scrap-processing companies in the Netherlands	125	158	196	201	164
Of which from own premises	-	-	-	15	12
Total	210	343	336	388	358
Of which from own premises	-	-	-	74	87
Share of stainless steel scrap-processing companies A + B (%)	40	54	42	48	54

Table 3 shows that the two large stainless steel scrap-processing companies, averaged over 2006 and 2007, accounted for almost half of the declarations. A markedly large number of declarations of scrap loads from own premises came from stainless steel scrap-processing company B. There is no ready explanation for this. Investigation into a explanation for this could take place during company inspections at the company concerned.



### 3.2 Loads of metal scrap from the Netherlands

In all cases, the cause of the increased radiation levels was examined for these loads. The radioactive substances requiring license and/or requiring to be reported were separated out from the loads and were (or will be) transported to a company that is authorised to store them (Central Organisation for Radioactive Waste (COVRA) in the case of radioactive substances requiring license, and to landfills for hazardous waste in the case of radioactive substances requiring to be reported), or were transported to a company that is authorised to process them (NRG location Petten for decontamination and Siempelkamp in Krefeld, Germany, for melting). In a few cases, no clear explanation was found for the original alarm by the gate detector, gripper detector or crane detector. Companies that have a Nuclear Energy Act license to sort scrap loads are the RTD and NRG. RTD and NRG send a copy of the reports on the findings of examinations and sorting to the VI-ZW. The VI-ZW reviews the reports, establishes whether or not there has been a violation of a regulation under the Nuclear Energy Act and takes further action if required.

Table 4 lists a number of comparatively frequent specific causes of the increased radiation level. It is also noted whether it involved contamination (thin layer of material on an object) or solid material (radioactive substances in the material). Examples of indicator instruments (usually with Ra-226 paint) include compasses, levelling instruments, watches and dials of pressure gauges. Examples of relatively common sealed sources are lightning-conductors and tubes from old electronic equipment (primarily Ra-226).

Table 4: Overview of the materials/objects generating the increased radiation level on scrap loads from the Netherlands by year and by categories for the years 2003 - 2007.

	2003	2004	2005	2006	2007
Slag wool (isolation material)	31 (28)	32 (28)	52 (51)	33 (32)	20 (20)
Source (sealed/encapsulated)	6 (6)	17 (17)	12 (12)	11 (11)	8 (8)
Indicator-instrument	8 (8)	14 (14)	10 (10)	20 (20)	11 (11)
Uranium shielding container	1 (1)	0 (0)	0 (0)	0 (0)	1 (1)
Contamination (unspecified)	18 (13)	40 (28)	41 (34)	-	-
Contamination fissile material	-	-	-	0 (0)	0 (0)
Contamination artificial	-	-	-	0 (0)	2 (1)
Contamination natural	-	-	-	12 (10)	4 (3)
Solid (unspecified)	57 (14)	74 (21)	71 (30)	-	-
Solid fissile material	-	-	-	2 (2)	1 (1)
Solid artificial	-	-	-	1 (1)	3 (3)
Solid natural	-	-	-	54 (28)	43 (15)
Unknown	-	-	-	5 (0)	9 (3)
<b>Total</b>	<b>121 (70)</b>	<b>177(108)</b>	<b>186 (137)</b>	<b>138 (104)</b>	<b>102 (66)</b>
<b>Share of violations in the total number (%)</b>	<b>58</b>	<b>61</b>	<b>74</b>	<b>75</b>	<b>65</b>

# For the years 2003, 2004 and 2005, the numbers include loads from the companies' own premises.

# The numbers given in the report for 2002, 2003 and 2004 listed for refractory and other have been added to solid.

# For the years 2006 and 2007, the categories contamination and solid have been broken down into the sub-categories fissile material, artificial radionuclides and radionuclides of natural origin.

# The numbers between parentheses concern the number of violations.



Table 4 (in combination with the numbers in table 5) shows that the share of different materials/objects can fluctuate considerably from year to year. Nonetheless, no significant shifts appear to be discernible. The most commonly occurring materials/objects in 2006 and 2007 are slag wool and solid materials containing natural radionuclides. Slag wool is a typical Dutch problem. Barely any slag wool with concentrations of radionuclides requiring a permit or to be reported are found in scrap loads from outside the Netherlands. The share of uranium shielding containers and contamination/solid material with fissile material or artificial radionuclide was low in 2006 and 2007 (total average less than 5%). The share of reports in which a violation was discovered was on average 71% in 2006 and 2007, making it a little higher than in the years 2003, 2004 and 2005 (average 65%).

### 3.3 Metal scrap of own yards

This subcategory has been included in the report for the first time, for the years 2006 and 2007. Objects with increased radiation levels are regularly found during checks using hand-held detectors and during loading and blending of scrap using grippers and cranes. Occasionally an outgoing load causes a gate detector alarm. Most of these declarations originate from two large stainless steel scrap-processing companies (see table 3). Given the fact that a large proportion of scrap at these companies originates from abroad, it is to be expected that a considerable amount of the metal scrap in these reports is from countries outside the Netherlands.

A discussion of why this is not detected at the moment of arrival is beyond the bounds of this report.

Table 5: Overview of materials/objects that were responsible for the elevated radiation level of loads of scrap from own yards per year and per category for the years 2006 and 2007.

