



Authority for Nuclear Safety and  
Radiation Protection

# Report on events in Dutch nuclear facilities during 2020

## **Colophon**

Authority for Nuclear Safety and Radiation Protection  
ANVS

Koningskade 4  
2596 AA The Hague  
P.O. Box 16001  
2500 AB The Hague

[www.anvs.nl](http://www.anvs.nl)

June 2021

# Contents

Summary	4
<b>1. Introduction</b>	<b>5</b>
1.1 Events at nuclear facilities in the Netherlands	5
1.2 Events at nuclear facilities in other countries	6
<b>2. Summary of events in 2020</b>	<b>7</b>
2.1 Borssele Nuclear Power Plant (KCB), Borssele	7
2.2 High Flux Reactor (HFR), Petten	8
2.3 Other NRG facilities, Petten	8
2.4 Central Organisation for Radioactive Waste (COVRA), Nieuwdorp	8
2.5 Higher Education Reactor (HOR), Delft	8
2.6 URENCO Nederland, Almelo	8
2.7 Dodewaard Nuclear Power Plant (KCD), Dodewaard	8
<b>3. Updated overview of events in 2019</b>	<b>9</b>
3.1 Completeness of licensees' notifications to the ANVS	9
3.2 Updates to INES ratings (or preliminary INES ratings)	9
<b>4. Evaluation</b>	<b>10</b>
4.1 Individual facility evaluations	10
4.2 Notification trends 2011 to 2020	11
<b>5. Conclusion</b>	<b>12</b>
<b>Annex A: INES event ratings</b>	<b>13</b>

# Summary

This report summarizes the events that are subject to a notification requirement that occurred at Dutch nuclear facilities in 2020<sup>1</sup>. Events can occur in nuclear facilities, as they can within any organization. This might be something that deviates from normal processes, such as the shutdown of a facility due to a power failure. Notification criteria are drawn up for each nuclear facility, specifying the events that have to be notified to the ANVS, and within what time frame. The requirement to draw up this report is laid down in the Nuclear Energy Act. As an independent authority in the area of nuclear safety and radiation protection in the Netherlands, the ANVS is empowered to grant such licences and to monitor compliance with them. Where necessary, it can also take enforcement action.

The ANVS also performs inspections to assess the overview of events recorded by the licensees. The purpose of such inspections is to verify that these recorded events are correctly resolved and that the licensee has learned the necessary lessons, and to ensure that all events that are subject to a notification requirement are indeed notified to the ANVS.

The ANVS publishes details of the event notifications it receives, on its website<sup>2</sup>. If the ANVS conducts an investigation in response to a notification, the results of that investigation will also be published on the website. This approach enables the ANVS to keep an updated summary of all events that are subject to a notification requirement (as referred to in this report).

In 2020, the licensees of the various nuclear facilities notified the ANVS of a total of 13 events that are subject to a notification requirement. The events are rated by the ANVS according to the 'International Nuclear and Radiological Event Scale' (INES). This scale is used internationally. It is used to indicate the severity of an accident or incident involving radiation on a scale from 1 to 7. Any events that are relevant to nuclear safety and/or radiation safety, but which fall below the lower threshold of Level 1, are referred to as 'below scale' or Level 0, a 'minor anomaly with no safety repercussions'. In 2020, the ANVS rated a single event as INES 1, in other words – a minor anomaly. In the case of one other event, the INES rating did not apply. The ANVS classified all of the remaining event notifications as minor anomalies with no safety repercussions: INES level 0. See Annex A for more information about the INES rating system.

In 2020 and early 2021, the ANVS carried out inspections of the summaries of events recorded at the facilities in 2019. This showed that, in 2019, there were no failures to notify the ANVS of events that are subject to a notification requirement.

Based on the information provided in licensee notifications, in reports and obtained by on-site inspections, the ANVS concludes that, in general, the licensees tackled the events that occurred at their facilities in 2020 with due care. The ANVS continues to make every effort to ensure that the process for resolving events at nuclear facilities becomes increasingly efficient. The nuclear facilities have shown that they are focusing on this issue, thus giving substance to the principle of continuous improvement. The ANVS feels that the event notifications received in 2020 confirm the importance of ensuring that its regulatory activities continue to focus on the following: ageing management, knowledge of facilities, management of maintenance work, human performance and management of change processes.

---

<sup>1</sup> Facilities with a Nuclear Energy Act licence in accordance with Section 15 (b).

