

RCC-Seminar

HAZOP, LOPA, Funktionale Sicherheit

Referat 5

Literatur

Handbuch

zum Managementsystem
für gute Unternehmensführung

»Recht im Betrieb«

Die Datenbanklösung
für Vorstand, Geschäftsführer und Beauftragte
Umweltschutz, Arbeitsschutz, Compliance

1. Die Ermittlung der einschlägigen Pflichten des Unternehmens
2. Die Aktualisierung der Rechtspflichten
3. Die Delegation der Rechtspflichten
4. Die Erfüllung der Rechtspflichten des Unternehmens
5. Die Kontrolle der Rechtspflichten

Dr. Rack recht im Betrieb, 2012

https://rack-rechtsanwaelte.de/seiten/compliance/compliance-management-system/compliance-management-system?gclid=EAlaIqobChMIvdDmlOTs5QIVVaWaCh264wuQEAAAYASAAEgJgP_D_BwE

PAAG-Verfahren 2000



INTERNATIONALE VEREINIGUNG FÜR SOZIALE SICHERHEIT | IVSS

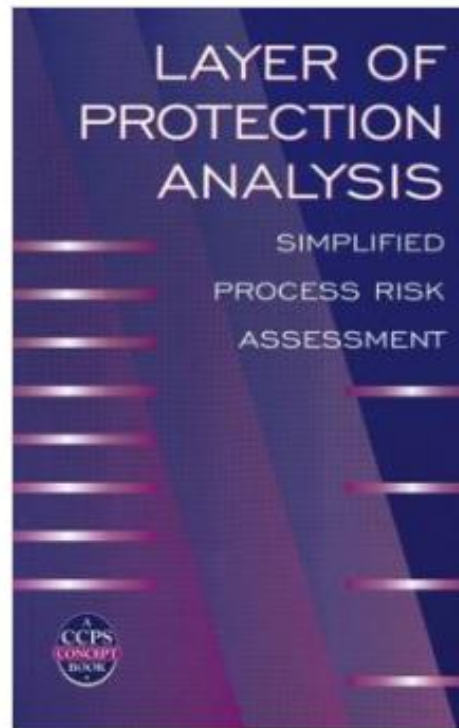
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„Die Methode gilt als internationaler Standard“
http://www.kas-bmu.de/publikationen/kas/KAS_19.pdf

BG-Chemie - Risikoanalyse von Störfallanlagen, http://www.bgchemie.de/webcom/show_article.php/_c-46/_nr-7/_p-1/i.html

2001 Layer of Protection Analysis: Simplified Process Risk Assessment



 **Published:**
October, 2001

ISBN:
978-0-8169-0811-0

Pages:
292

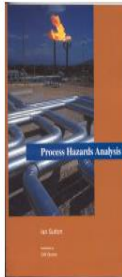
<http://www.aiche.org/ccps/publications/books/layer-protection-analysis-simplified-process-risk-assessment>

Process Hazard Analysis, HAZOP, FMEA (2001)

Process Hazards Analysis

By Ian Sutton

This 310 page manual is a great enterprise risk management tool related to HAZOP study and process FMEA.



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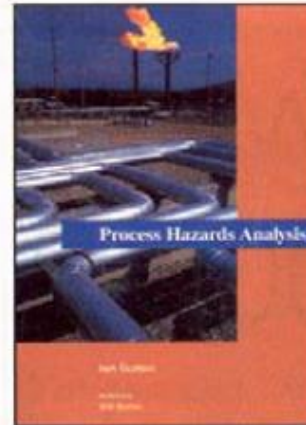
Process Hazards Analysis Ebook

ISBN: C60-802C-2c45-72D2

http://feedforward.com.au/hazop_risk_management.htm#toc

http://bin95.com/chemical_hazard.pdf

Bookshelf



Process Hazards Analysis. By Ian Sutton. SW Books, 2437 Bay Area Blvd., PMB 195, Houston, TX 77058. Web: swbooks.com. 2001. 314 pages. \$65.