	2006	2007
Slag wool (isolation material)	1 (1)	3 (3)
Source (sealed/encapsulated)	13 (13)	6 (6)
Indicator-instrument	0 (0)	5 (5)
Uranium shielding container	0 (0)	3 (3)
Contamination fissile material	0 (0)	0 (0)
Contamination artificial	5 (2)	13 (9)
Contamination natural	33 (23)	39 (33)
Solid fissile material	3 (3)	5 (5)
Solid artificial	8 (7)	5 (4)
Solid natural	8 (5)	6 (4)
Unknown	3 (0)	2 (0)
Total	74 (54)	87 (72)
Share of violations in the total number (%)	73	83

Table 5 shows that the share of the different materials/objects can fluctuate considerably from year to year. The most common cause in both 2006 and 2007 is contamination with natural radionuclides. The share of slag wool is considerably lower than in scrap originating in the Netherlands. At an average of 26%, the share of uranium shielding containers and contamination/solid material with fissile material or artificial radionuclides was considerably higher than in scrap originating in the Netherlands (less than 5%). This is in line with the findings regarding scrap originating outside the Netherlands (see table 8).



### 3.4 Loads of metal scrap from abroad that were returned

Table 6 provides an overview of the number of scrap loads with an increased radiation level from abroad that were returned without separating out the material causing the increased radiation levels. The table provides a breakdown of returns to the various countries and country clusters. Generally speaking scrap is not returned to countries outside Europe, as it is very uncertain that it will be properly dealt with in such countries (with a few exceptions).

Such returns can only be carried out if the radiation level on the outside of the container in which the load is transported does not exceed 5 microsieverts per hour. In addition, the sender abroad has to submit a declaration confirming that he is aware of the reason for the non-acceptance of the load and that he will process the load after its return in line with the rules applicable in his country.

Table 6: Overview of the number of returns abroad of scrap loads with an increased radiation level by year and origin over the years 2003 - 2007.

	2003	2004	2005	2006	2007
Belgium	9	4	0	4	3
Germany	2	20	30	12	13
Eastern Europe	1	0	0	0	0
Rest of Europe	3	5	0	7	0
Other	0	0	0	0	0
Total	15	29	30	23	16

# The numbers noted for Eastern Europe for the years 2003, 2004 and 2005 refer to the former USSR countries. For the years 2006 and 2007 the numbers for Eastern Europe are for Eastern European countries that are not in the EU.

Table 6 shows that the number of returns in 2006 and 2007 was slightly lower than in 2003, 2004 and 2005. In 2006 and 2007 most returned loads were sent to Germany. Returns to Germany are made predominantly by companies in the border area.

### 3.5 Loads of metal scrap from abroad that have been examined in the Netherlands

In all cases, the materials with increased radiation levels were separated out from these loads, and the cause of the increased radiation level was examined. Both the nature and the quantity of radionuclides were examined. The radioactive substances requiring licenses and/or requiring to be reported were separated out from the load and were (or will be) transported to a company that is authorised to store them (COVRA in the case of radioactive substances requiring licenses and to landfills for hazardous waste in the case of radioactive substances requiring to be reported), or were transported to a company that is authorised to process them (NRG location Petten for decontamination and Siempelkamp in Krefeld, Germany, for melting). As stated above, companies that have a Nuclear Energy Act license to sort scrap loads are the RTD and NRG. RTD and NRG send a copy of the reports on the findings of examinations and sorting to the VI-ZW. The VI-ZW reviews the reports, establishes whether or not there has been a violation of a regulation under the Nuclear Energy Act and takes further action if required.



Table 7 provides an overview of the number of scrap loads from abroad from which the materials causing the increased radiation level were separated out in the Netherlands. The table provides a breakdown of returns to the various countries, country clusters and continents.

Table 7: Overview of the number of scrap loads from abroad with an increased radiation level that were sorted in the Netherlands by year and origin over the years 2003 - 2007.

	2003	2004	2005	2006	2007
Belgium	3 (2)	12 (10)	9 (7)	9 (4)	14 (10)
Germany	6 (4)	18 (14)	16 (15)	15 (12)	10 (8)
Eastern Europe	17 (10)	16 (15)	30 (24)	13 (8)	27 (23)
Rest of Europe	8 (7)	24 (17)	11 (8)	11 (9)	8 (3)
Asia (including the European part of Turkey)	20 (20)	38 (33)	18 (18)	48 (38)	33 (30)
Africa	6 (5)	13 (13)	15 (15)	22 (20)	28 (27)
South America	13 (13)	12 (10)	17 (17)	21 (19)	25 (17)
Other	1 (0)	4 (4)	4 (4)	14 (10)	8 (8)
Total	74 (61)	137(116)	120 (108)	153 (120)	153 (126)
Share of violations in the total number (%)	82	85	90	78	82

# The numbers noted for Eastern Europe for the years 2003, 2004 and 2005 refer to the former USSR countries. For the years 2006 and 2007 the numbers for Eastern Europe are for Eastern European countries that are not in the EU.

Table 7 shows that the increase in the number of loads of scrap with an increased radiation level from abroad in 2006 and 2007 can be mainly attributed to loads from countries outside Europe. The percentage of declarations for which a violation is found, is at around 80% for the years 2006 and 2007. This means that this percentage is nearly 10% above that for scrap loads from the Netherlands.

Table 8 lists a number of comparatively frequent specific causes of the increased radiation level in scrap loads. It also states whether this concerned contaminations (thin layer surface deposits on an object), or solid material. Examples of indicator-instruments include compasses, levelling instruments, watches and dials of pressure gauges. Examples of comparatively frequent sealed sources are lightning conductors (containing the nuclides Ra-226 or Am-241) and Ra-226 tubes in old electronic equipment. An example of a frequently encountered solid material with artificial radionuclide is stainless steel with Co-60.

Please note in table 8 that no slag wool with an increased radiation level is found in scrap loads from abroad. Slag wool containing concentrations of radionuclides requiring a permit or requiring to be reported is a typically Dutch issue. Both in 2006 and 2007, uranium shielding containers were regularly discovered in the scrap. At an average of 29%, the share of uranium shielding containers and contamination/solid material with fissile material or artificial radionuclides was considerably higher than in scrap originating in the Netherlands (less than 5%). Just as with Dutch scrap, contamination with naturally occurring nuclides concerns mainly Ra-226 deposits.