<sup>2</sup> See [www.ongewonegebeurtenissen.nl](http://www.ongewonegebeurtenissen.nl).

# 1. Introduction

As at any organization, events occur at nuclear facilities which influence (or have the potential to influence) operational safety. One example of an event of this kind is the shutdown of a facility due to a power failure. Another is a procedure that has not been followed in full.

The licensees of nuclear facilities in the Netherlands are required to record all events that could influence safety. These include events that are relevant to conventional safety, in addition to nuclear safety-related events. Some nuclear safety-related events are subject to a notification requirement, according to notification criteria established by the ANVS for each licensee. The licensees record these events in an internal database that includes details of the measures taken and the lessons learned following an analysis of each event.

This report summarizes the events that are subject to a notification requirement that occurred at Dutch nuclear facilities in 2020.

The ANVS's event reporting activities stem from an undertaking made by the then Minister of Social Affairs on 27 February 1980, to inform the House of Representatives about the functioning of Dutch nuclear power plants, in writing, annually. When the ANVS was established on 1 August 2017, it was stipulated that the Authority must submit annual reports to the Minister concerning any events that are subject to a notification requirement. The ANVS has prepared this report in fulfilment of that responsibility.

## 1.1 Events at nuclear facilities in the Netherlands

The conditions of a Nuclear Energy Act licence require that the ANVS must be notified of any events. The types of event involved are defined in facility-specific notification criteria laid down by the ANVS. The notification criteria also specify the notification deadline. The length of the period allowed for notification depends on the nature of the event; in some cases, immediate notification is required, while in others notification must take place within a period of no more than four weeks.

Following a notification to the ANVS, a licensee is required to investigate the precise nature and circumstances of the event. In that context, consideration must be given to the lessons that can be learned and to the scope for making improvements to prevent recurrence. That is the responsibility of the licensee of the nuclear facility in question. Such post-event analysis contributes to the continuous improvement of safety at nuclear facilities. The ANVS oversees the licensees' event investigations and checks that the associated lessons and areas for improvement are correctly followed up.

The ANVS publishes details of the event notifications it receives, on its website. It does so when sufficient information about the event is available to formulate a comprehensive description. Each event that is the subject of a notification published on the ANVS website is given an INES rating. INES stands for 'International Nuclear and Radiological Event Scale' – a measure of the severity of an event, for use in communications. You can find more information about INES in Annex A to this report.

In the case of various specific events, the ANVS will release information immediately: Details of events that impact the living environment, of technical malfunctions that have a significant impact on safety management, and of events that, due to factors such as their high profile may give rise to questions – or cause concern – among local residents or the general population are immediately published on the ANVS website and on social media. This may also concern events that are not covered by the notification criteria. While these events are featured on the website, no further mention will be made of them in this report.

The ANVS performs random inspections of facilities' databases to check that the licensee has learned the necessary lessons from these events. The ANVS also checks whether any events occurred that are subject to a notification requirement but were not notified to the Authority. The ANVS must, nevertheless, be notified of these events, details of which are then

placed on the Authority's website. Furthermore, in the course of its inspections, the ANVS examines the entire process and the system used to resolve events. If an inspection yields novel information that warrants reviewing an event, this will be included in the ANVS's standard regulatory activities. If necessary, the ANVS website will be modified to reflect this. The details of any changes that took place in preceding years will be included in the next report.

This report includes the notifications submitted by the following licensees, pursuant to Section 15 (b) of the Nuclear Energy Act:

- EPZ, licensee of the Borssele Nuclear Power Plant (KCB) at Borssele.
- The Nuclear Research and Consultancy Group (NRG) in Petten – a partnership of licensees – is responsible for the operation of the following facilities:
  - the High Flux Reactor (HFR),
  - the other facilities (NRG Laboratories).
- The Central Organisation for Radioactive Waste (COVRA) in Nieuwdorp;
- Delft University of Technology, of Delft, licensee of the Higher Education Reactor (HOR), the DELPHI sub-critical ensemble and laboratories at the Reactor Institute Delft (RID).
- URENCO Nederland, licensee of the uranium enrichment plants and stable isotopes (enrichment of elements other than uranium, which are not radioactive) in Almelo.
- The Joint Nuclear Power Plant Nederland (GKN), of Dodewaard, licensee of the Dodewaard Nuclear Power Plant (KCD), which was definitively shut down in March 1997 and is currently in a state of safe enclosure.