Reviewed by Karel Kapoun, ENSR International, Westford, Mass.

Over the last 30 years, process hazard analysis (PHA) has become a standard operating procedure for many health and safety managers in the chemical process industries (CPI). Meanwhile, a large number of publications, both technical articles and books, have been published, and an even larger number of PHA training sessions have been held. However, most of the publications and training courses were either too specific or general. Ian Sutton's book seems to fill the gap. The book is well-written and the content is suitable for use as reference material for PHA leaders, practicing chemical engineers and plant safety professionals alike.



HAZOP (Hazard and Operability Analysis)

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The HAZOP (Hazard and Operability) method is a widely used technique for identifying the hazards on process facilities. Even those who are not familiar with the hazards analysis process will often have heard of the term HAZOP, even if they are not really sure what it means.

<http://www.stb07.com/process-safety-management/hazop.html> Nicht mehr zugänglich!
<http://www.stb07.com/ebooks/ebook-process-safety-management.html> (Nicht mehr zugänglich)
Process Hazards Analysis Ian S. Sutton Second Edition, Sutton Technical Books 2003,
Sutton Technical Books, Houston, Texas, United States of America, www.suttonbooks.net
http://feedforward.com.au/hazop_risk_management.htm#toc
https://books.google.de/books/about/Process_Hazards_Analysis.html?id=K8eZtgAACAAJ&redir_esc=y
<http://bin95.com/hazop.pdf>

For example, when the Process Safety Management (PSM) regulations in the United States were being promulgated in the early 1990s it was not unknown for a plant manager to say, "I know what PSM is, it's HAZOPs!" In fact the HAZOP method is just one of the many types of Process Hazards Analysis (PHA) techniques that are available, and PHAs are just one element of a PSM program. Nevertheless, these managers were somewhat justified in what they said because they knew that, unless they could identify the hazards on their facilities, they could not reduce risk.

Furthermore, both regulators and legal advisors generally support use of the HAZOP technique because of its reputation and because it is so thorough. The use of the HAZOP technique is very defensible if a company is challenged regarding its safety performance, particularly in a legal dispute.

As a result of its widespread use and acceptance, large numbers of process safety practitioners are now trained in the use of the HAZOP method, and many of those are also trained as leaders/facilitators. Furthermore, a substantial HAZOP infrastructure has developed. Many consulting companies offer HAZOP facilitation services special-purpose software.

PAAG-Verfahren 2008



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Ausbau der SOZIALEN SICHERHEIT in allen Teilen der Welt.

Zur Intensivierung der Arbeitssicherheit in den Betrieben ist
seit 1970 für den Bereich der chemischen Industrie
einschliesslich der Kunststoff-, Sprengstoff-, Mineralöl- und
Gummiindustrie die



INTERNATIONALE SEKTION DER IVSS
FÜR DIE VERHÜTUNG VON
ARBEITSUNFÄLLEN UND
BERUFSSKRANKHEITEN IN DER
CHEMISCHEN INDUSTRIE

gebildet worden. Vorsitz und Sekretariat liegen bei der
Berufsgenossenschaft der chemischen Industrie,
69115 Heidelberg, Deutschland.

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ISSN 1015-8022

Das PAAG-Verfahren

Methodik
Anwendung
Beispiele



Herausgeber

Internationale Sektion der IVSS für die Verhütung von Arbeit-
unfällen und Berufskrankheiten in der chemischen Industrie
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2008, Menschliche Faktoren

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NATURSCHUTZ UND REAKTORSICHERHEIT