Table 8: Overview of the materials/objects generating an increased radiation level on scrap loads from abroad by year and by categories for the years 2003 - 2007.

	2003	2004	2005	2006	2007
Slag wool (isolation material)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Source (sealed/encapsulated)	14 (14)	18 (18)	20 (20)	25 (25)	18 (18)
Indicator-instrument	2 (2)	2 (2)	8 (8)	3 (3)	4 (4)
Uranium shielding container	1 (1)	6 (6)	3 (3)	7 (7)	7 (7)
Contamination (unspecified)	35 (34)	73 (65)	58 (56)	-	-
Contamination fissile material	-	-	-	0 (0)	3 (3)
Contamination artificial	-	-	-	11 (9)	12 (6)
Contamination natural	-	-	-	59 (47)	57 (50)
Solid (unspecified)	22 (10)	38 (25)	31 (21)	-	-
Solid fissile material	-	-	-	5 (5)	9 (9)
Solid artificial	-	-	-	18 (12)	16 (10)
Solid natural	-	-	-	23 (12)	25 (19)
Unknown	-	-	-	2 (0)	2 (0)
<b>Total</b>	<b>74 (61)</b>	<b>137 (116)</b>	<b>120 (108)</b>	<b>153 (120)</b>	<b>153 (126)</b>

# The figures shown in the reporting over 2002, 2003 and 2004 for refractory and other have been combined into solid.

# For 2006 and 2007, the categories contamination and solid have been divided into the subcategories fissile materials, artificial radionuclides and naturally occurring radionuclides.

### 3.6 Some instances of radioactive materials in scrap highlighted

#### 3.6.1 Illegal dispose of a cesium-137 source in Dutch scrap

On 20 March 2006 the VI-ZW received a declaration from a scrap company concerning a container with scrap with an increased radiation level. The enhancement was first detected by a gate detector alarm. Upon manual measurement it was found to be a minor elevation (maximum 0.1 microsieverts per hour on the outside of the container). The load of scrap came from a Dutch ship repair company that also carries out modifications and repairs to drilling and production platforms for the oil and gas industry. Further investigation and sorting of the load revealed that the increased radiation level was caused by a sealed source with an activity of 195 megabecquerels (1999) Cs-137. The source came from a drilling platform operating under a foreign flag that was along the riverside wall of a Dutch yard, undergoing modifications. It was no longer possible to establish with certainty how the illegal disposal of the source could have taken place. It was most probably due to an unsound identification of the source. A report was made up against the foreign owner of the drilling platform.



Photo 1: cesium-137 source removed from a load of scrap

### 3.6.2 Scrap with a large number of indicator instruments

On 4 August 2006, the VI-ZW received a declaration from a scrap company concerning a container with scrap with an increased radiation level. The load comprised (remains of) car wrecks originating from a Dutch car-breaker's yard. Sorting out the load led to great problems as in addition to the scrap, there were considerable amounts of dirt and soil in the container. In total, approximately 50 indicator-instruments with radioactive substances were removed from the load. In addition, the customary loose dials and indicators were also found in the cargo. In addition, approximately 150 kg of contaminated soil was removed. A company inspection of the car-breaker's yard by the VI-ZW found no further soil contamination.



Photo 2: indicator instruments removed from the scrap load

### 3.6.3 Discovery of a large source of cesium-137 in foreign scrap

On the afternoon of 12 February 2007, a scrap company declared a container loaded with scrap having a relatively high radiation level. The radiation level measured on the outside of the container, which arrived from Iran via Belgium, was more than 5 millisieverts per hour. The container's contents were sorted that same evening. The increased radiation level was caused by a block of compacted scrap weighing approx. 100 kilograms. On the block's surface, the radiation level was approximately 140 millisieverts per hour and at a distance of 1 metre, the radiation level was more than 6 millisieverts per hour. The activity in the block was estimated at more than 70 gigabecquerels of cesium-137. Considering the relatively high radiation levels of the discovery, a so-called INES-report was submitted to the IAEA in Vienna (INES level 1).



Photo 3: cesium-137 source removed from the scrap cargo



## 4 Other declarations, reports and tips

This section discusses declarations other than declarations of scrap loads with an increased radiation level. It also discusses the reports by permit holders, and tips. In table 9, in section 4.4, the number per year is given, broken down into subcategories.

### 4.1 Other declarations

Most of these concern declarations by companies that, for various reasons, carry out radiation measurements as part of their operations. These measurements are usually performed with for ensuring adequate protection of the workers. An example is the detection of an increased radiation level of a open-top container, on which contaminated tubing has been used for the upper rim, at a scrap trader when it passed a gate detector. Another example is the detection of contamination in a valve used for production of oil or natural gas and that was given to a specialised company for overhaul. The overhaul company performed the measurements prior to commencing the overhaul process with a view to labour protection and preventing environmental contamination. A third example is the detection of an increased radiation level in loads of residues to be recycled, other than scrap. The declarations of companies that process both scrap and (occasionally) other residues with metals are stated as part of the declarations of scrap loads with increased radiation levels, as this often relates to mixed cargoes.

