



EUROPEAN COMMISSION
JOINT RESEARCH CENTRE

Directorate Energy, Transport and Climate
Unit Hydrogen and Batteries



Petten 01 January 2025

NOTE TO THE ATTENTION OF THE USERS OF THE HYDROGEN INCIDENTS AND ACCIDENTS DATABASE HIAD 2.1

The Joint Research Centre (JRC) of the European Commission developed the Hydrogen Accidents and Incidents Database HIAD in the frame of the European Network of Excellence HySafe (2003-2006).

HIAD is intended for public use. It is in first instance a repository of hydrogen-related unwanted events occurred in the past. Almost all data in HIAD come from a publicly available primary or secondary source (news, inspection reports from public institutions, other public databases, scientific articles, etc.). As far as possible, HIAD maintains a traceable link to the original sources.

Important legal information

By downloading and/or opening the EXCEL files containing HIAD dataset, you automatically accept the following conditions:

- **Neither the European Commission nor the any person acting on its behalf is responsible for the use which might be made of the information contained in the database HIAD 2.1. The same is valid for the Clean Hydrogen JU.**
- **Neither the European Commission nor the Clean Hydrogen JU are responsible for the validity of the data contained in the original sources.**
- The use of the database and of the data contained within is free of charge, but its use **should be properly acknowledged** by mentioning the following:
European Hydrogen Incidents and Accidents database HIAD 2.1, European Commission, Joint Research Centre, Petten, The Netherlands

A short history of HIAD evolution

After the end of the European project HySafe, JRC has maintained and populated HIAD with the support of the International Association HySafe. HIAD was accessible via a web-interface, full online consult was available, but the application had limited data download functions.

In 2017, the JRC executed a major upgrade producing HIAD 2.0 with the financial support of the FCH 2 JU. Shortly later, HIAD was integrated in the activities of the European Hydrogen Safety Panel (EHSP) of the FCH 2 JU.

Since December 2020, HIAD is offline due to new security measures and therefore users cannot access directly the data and perform their own search. In alternative to the online access, JRC developed a system which exported the online data into an offline EXCEL file, which will allow users to access and analyse the complete set of data according to their needs. The file **JRC HIAD database** has been requested by and distributed to hundredths of experts.

During 2022 and the first months of 2023, JRC has updated the database its structure to improve some event descriptors and reduce data noise. The most recent version is **JRC HIAD 2.1 export 2025 01 01 for users** (the value 2.1 indicate the progressive structural upgrade, the date indicates the end date of the events update). You are reading this file because you have required accessing the database and you have been provided the link to the JRC Major Accident Hazards Bureau platform hosting HIAD: <https://minerva.jrc.ec.europa.eu/en/shorturl/capri/hiadpt>

Quality of data

The overall quality of the descriptions depends on the quality and the level of details offered by the sources. To guide the users and allow a down selection based on event descriptors quality, JRC developed a quality label of each event.

All incident descriptions provided to HIAD by experts are first reviewed and validated by JRC, before becoming publicly available. The JRC validation provides a quality indicators based on 5 quality values. Events not validated receive value 1 and are not shared with users. They wait for possible improvement or eventual cancelling.

Whenever possible, HIAD contains a lesson learned and a cause analysis. In the majority of the cases (quality 2 and 3), however, the low quality of the event descriptors does not allow for a meaningful lesson learned.

What is new in HIAD 2.1 2025 01 01

The regular work of updating and revision performed throughout the year consists in:

- (1) Scanning of news and specialised literature to harvest recent events.
- (2) Identification of past events in other datasets and databases, which were not yet in HIAD.
- (3) Discovery of additional details of events already in HIAD. This allowed an improvement of the event descriptors and possibly a re-assignment of the quality category of the event.
- (4) Review of non-validated events, to check if new information is available, allowing an improvement of their quality and their validation. This check could also result in their deletion.

This work resulted in an increase of HIAD to 954 events, an increase of 199 events. Specifically to point (2) above, we added DOT the PHMSA data¹ related to transport of hydrogen by road trailers and by pipelines. For completeness, we also added 'vintage' transport data belonging to older US collection reports^{2,3}.

How to use HIAD and caveats

HIAD data collection is a service provided by JRC to hydrogen all safety experts, educators, students and technologists active in the field of hydrogen. Please consider that **the events described in HIAD are not intended to serve as instruments for passing judgement on individual companies or countries associated with an accident.** A blame culture surrounding the database would greatly reduce the sharing of information. Hence, the HIAD EXCEL file provides only literature references but does provide the documents containing the first or secondary data sources, which remains managed solely by JRC. JRC will provide these on an ad hoc basis, following a request for specific research purposes and only on a sub-set of the total dataset.

A proper use of the data in HIAD should also consider the following **caveats**:

- Do not conclude from the data in HIAD that 'hydrogen is not safe'. Every technology, once deployed, will always be affected by unplanned, unwanted events. HIAD is a tool developed to assist safe improvements of hydrogen technologies.
- HIAD events descriptors have been designed to draw a lesson learned and improve the safety of hydrogen technologies, not to compare the safety of hydrogen technologies with the safety of other technologies. Do not use HIAD data to answer the ill-posed question: 'which technology is safer?'
- The present structure of HIAD data is not done for deriving quantitative failure probabilities of specific components, because the majority of the event descriptions do not provide the details required and the statistical reliability enabling this type of analysis.
- Be very cautious before drawing general conclusions, because they could be biased by the types of primary sources used. For example, the historical and geographic distribution of the accidents is predominantly reporting European and North America events. Moreover, certain industrial sectors are more represented than others, because they are committed to investigate and publicly report their accidents, while others are not.

¹ <https://www.phmsa.dot.gov/hazmat-program-management-data-and-statistics/data-operations/incident-statistics>

² Ordin, P. M. (1974). Review of hydrogen accidents and incidents in NASA operation. In NASA Report NASA-TM-X-71565.

³ Zalosh, R. G., & Short, T. P. (1978). Compilation and Analysis of Hydrogen Accident Reports Final Technical Report. In Factory Mutual Research Corporation, FMRC J.1. 4A7NO.RG, RC78-T-54.

For questions, updates, feedbacks and collaboration proposal, please write to JRC-PTT-H2SAFETY@ec.europa.eu



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