## 1.2 Events at nuclear facilities in other countries

In line with international agreements on responsibility for nuclear safety and radiation safety, information on the ANVS website is generally restricted to references to communications by the competent authorities in other countries. For details of the competent authorities in other countries and links to their information pages, see <https://www.autoriteitnvs.nl/nucleaire-crisis-of-stralingsongeval/nucleaire-veiligheid-in-onze-buurlanden>.

## 2. Summary of events in 2020

This chapter summarizes the events at Dutch nuclear facilities in 2020, concerning which the ANVS was notified by the relevant licensees pursuant to Section 15 (b) of the Nuclear Energy Act. The event notifications included in the summary concern events notified to the ANVS on the basis of the defined notification criteria. Table 1 shows the number of events that are subject to a notification requirement at each facility, rated by INES level.

Facility	Events in 2020 that are subject to a notification requirement	Consisting of:			
		INES n/a	INES level 0	INES level 1	INES level >1
Borssele Nuclear Power Plant (KCB), Borssele	2	0	1	1	0
High Flux Reactor (HFR), Petten	3	0	3	0	0
Other NRG facilities, Petten	6	1	5	0	0
Central Organisation for Radioactive Waste (COVRA), Nieuwdorp	0	0	0	0	0
Higher Education Reactor (HOR), Delft	0	0	0	0	0
URENCO Nederland, Almelo	1	0	1	0	0
Dodewaard Nuclear Power Plant (KCD), Dodewaard	1	0	1	0	0
<b>Total for all nuclear facilities</b>	<b>13</b>	<b>1</b>	<b>11</b>	<b>1</b>	<b>0</b>

Table 1. The total number of events that are subject to a notification requirement at each facility in 2020, rated by INES level.

In 2020, a single event was rated as INES 1. Every other event notified to the ANVS in 2020 was rated as INES 0. An event's rating can be increased to INES 1 if further investigation reveals that the event could potentially have had more severe consequences, that there is a systemic safety culture problem, or that the licensee has failed to learn the necessary lessons from previous events.

All events that are subject to a notification requirement, that occurred at each nuclear facility, are summarized in the following subsections. Details of each event are available on the ANVS website. In addition, the website contains details of other events that are not included in this report. The ANVS posts an updated summary of all event notifications it receives, on its website. The ANVS updates the event details on its website whenever relevant novel information becomes available, at the conclusion of an investigation, for example. For this reason, the full descriptions of these events are not included in this report. For up-to-date descriptions of the events referred to below, see the ANVS website: [www.ongewonegebeurtenissen.nl](http://www.ongewonegebeurtenissen.nl).

### 2.1 Borssele Nuclear Power Plant (KCB), Borssele

In 2020, EPZ, the licensee of the Borssele Nuclear Power Plant, notified the ANVS of two events.

- 15 July 2020: Belated check on two emergency power systems (INES level 0).
- 21 December 2020: Malfunctioning personnel lock (INES level 1).

## 2.2 High Flux Reactor (HFR), Petten

In 2020, NRG, the operator of the High Flux Reactor, notified the ANVS of three events.

- 18 April 2020: Defective level indicator on remediation equipment storage tank (INES level 0).
- 26 June 2020: Capture efficiency of a carbon filter found to be too low (INES level 0).
- 14 October 2020: Damage to fuel elements (provisional INES level 0).

## 2.3 Other NRG facilities<sup>3</sup>, Petten

In 2020, NRG notified the ANVS of six events at its other facilities.

### 2.3.1 Molybdenum Production Facility (MPF)

- 21 January 2020: Malfunction in fire alarm system (INES level 0).
- 23 March 2020: Filling level of liquid waste tank exceeded D-2 East MPF (INES level 0).
- 23 April 2020: Filling level of liquid waste tank exceeded B-2 East MPF (provisional INES level 0).

### 2.3.2 Hot Cell Laboratories (HCL)

- 22 April 2020: Torn hose F1 cell HCL (INES level 0).

### 2.3.3 Jaap Goedkoop Laboratory (JGL)

No events.

### 2.3.4 Decontamination and Waste Treatment Facility (DWT)

- 3 June 2020: Ventilation failure (INES level 0).

### 2.3.5 Laboratories NRG general

- 4 June 2020 Increased concentrations of heavy metals in sediment samples, the INES rating did not apply.

## 2.4 Central Organisation for Radioactive Waste (COVRA), Nieuwdorp

In 2020, COVRA did not notify the ANVS of any events.

## 2.5 Higher Education Reactor (HOR), Delft

In 2020, Delft University of Technology, the licensee of the Higher Education Reactor, did not notify the ANVS of any events.