### 4.2 Reports

Most of these concern reports by companies that have a license under the Nuclear Energy Act. On the one hand, these include reports of incidents arising from work with radioactive substances in laboratories and hospitals. An example is the occurrence of contamination in an unmonitored area, owing to a leak in a sewerage pipe used to dispose of waste water contaminated with radioactive substances. Another example is the occurrence of serious contamination in a radionuclide laboratory owing to a fracture in a test structure containing radioactive substances. On the other hand, it includes reports of loss, missing and theft of radioactive substances. An example is the missing of a package containing radioactive substances during transport from the producer of the radioactive substances to a user of those radioactive substances. Mostly this relates to 'misrouting', and the radioactive substances are later delivered to their intended destination. Very occasionally, this kind of package stays definitely missing. Another example is the theft of a radioactive source from the car in which the source is being transported.

These reports usually do not, in the first instance, represent violations of a provision under the Nuclear Energy Act. However, the examination of the cause of the incident or disappearance does sometimes reveal underlying violations of provisions under the Nuclear Energy Act.



### 4.3 Tips

A few times a year, the VI-ZW receives notifications of (supposed) shortcomings in terms of radiation protection. Violations are regularly identified in verifying the tips and as such can therefore be concluded to have been justified.

### 4.4 Overview other declarations, reports and tips

Table 9: Overview of the number of other declarations, reports and tips per year and per sub-category for the years 2003 - 2007.

	2003	2004	2005	2006	2007
Declarations of open-top containers with contaminated tubing	15 (15)	11 (11)	6 (6)	4 (4)	12 (12)
Declarations of material from the oil and gas production	8 (3)	4 (0)	4 (4)	9 (7)	1 (0)
Declarations of recycling metal other than scrap	14 (0)	10 (0)	13 (3)	9 (0)	12 (2)
Remaining other declarations	15 (2)	22 (7)	14 (5)	29 (19)	17 (13)
Reports of incidents and accidents	4 (1)	5 (2)	10 (3)	8 (4)	8 (3)
Reports of loss, missing and theft	1 (0)	2 (1)	3 (0)	2 (2)	7 (2)
Other reports	3 (0)	5 (2)	1 (0)	2 (0)	3 (3)
Tips	10 (4)	8 (4)	5 (2)	13 (5)	20 (10)
Total	70 (25)	67 (27)	56 (23)	76 (41)	80 (45)
Share of violations in the total number (%)	36	40	41	54	56

Table 9 reveals substantial year-on-year fluctuations in the numbers in the various sub-categories. The increase in 2006 and 2007 can largely be explained by the number of tips received. The percentage of declarations, reports and tips for which a violation was found was clearly higher in 2006 and 2007 than in 2003, 2004 and 2005.

### 4.5 Some other declarations, reports and tips highlighted

#### 4.5.1 Increased radiation level due to NDMT-work (Non Destructive Material Testing)

On 21 February 2006, the VI-ZW received a tip from the Laboratory for Radiation Research at the National Institute for Public Health and the Environment, that a monitoring station of the National Radioactivity Monitoring network at the edge of the Vlissingen-Oost industrial park (Sloegebied) was regularly reporting an increased gamma-radiation level, at more or less fixed times. Based on information from the regional fire-brigade, NDMT-activities using ionising radiation were suspected to be causing the increased radiation level. After an exploratory investigation in the vicinity of the monitoring station that reported the increased radiation levels, the VI-ZW performed a unannounced inspection at the company where the source of the radiation was located. On the company premises concerned, a Dutch NDMT-company was performing



activities with sealed sources on pipes destined for a pipeline. At the edge of the enclosure, a radiation level of up to 230 microsieverts per hour was recorded, where a maximum level of 10 microsieverts per hour was allowed according to licence prescriptions. Other violations were also identified. Immediate corrective measures were required of the NDMT-company. An official report was filed against the NDMT-company.

#### 4.5.2 Contaminations in a crematorium

On 2 March 2006, the VI-ZW received a tip describing a suspected contamination with radioactive substances at a crematorium. At the beginning of 2006, a man had a medical treatment in which a total of 57 radioactive iodine-sources in the form of 'seeds' were implanted in the prostate. After the treatment, the man died unexpectedly and was then cremated, without the radioactive sources being removed from the body. Relatives did indicate that the man had recently undergone a treatment with radioactive substances, but the importance of this remark was evidently not correctly assessed by the undertaker. The treating doctor from the hospital immediately gave the alarm after receiving the obituary notice of his patient. The crematorium was then informed. Hospital staff performed measurements in the crematorium. These measurements indicated increased radiation levels in the cremation furnace, the cremulator (a machine that pulverises the ashes after cremation) and in the ashes of the cremated patient. The ashes of five people that were cremated after the patient concerned, in the same oven, also had an increased radiation level. The furnace and the cremulator were decontaminated and could thereafter be used again. The ashes of the six people who were cremated were examined in more detail at the hospital. The contamination level of four of the ashes was above the exemption level. In total 47 of the 57 radioactive sources were recovered more or less undamaged. Initially, it was expected that the sources would all be recovered intact and that the ashes would not be contaminated with radioactive substances. This is because the sources were made of titanium, which has a much higher melting point than the operating temperature of the cremation furnace. The missing ten sources were damaged in the processing of the ashes after the cremation (in the cremulator). This led to the contamination of the ashes of four other deceased. Legislation does not provide for this situation, in which the ashes of four deceased were so contaminated with radioactive substances that the relatives could not freely obtain the ashes. For that reason, in consultation with the parties involved, a pragmatic solution was sought that without prejudice to the importance of protecting against radiation, would not disrupt the grieving process of the relatives more than necessary. The legislation does include an exception to the requirement for a permit for radioactive substances if the radioactive substances are treated as encapsulated sources and at the same time have only a relatively low radiation level. In this case, therefore, the solution decided upon involved the encapsulation of the ashes of each of the deceased in sealed urns. It would not be allowed to open the urns before the date in which the amount of radioactive substances would decay to below the exemption level. By taking this approach, the possession of radioactive substances by members of the population, namely the relatives, could be justified. Three weeks after being transferred to the hospital, the contaminated ashes of the four deceased were made into encapsulated sources that could be released for further ash destinations.