Forschungsbericht 206 48 300
UBA-FB 001128



Einfluss menschlicher Faktoren auf Unfälle in der verfahrens- technischen Industrie

von

Dr. Babette Fahlbusch

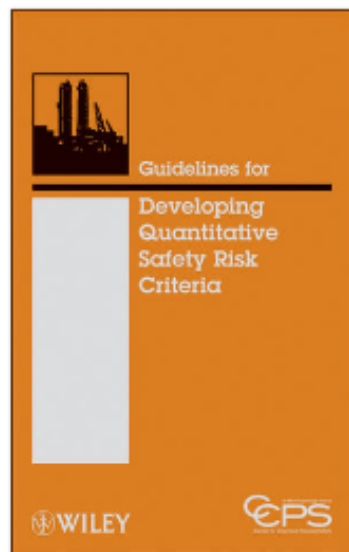
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2009 Safety Risk Criteria



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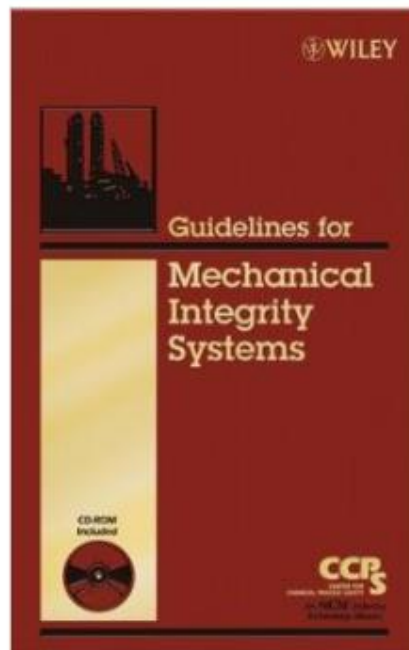
CCPS (Center for Chemical Process Safety)

ISBN: 978-0-470-26140-8

248 pages
September 2009

<http://eu.wiley.com/WileyCDA/WileyTitle/productCd-0470261404.html>

Guidelines for Mechanical Integrity Systems



 **Published:**

July, 2006

ISBN:

978-0-8169-0952-0

Pages:

320

<http://www.ache.org/ccps/publications/books/guidelines-mechanical-integrity-systems>

2011 Australien

2 The Study

- 2.1 Introduction
- 2.2 Hazard and Operability Study Methodology
- 2.3 Sequence of Examination
- 2.4 Details of Study Procedure
- 2.5 HAZOP Effectiveness
- 2.6 Non-traditional HAZOP Equivalents

3 The Report

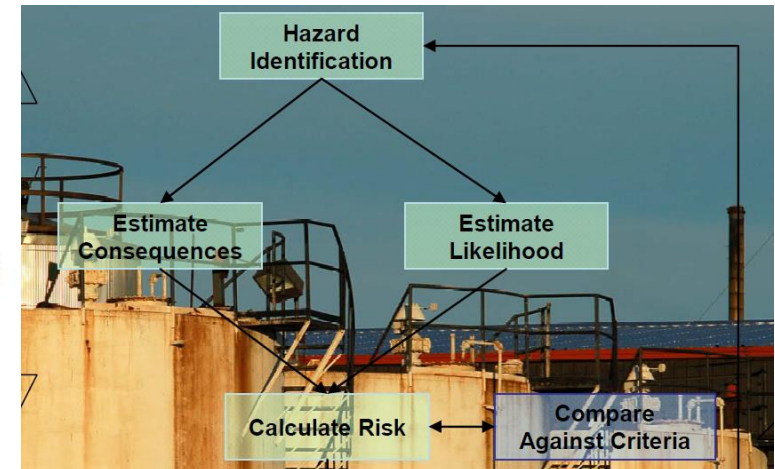
- 3.1 Aims
- 3.2 Study Title Page
- 3.3 Table of Contents
- 3.4 Glossary and Abbreviations
- 3.5 Summary of Main Findings and Recommendations
- 3.6 Scope of Report
- 3.7 Description of the Facility
- 3.8 HAZOP Team Members
- 3.9 HAZOP Methodology
- 3.10 Guide Words
- 3.11 Plant Overview
- 3.12 Analysis of Main Findings
- 3.13 Action Arising From the HAZOP