## 2.6 URENCO Nederland, Almelo

In 2020, URENCO notified the ANVS of a single event.

- 14 July 2020: Higher than permitted quantity of enriched uranium in road tanker (INES level 0).

## 2.7 Dodewaard Nuclear Power Plant (KCD), Dodewaard

GKN, the licensee of the Dodewaard Nuclear Power Plant, notified the ANVS of a single event in 2020.

- 21 May 2020: Fire on the exterior of the Dodewaard Nuclear Power Plant's reactor building (INES level 0).

---

<sup>3</sup> 'Other facilities for which NRG has a licence' means the Hot Cell Laboratories (HCL), comprising the Research Laboratory (RL) and the Molybdenum Production Facility (MPF), the Low Flux Reactor (LFR), the Waste Storage Facility (WSF), the Decontamination and Waste Treatment (DWT) and other laboratories, including the Jaap Goedkoop Laboratory (JGL).

# 3. Updated overview of events in 2019

An update is included in every report, as the further investigation of an event or inspections of the events recorded by the licensees can lead to novel results, findings or insights. This could involve the revision of an INES rating, for example. This is always modified directly on the website.

## 3.1 Completeness of licensees' notifications to the ANVS

For 2019, no failures to notify the ANVS of events that are subject to a notification requirement were found.

## 3.2 Updates to INES ratings (or preliminary INES ratings)

During 2020, no additional information became available (from documents or inspections) that has caused the INES ratings of events from previous years to be revised. Accordingly, there have been no changes to the data presented in the 2019 events report.

# 4. Evaluation

Licensees' event notifications and information about other events at the facilities provide the ANVS with insight into the following:

- How are licensees dealing with events?
- Applying the principle of continuous improvement – learning from events.
- How are the measures devised in response to events being implemented?

In this chapter, the ANVS considers the questions above in relation to each facility and addresses some event reporting trends in the period from 2011 to 2020, inclusive.

## 4.1 Individual facility evaluations

The quality of the event resolution procedures at each facility is illustrated in the following summary, both generally and in relation to the main events. For more information about all events, visit [www.ongewonegebeurtenissen.nl](http://www.ongewonegebeurtenissen.nl).

### 4.1.1 Borssele Nuclear Power Plant (KCB), Borssele

EPZ notified the ANVS of two events in 2020, one of which was rated as INES level 0. The other event was rated as INES level 1. The EPZ investigation into this event showed that, during the incident, the decision-making process of those involved was not adequate. As a result of this finding, the INES rating has been increased to INES 1. EPZ has taken appropriate measures to prevent a comparable incident from occurring in the future. EPZ has a well-structured process for analysing and reporting events at the Borssele Nuclear Power Plant that are subject to a notification requirement and those that are not. EPZ has shown that it critically assesses its own actions and that it is striving to improve.

### 4.1.2 High Flux Reactor (HFR), Petten

NRG gave notification of three events at the HFR in 2020, two of which were rated as INES level 0, while the remaining event was provisionally rated as INES level 0. The ANVS and NRG have both conducted follow-up investigations into the underlying causes of the 'damage to fuel elements' event. These investigations focused on technology, organization, and the part played by human performance. By conducting an in-depth investigation into both the technical and organizational aspects, NRG has demonstrated its willingness to learn from the event. Based on the results of this investigation, NRG has taken a number of measures in various areas, including human performance. All event notifications were resolved satisfactorily, in terms of quality and depth. NRG has provided satisfactory answers to the ANVS's questions concerning its recorded events.

### 4.1.3 Other NRG facilities, Petten

In 2020, NRG notified the ANVS of six events at its other facilities. Five events were rated as INES 0, and there was one event for which the INES rating did not apply.

Although the quality of event resolution has improved, the internal management of the notification system and the speed of resolution are still key focal areas. Last year, in an effort to deliver improvements, NRG recruited a new member of staff to streamline the process of resolving internal event notifications and events that are subject to a notification requirement. The ANVS expects that individual's work to produce tangible results in 2021.

The number of notifications at other NRG installations is not a key concern for the ANVS. This concerns five different installations at which a wide range of activities take place. Accordingly, it is quite plausible to suppose that the total number of notifications that NRG receives from its other facilities will exceed those received by a licensee with just a single facility.