#### 4.5.3 Removal of contaminated material from an drilling platform

On 17 March 2006, the VI-ZW received a report regarding the transfer of contaminated material by a Dutch oil and gas production company to two Dutch service companies that did not have the required licenses. The contaminated material originated from a production test on a drilling site located on the Dutch part of the North Sea Continental Shelf. The oil and gas production company had not expected that the material used in the production test could become contaminated in a few weeks by amounts of radioactive substances that would require notification and a license and had therefore not performed any contamination measurement when the test equipment used was returned. The contaminated material was decontaminated at the company's expense. In cooperation with the National Mines Inspectorate, an official report was filed against the company.



Photo 4: contaminated equipment from the gas production test

#### 4.5.4 Contaminated flue gas desulphurisation plant at an electricity generation station

On 12 September 2006, a scrap company reported a gate alarm for a container loaded with scrap originating from an electricity generating station. The generating station hired the RTD to investigate the (underlying) cause of the gate alarm. The investigation showed that the gas washer of the flue gas desulphurisation plant at the generating station was covered to a great extent by scale. The scale contained amounts of radium-226 requiring a licence. After the generating station had made a declaration to the VI-ZW, the scale was removed from the gas cleaning equipment using a radiation protection approach. Ultimately, the generating station applied for and was granted a licence for the possession of radioactive substances requiring a license within its installations.



Photo 5: contaminated flue gas desulphurisation plant

#### 4.5.5 Radium-226 powder in household effects

On 11 November 2006, a scrap company declared a gate-alarm set off by a recycling company's delivery van. The delivery -van did not deliver any scrap, but was present on the scrap company's premises for other purposes. The delivery van drove off after the gate alarm, even though the personnel at the scrap company had indicated that it would have to wait there for the VI-ZW decision regarding the gate alarm. VI-ZW contact with the recycling company revealed that the delivery van was loaded with the household effects of a former clockmaker. Initially, the recycling company was unwilling to resolve the matter. At the direction of the VI-ZW, the recycling company finally had the household effects investigated by the NRG. Ultimately, two tubes containing radioactive powder were picked out of the household effects. The activity of the powder in the tubes was approximately 300 kilobecquerels of radium-226.



Photo 6: box with tube with radium powder

#### 4.5.6 Illegal import and incorrect storage of sealed sources

On 12 April 2007, during an inspection of a branch of an NDMT-company, on the premises of a ship repair company that modified platforms for the oil and gas industry (among other things), a crate containing radioactive sources was found under a table in the NDMT-company's work area. Transport stickers had been applied to the crate. The VI-ZW inspector measured an increased radiation level on the crate. Further investigation revealed that the sources were forwarded to the ship repair company, without notification of transportation and import, at the end of 2006 by the Norwegian owner of the platform being modified on site. The ship repair company did not notice that the crate contained radioactive sources and without further precautions, the crate was stored in a warehouse. At the end of February 2007, e-mail correspondence between the Norwegian company and the NDMT-company clarified that the sources were forwarded at the end of 2006. The crate containing the sources was then transferred from the warehouse of the ship repair company to the NDMT-company's workplace. The sources were not directly stored by the NDMT-company in the storage area for radioactive substances. In total there was a string of violations for which the necessary warning official letters were written.

#### 4.5.7 Operations with a sealed source without a licence

On 26 April 2007, a scrap company reported a gate alarm caused by a case with a measuring instrument, intended for measuring the contents of fire extinguishers. The VI-ZW's investigation of the report revealed that the Dutch owner of the measuring instrument did not possess a Nuclear Energy Act licence for the cobalt-60 source present in the measuring instrument. The company had already performed operations with



the source for 10 years without a licence. The source was acquired in Denmark and was imported into the Netherlands without the required formalities. An official report was filed against the company.



Photo 7: case with measuring instrument

#### 4.5.8 Blood samples for a ring-investigation contaminated with technetium-99m

On 13 September 2007, a scrap processing company reported a gate-alarm, which was caused by a car from a courier company. On-site investigation by the VI-ZW revealed that the increased radiation level was caused by a box of blood samples, which were given to the courier by a hospital, for delivery to various addresses. The blood samples proved to contain technetium-99m. Contact with the hospital made clear that the blood samples were intended to be used in the performance of a ring-investigation (not related to radioactive substances). After the detection of the radioactive substance in the samples, the samples were taken back by the hospital. When taking the blood sample from a patient, the hospital had not checked whether the patient had recently been administered radioactive substances. The hospital concerned has since sharpened its procedures in this regard.



Photo 8: box of samples for ring-investigation



## 5 Requests for support

This section discusses requests for support by the VI-ZW. This includes, on the one hand, requests for support from other government authorities such as customs, the fire-brigade and police, and requests from citizens on the other. In terms of support provided to other government authorities, the support given to customs as part of combating terrorism is a special task. The various subcategories of support provided are discussed in greater detail below. In table 10, in section 5.4, the number of requests per year are given, broken down into subcategories.

### 5.1 Support to customs as part of combating terrorism

Following the terrorist attacks in the US on 11 September 2001, the US government urged the Dutch government to install radiation detection gates in the port of Rotterdam. These gates are intended to identify Special Nuclear Material (SNM) and other radioactive substances that can be used for terrorist activities. Initially, four detection gates were installed at the ECT Delta terminal on the Maasvlakte. At the end of 2006 and the beginning of 2007, this number was gradually increased to approximately 40. These gates are operated by customs officials who investigate most alarms without support from the VI-ZW. In cases where further examination requiring more specialist knowledge is needed, arrangements have been made for the VI-ZW to provide support to customs.

### 5.2 Other support to government authorities

The other requests for support relate, for instance, to declarations as referred to in article 22 and 33 of the Nuclear Energy Act that were initially received by other government authorities. Also, other government authorities sometimes come across situations that give them cause to suspect a violation under the Nuclear Energy Act. Arrangements have been made for the VI-ZW providing specialist support to those other government authorities on their request. Additionally, the VI-ZW provides radiation protection support to other government authorities (for example the police) if, in the course of their investigations, they receive an indication that fissile materials, ores or radioactive substances might be involved.

### 5.3 Support to citizens

On the one hand, citizens occasionally request support in disposing of radioactive substances that require a license or should be reported. Examples are the disposal of old measuring instruments containing radioactive substances, and the disposal of collections of minerals containing relatively high concentrations



of uranium and thorium. A regularly reoccurring phenomenon is coming into possession of radioactive substances via an inheritance. On the other hand, citizens are sometimes concerned because they suspect, for various reasons, that they are exposed to excessive levels of ionising radiation. These usually are delusions as part of psychiatric illness. The VI-ZW aims to eliminate concerns by measuring radiation levels on request. Where necessary, general medical practitioners or specialised health services are informed.

## 5.4 Overview support

Table 10: Overview of the number of requests for support per year and by sub-category for the years 2003 - 2007.

	2003	2004	2005	2006	2007
Support for customs in combating terrorism	-	14 (3)	14 (9)	13 (9)	26 (18)
Support for other government authorities	4 (1)	0 (0)	5 (1)	8 (3)	5 (0)
Support for citizens	2 (0)	2 (1)	1 (0)	4 (1)	3 (1)
Other support	3 (0)	3 (0)	2 (1)	1 (0)	3 (0)
Total	9 (1)	19 (4)	22 (11)	26 (13)	37 (19)
Share of violations in the total number (%)	11	21	50	50	51

Table 10 shows a considerable increase in the number of requests for support in 2006 and 2007 compared with 2003, 2004 and 2005. The increase in 2007 is almost fully attributable to support provided to customs as part of combating terrorism. The increase in the number of radiation detection gates was likely the main reason for this. The percentage of violations has remained relatively constant in the last three years. So far, no SMN or materials for manufacturing a 'dirty bomb' have been found.

## 5.5 Some cases of support highlighted

### 5.5.1 Waste paper with a radium-compress

On 13 January 2006, the VI-ZW received a request for support from the CCP-team of the customs office Rotterdam Maasvlakte regarding a container loaded with waste paper destined for China, which emitted more than 3 microsieverts per hour on the outside. Under VI-ZW supervision, the container was unloaded and the increased radiation level was traced back to one bale of waste paper originating in Germany. Further investigation revealed a radium compress in its original packaging within the bale. The compress dated from 1951 and had an activity of 7.4 megabecquerels of radium-226.



Photo 9: contents of the radium compress packaging

#### 5.5.2 Handbags with radioactive buckles

On 21 December 2006, the VI-ZW received a request for support from the CCP-team of the customs office Rotterdam Maasvlakte regarding a container loaded with leather handbags from India, which emitted more than 1 microsieverts per hour on the outside. The contents of the container were examined by a VI-ZW inspector. The increased radiation level was caused by the presence of cobalt-60 in part of the handbags' buckles. The importer had ordered the RTD to remove the radioactive buckles from the bags, which were destined for a Dutch retail chain. In total, 42 buckles showed elevated radiation levels. The activity is estimated at approximately 40 kilobecquerels per 11 gram buckle. In view of the fact that the incident involved consumer goods, an INES-report was submitted to the IAEA in Vienna.

On 10 September 2007, a similar incident resulted in a request for support from the CCP-team of the customs office Rotterdam Maasvlakte. In this case, more than 1500 buckles containing cobalt-60 were removed from the handbags. In this case as well, an INES-report was submitted.



Photo 10: handbags with buckles containing cobalt-60

### 5.5.3 Illegal operations with a sealed source by Polish employees

On 10 September 2007, the VI-ZW received a request for support from the CCP-team of the customs office Rotterdam Maasvlakte regarding a gate alarm caused by a car from Poland. The alarm was caused by a measuring instrument containing a cobalt-60 source, which was intended to be used in measuring the level of the contents of fire extinguishers. The involved employees from Poland wanted to use the instrument to perform measurements on a ship moored in the harbour. The instrument had been imported and transported without the proper formalities and there was no Nuclear Energy Act license for operations with the source. In cooperation with the harbour police, the measuring instrument was impounded and ultimately forwarded to COVRA as radioactive waste. An official report was filed against the Polish company concerned.

### 5.5.4 Healthy radioactive wallpaper

On 11 October 2007, the VI-ZW received a request for support from the CCP team of the customs office Rotterdam Maasvlakte regarding a container with mixed cargo. Under VI-ZW supervision, the container was unloaded. The increased radiation level was traced back to a pallet of 48 boxes each containing 12 rolls of wallpaper. The radiation level on the surface of the pallet of boxes was up to 4 microsieverts per hour. The wallpaper was manufactured in South Korea and was destined for the Dutch branch of a



renowned wallpaper brand. Examination by the RIVM, which was requested by the VI-ZW, revealed that the wallpaper required notification according to the Nuclear Energy Act. According to a South Korean patent submitted later, the radioactive substances from the uranium and thorium series, which were intentionally added to the wallpaper, were intended to improve the health of the people staying in rooms decorated with this wallpaper. The wallpaper concerned was sent back to South Korea at the importer's expense.