#### 4.1.4 Central Organisation for Radioactive Waste (COVRA), Nieuwdorp

In 2020, COVRA did not notify the ANVS of any events that are subject to a notification requirement. The completed inspection showed that, although the notification criteria are being correctly applied and the notifications are being recorded, the follow-up to any events that do occur needs to be better recorded and more traceable. This will more clearly indicate how COVRA is applying the lessons learned from such events.

#### 4.1.5 Higher Education Reactor (HOR), Delft

In 2020, Delft University of Technology did not notify the ANVS of any events. The inspection carried out in 2020 showed that the licensee has complied with the recommendations formulated by the ANVS during the 2019 inspection. At the time, it was noted that the safety impacts of any events that took place were insufficiently analysed and recorded in the quarterly reports that the licensee submits to the ANVS. In the 2020 reports, the licensee focused on these safety impacts and demonstrated a clear overall improvement.

#### 4.1.6 URENCO Nederland, Almelo

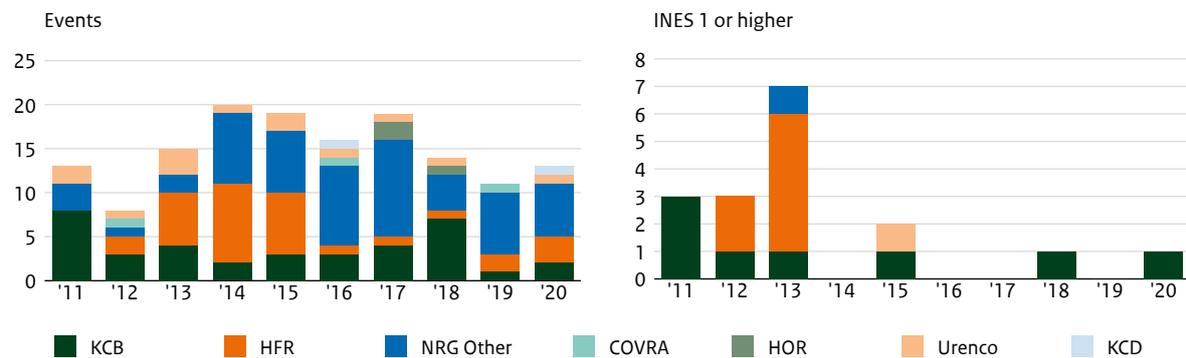
URENCO notified the ANVS of one event in 2020. In its biannual reports, URENCO demonstrates that its event recording is satisfactory and that it is applying the lessons learned from any such events. The contents of these reports were discussed during an inspection. They are complete and contain no safety-related events that are subject to an ANVS notification requirement.

#### 4.1.7 Dodewaard Nuclear Power Plant (KCD), Dodewaard

The Joint Nuclear Power Plant in the Nederland (GKN) notified the ANVS of one event in 2020. This concerned the fire on the exterior of the reactor building. This has been adequately tackled and investigated by GKN.

### 4.2 Notification trends 2011 to 2020

To give the public an indication of the severity of events, the ANVS rates events on the INES scale (see Annex A). However, most of the events that occur in the Netherlands are 'below scale', i.e. rated as INES 0: a minor anomaly with no safety repercussions. All events that are subject to a notification requirement are illustrated in Figure 1. Figure 2 shows the events rated as INES 1 and higher that have occurred at the various facilities in the Netherlands since 2011. The INES 0 events shown in Figure 1 are difficult to compare at international level. Partly because the number of notifications depends on the notification criteria, and partly because the practice in many countries is to restrict notification to events rated as INES 1 and higher. These, too, are difficult to compare at international level.



**Figure 1** All events subject to a notification requirement in the period from 2011 up to and including 2020.

**Figure 2** The number of events that are subject to a notification requirement and rated as INES 1 or higher, from 2011 up to and including 2020. Two events at the HFR and one event at one of NRG's other facilities in 2013 were rated as INES 2; the other events were all rated as INES 1.

# 5. Conclusion

In 2020, the licensees of Dutch nuclear facilities notified the ANVS of a total of 13 events that are subject to a notification requirement. One of these events was rated as INES 1, and in the case of another event, the INES rating did not apply. The remaining event notifications were classified as minor anomalies with no safety repercussions: INES level 0.

The licensees internally record events that are subject to a notification requirement and those that are not. Depending on their severity, events are analysed by the licensee to identify their possible causes. These analyses lead to measures that can reduce the risk of recurrence or of similar events. The ANVS supervises the licensees' activities to ensure that they are satisfactorily fulfilling their licence obligations. In addition, the ANVS may decide to conduct its own investigation into the event.