Photo 11: wallpaper with added radioactive substances





## 6 Enforcement by the VI-ZW

### 6.1 Number of violations

Table 11 provides an overview of the number of notifications involving one or more violations. The violations are sub-classified in accordance with the following articles of the Nuclear Energy Act:

- 15 (holding, transporting, taking into or out of Dutch territory, or having taken into or out of Dutch territory, or dispose of fissile materials or ores, without a license);
- 22 (failing to report the possession or obtainment of fissile materials or ores);
- 29 (holding, transporting, taking into or out of Dutch territory, or having taken into or out of Dutch territory, or dispose of radioactive substances, without a license);
- 32 (failing to report having, using, or dispose of radioactive substances requiring to be reported);
- 33 (failure to report the possession or obtainment of radioactive substances);
- 76a (violation of a license prescription);
- other violations (for example an Article from the Criminal Code).

If a violation of article 22, 33 or 76a is established, a concurrence with a violation of article 15 and/or 29 is not included in the figures noted for violations of article 15 and/or 29. In the event of a source in a shielding container of depleted uranium, only the violation of article 29 has been counted. In the event of concurrence with a violation of article 29 and 32, only the violation of article 29 has been counted. No more than one violation has been counted for each notification.

The fact that two companies trading in stainless steel scrap have an Nuclear Energy Act license, has not been taken into consideration in counting the violations. The reason for this is that the Nuclear Energy Act license for these companies is purely aimed at offering a pragmatic solution for the removal of the separated material with an increased radiation level. Table 11 shows that the number of violations in 2006 and 2007 has once again increased with respect to 2003, 2004 and 2005. The number of violations of article 22 and article 33 revealed during handling of the notifications is low, at an average of three violations per year in the years 2003 - 2007. The number of violations of article 76a in 2006 and 2007 was somewhat higher than in 2004 and 2005. The violations of article 32 concern mainly failures to report holding radioactive substances that require to be reported. The violations of article 15 in 2006 and 2007 mainly concerned, besides the presence of shielding containers or depleted uranium, the presence in scrap of:

- various objects of depleted uranium (e.g. collimators and counterweights);
- thorium-containing alloys;
- thorium-containing optical lenses.

No enriched uranium or plutonium was found in the years 2006 and 2007 in scrap loads or in connection with other declarations, reports and tips.



Table 11: Overview of the number of violations per year and per article for the years 2003 - 2007.

	2003	2004	2005	2006	2007
Article 15 (holding fissile materials or ores without license)	10	22	23	20	30
Article 29 (holding radioactive substances without license)	139	228	215	259	257
Article 32 (failure to report possession of radioactive substances etc.)	0	2	29	45	25
Article 22 or 33 (failure to submit declaration)	5	3	1	1	4
Article 76a (violation of license prescription)	5	0	1	5	7
Other violations	-	-	-	2	5
<b>Total</b>	<b>159</b>	<b>255</b>	<b>269</b>	<b>332</b>	<b>328</b>
Increase in the number of violations versus prior year (%)	15	60	5	23	-1

## 6.2 Sanctions applied

The VI-ZW responded to most of the violations without warning letters; instead, other instructions were given to eliminate the violations, since most of the violations were not, or only to a limited extent, attributable to the party found to be in violation. For example: scrap companies only find that scrap contains increased radiation levels after it has arrived and passed through a gate detector on their company premises.

In a number of cases, the VI-ZW was confronted with serious violations or refusals to remedy the violation identified. In these cases, the VI-ZW sent warning letters or instituted administrative and/or criminal proceedings. An overview of the number of warning letters and sanctions applied in the years 2003 - 2007 is shown in Table 12.

Table 12: Number of warning letters sent or administrative and/or criminal proceedings instigated per sort and per year for 2003 - 2007.

	2003	2004	2005	2006	2007
Warning letter	-	-	-	30	19
Proposed administrative coercion	1	0	0	0	0
Administrative coercion	0	0	0	0	0
Administrative coercion and official report	0	0	1	0	0
Proposed fine	4	3	0	0	7
Fine (and fine collected)	1	0	0	0	0
Proposed fine and official report	1	4	0	0	4
Official report	2	6	7	8	6
<b>Total</b>	<b>9</b>	<b>13</b>	<b>8</b>	<b>38</b>	<b>36</b>

# The number of warning letters is not stated in the report over 2002, 2003 and 2004.



Table 12 shows that the number of times per year when a sanction was imposed is in the order of magnitude of ten. The proposal to impose a fine in 2007 concerned primarily owners of open-top containers with contaminated tubing (contaminated rim), who refused to have the radioactive substances removed from the open-top containers.





## 7 Doses of radiation received

### 7.1 Doses regarding members of the population

As far as the VI-ZW can ascertain, in not a single notification received and handled by the VI-ZW in 2006 and 2007 did members of the population (thus not the employees going about their business) received a dose of any significance. In all cases the doses received by members of the population remained (far) below the legal limits of 0.1 respectively 1 millisievert per year (outside and inside the company premises respectively).

In 2006 and 2007, INES-reports were made to the IAEA (ref. 3) concerning consumer products with increased radiation levels. In both cases it concerned a consignment of ladies' bags destined for a Dutch retail chain, in which Co-60 was found in the buckles. The maximum radiation level of the buckles was around 15 microsieverts per hour. Because the containers in which the bags were found caused a gate alarm at customs, the bags could be taken out of circulation in time and exposure of members of the population was prevented. The bags were manufactured in Asia.

### 7.2 Doses regarding inspectors of VI-ZW

During the handling of the notifications received in 2006 and 2007, inspectors of the VI-ZW who are classified as exposed employees received doses of a maximum of some tens of microsieverts per person per year. These doses can be noted as negligible and remain far below the legally permitted doses for exposed employees.

### 7.3 Doses regarding employees of the inspection companies

It is impossible to say precisely how many doses employees of the inspection companies RTD and NRG received while handling the notifications, as the employees involved also worked on other things besides the handling of notifications. The employees in question are all classified as exposed employees. The doses for the most-exposed of these employees as far as the handling of notifications is concerned are estimated to be around one millisievert per year. These doses were mainly experienced during operations to secure relatively large sealed sources which were encountered in scrap. Doses resulting from internal contamination will be negligible, considering the personal protection equipment used. For these employees also, the doses are far below the legally permissible doses for exposed employees.



#### 7.4 Doses regarding employees of the recipient scrap-companies

The doses received by employees of recipient scrap companies will generally be small and are estimated at around some tens of microsieverts per year. These doses are so small because of the timely detection of the increased radiation levels by the use of gate detectors etc. For these employees also, who are not classified as exposed employees, the doses remain far below the legal limit of 1 millisievert per year.

#### 7.5 Doses regarding employees of the forwarding scarp companies etc

It is difficult to make an estimate of the doses received by employees of the forwarding scrap companies, dismantling companies etc.

The VI-ZW estimates that in 2007 in one case the doses received during dismantling and processing of scrap from a sealed source could have been considerable. In the case in question the VI-ZW made a so-called INES-report to the IAEA (ref. 3).

This concerned a container of scrap from Iran in which a maximum radiation level of more than 5 millisieverts per hour was determined on the exterior of the container. A block of compacted scrap was found to contain a Cs-137 source of an estimated 70 gigabecquerels. At a distance of one metre from the compacted block the radiation level was 6.5 millisieverts per hour.

Furthermore, the possibility cannot be excluded that during dismantling work, significant internal doses may have been experienced as a result of inhaling fine dust particles. This could, for example, be the case during the removal of scrap containing pulverised slag wool. The possibility cannot be eliminated that during such activities employees may have received doses higher than the legal limit (1 millisievert per year for non-exposed employees).



## 8 Conclusions and recommendations

### 8.1 Conclusions

The findings in following up on the notifications in the years 2006 and 2007 lead to the conclusions set out below.

1. The number of notifications received in 2006 and 2007 by the VI-ZW amounted to nearly 500 per year. This represents an increase of around 15% compared to the years 2004 and 2005.
2. The number of declarations of scrap loads with an increased radiation level has increased in 2006 and 2007 to approximately 375 per year. The number of violations found in connection with them increased proportionally to almost 280 per year.
3. For scrap loads with an increased radiation level from abroad, the percentage of violations, which averaged around 80%, was higher than the percentage of violations for scrap loads with an increased radiation level from the Netherlands, which averaged over 70%.
4. Once an increased radiation level in a load of scrap was ascertained, the scrap processing companies as a rule took the initiative themselves to take adequate measures to have the radioactive materials removed from the scrap and dealt with in the correct manner. Only in a few cases was the VI-ZW forced to take enforcement action.
5. The number of other declarations, reports and tips in 2006 and 2007 increased to almost 80 per year. The percentage of violations that has thus been established, has increased to over 50%.
6. The number of requests for support in 2007 increased to nearly 40 per year. The percentage of violations that has thus been observed has remained fairly constant over recent years at a little over 50%. The support provided to customs in combating terrorism was the main reason for the increase in the number of requests for support and the number of violations found in connection with them.
7. The placing of radiation detection gates by customs at the port of Rotterdam, and the passing on by customs of certain alarms to the VI-ZW, has on a number of occasions led to the interception of consumer products with unacceptably high concentrations of radioactive substances.
8. The number of times that administrative-law (other than warning letters and instructions to eliminate the violations) and/or criminal-law sanctions were applied was at 17 times in 2007 a little higher than the average during the years 2003 - 2006 (around 10 per year).
9. In some notifications there was a (potentially) high-risk situation for the employees at the scrap processing companies, dismantling companies, members of the population and/or the environment. In three instances, the situation was considered to be serious enough for an INES-report to be submitted to the IAEA.
10. In following up on notifications in the past few years, the limited staffing levels and the continued increase in the number of notifications have meant that examinations of the underlying causes of the violations did not take place in all cases.



## 8.2 Recommendations

The findings in following up on the notifications in the years 2006 and 2007 lead to the recommendations set out below.

1. It is desirable for the VI-ZW to maintain and where possible improve its procedures for the receipt and processing of notifications. Sufficient resources (human, financial and supporting) need to be provided to that end. The increased number of notifications over the years must be taken into account here. Customs support in particular requires a relatively large amount of manpower.
2. It is desirable for the Inspectorate to continue stringent monitoring of (timely) reporting of scrap loads with increased radiation levels, even if these involve only a slightly increased radiation level on the outside of scrap containers. In some instances, a slightly increased radiation level on the outside was found to be due to the presence of a medium-sized sealed source in the scrap.
3. It is desirable for companies abroad to become more aware of the risks that can arise in disposing of radioactive substances in scrap, especially large and medium-sized sealed sources. The VI-ZW can contribute to raising awareness of this by sharing its experience with international organisations seeking to address this issue and at international conferences where the issue of radioactive substances in scrap is discussed.



## 9 References

- Ref. 1      **Signalen met betrekking tot radioactieve stoffen en straling in 2003, 2004 en 2005.** Artikelcode: 6321  
(Notifications relating to Radioactive Substances and Radiation in 2003, 2004 and 2005. Article code: 6321)
- Ref. 2      **Inspectierichtlijn metaal en schroot met radioactieve stoffen.** (d.d. 25-02-2003).  
(Inspection guideline for metal and scrap with radioactive substances. (Dated 25-02-2003)).
- Ref. 3      **IAEA website.** <http://www-news.iaea.org/news/topics/default.asp> (INES meldingen).