The ANVS has concluded that the resolution of those events that it was notified about in 2020 was tackled with due care by the staff of the nuclear facilities in question. This conclusion is based on information gleaned from the notifications, reports, and completed inspections. The ANVS continues to make every effort to ensure that the process for resolving events at nuclear facilities becomes increasingly efficient. The nuclear facilities have shown that they are focusing on this issue, thus giving substance to the principle of continuous improvement. By making enquiries and carrying out inspections the ANVS tracks the progress and effectiveness of measures taken by nuclear facilities, to prevent any future repetition of past events. Where necessary, the ANVS makes use of enforcement instruments.

The ANVS feels that the event notifications received in 2020 confirm the importance of ensuring that its regulatory activities continue to focus on the following: knowledge of facilities, management of maintenance work, ageing management, human performance, and management of change processes.

# Annex A: INES event ratings

An assessment is made of the severity of all events that are subject to a notification requirement and that are relevant to nuclear safety and/or radiation safety. Assessment is based on the International Nuclear and Radiological Event Scale (INES) defined by the International Atomic Energy Agency (IAEA) and the Organisation for Economic Cooperation and Development (OECD)'s Nuclear Energy Agency (NEA). INES ratings, from Level 1 (anomaly) rising to Level 7 (serious accident), are used to make the level of events at nuclear facilities all over the world clear to the general population, in consistent terms. The more than 70 countries that participate in INES are required to notify the IAEA about any events of INES Level 2 or higher.

The INES rating is the result of three separate ratings:

1. effects on humans and the living environment,
2. effects on the facility, and
3. degradation of the system of layered safety provisions.

The ultimate rating of an event is based on the highest rating of the three.

Any events that are relevant to nuclear safety and/or radiation safety, but which fall below the lower threshold of Level 1, that have no actual safety impacts and that are below the lower limit of Level 1 with regard to the degradation of safety provisions, are referred to as 'below scale' or Level 0, a 'minor anomaly with no safety repercussions'. An INES 0 event can nevertheless be relevant to nuclear safety if, for example, it involves the unexpected activation of safety systems, or if one of the layered safety provisions was partially or entirely ineffective during the event.

Ratings of INES levels 1 to 3, inclusive, are given mainly on the basis of degradation of the system of layered safety provisions. Such degradation might involve, for example, the loss or partial loss of shielding resulting in elevated radiation levels, or the failure of one or more cooling systems, or the occurrence of (possibly severe) radioactive contamination within a facility. The four levels are defined as follows:

- **Level 1** is an 'anomaly'. Level 1 anomalies are events in which, for example, problems arise with a facility's safety provisions, but where there are no (or only very limited) actual consequences and the remaining safety margin is sufficient to prevent exposure to radiation.
- **Level 2** is an 'incident'. Level 2 events are incidents involving more serious degradation of safety provisions, or with considerable potential consequences. The actual effects of Level 2 events on humans and the living environment are limited, but they may involve elevated radiation levels or more severe radioactive contamination.
- **Level 3** is a 'serious incident'. Level 3 events are severe incidents where an accident is only just avoided and little or no safety margin remains. The actual effects of such an incident may also be greater, but fall short of serious injury or the need to implement measures to protect the general population.

The assignment of higher INES ratings (4 to 7) depends mainly on the occurrence of nuclear or radiological accidents, the effects on humans and the environment, and the effects on the facility. Definitions of the higher INES levels are not provided here, because this report is concerned only with events, not with accidents or radiological emergencies. No events of INES level 3 or higher have ever occurred at Dutch nuclear facilities.

Events that are entirely irrelevant in the context of nuclear safety and radiation protection are not eligible for an INES rating. Where such events are nevertheless mentioned in this report or on the ANVS website (perhaps because they concern an environmental or occupational health & safety-related incident that is subject to a notification requirement or because they are being communicated due to the publicly noticeable impacts of an event) it is indicated that the INES rating does not apply.

More information about the INES scale can be found on the ANVS website (<http://www.autoriteitnvs.nl/onderwerpen/ines>) and that of the International Atomic Energy Agency (<https://www.iaea.org/sites/default/files/ines.pdf> and <http://www-pub.iaea.org/MTCD/Publications/PDF/INES2013web.pdf>)

Published by:

**Authority for Nuclear Safety and Radiation Protection**  
**ANVS**

Koningskade 4 | 2596 AA The Hague  
P.O. Box 16001 | 2500 BA The Hague

[www.anvs.nl](http://www.anvs.nl)

June 2021