Planning

Hazardous Industry Planning Advisory
Paper No 8

HAZOP Guidelines



6 Estimation of the Likelihood of Hazardous Incidents

- 6.1 Logic Models
- 6.2 Sources of Failure Data
- 6.3 Other Data Requirements

7 Risk Analysis

- 7.1 Risk Estimation
- 7.2 Risk Presentation

8 Assessment of Risk Results

- 8.1 Assessment against Risk Criteria
- 8.2 Recommendations for Risk Reduction

<http://www.planning.nsw.gov.au/Portals/0/HIPAP%206%20Final%202011.pdf>

<http://www.planning.nsw.gov.au/Portals/0/HIPAP%206%20Final%202011.pdf>

Gefahrenermittlung und Gefahrenbewertung in der Anlagensicherheit

Praxisbewährte Methoden, ISSA-02
Stand 2012

Gefahrenermittlung und Gefahrenbewertung in der Anlagensicherheit

Praxisbewährte Methoden



IVSS Sektion Chemie

c/o BG RCI (Berufsgenossenschaft Rohstoffe und chemische Industrie)
Kurfürsten-Anlage 62
D-69115 Heidelberg/Germany
T.: +49 6221-5108-0

2. Auflage 2012
ISBN 92-843-7122-8

www.issa.int/prevention-chemistry

Inhalt

Vorwort

Autoren, Co-Autoren, Institutionen und Firmen

Einleitung

Gemeinsame Aspekte aller Methoden

Screening-Methoden

WACKER-Plausibilitäts-Check

Checklisten

Gefahrenermittlung

WACKER-Analyse

BASF-SGU Stufe 1

TÜV Nord-Methode

Gefahrenbewertung

Zurich Hazard Analysis (ZHA)

FMEA (Prozess-FMEA)

Risikographen

Layers of Protection Analysis (LOPA)

DOW Fire & Explosion-Index

Fehlerbaum

Quantitative Risikobeschreibung

Glossar

Abkürzungen

2012 LOPA



Die so genannte Layer-of-Protection-Analyse (LOPA) stellt ein quantitatives Verfahren zur Bewertung von prozesstechnisch bedingten Einzelszenarien dar, welches vor allem in Unternehmen mit internationaler Ausrichtung in zunehmender Weise zum Einsatz kommt.

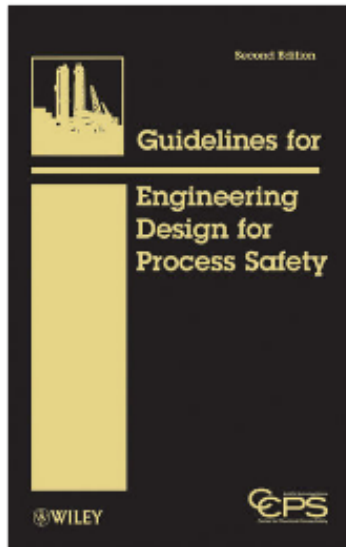
Ein besonderes Element stellt dabei die in Teilbereichen mögliche Quantifizierung des Risikos und die darauf aufbauende Darstellung der Analyseresultate dar.

Zu diesem Zweck war es erforderlich, Festlegungen hinsichtlich der Zulässigkeit bestimmter Risikoniveaus zu treffen. In der vorliegenden Guideline wird eine möglichst praxisnahe Umsetzung der Layer-of-Protection-Analyse dargelegt, es werden die einzelnen, dafür erforderlichen Parameter im Detail beschrieben und -

https://www.tuv-akademie.at/uploads/media/LOPA_deutsch_BlickinsBuch.pdf

2012 Guidelines for Engineering Design for Process Safety, 2nd Edition

Home / Chemistry / Chemical & Biochemical Engineering / Process Safety



Guidelines for Engineering Design for Process Safety, 2nd Edition

Center for Chemical Process Safety (CCPS)

ISBN: 978-0-470-76772-6

440 pages

May 2012

<http://www.aiche.org/ccps/resources/publications/books/guidelines-engineering-design-process-safety-2nd-edition>
<http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118230531.html>

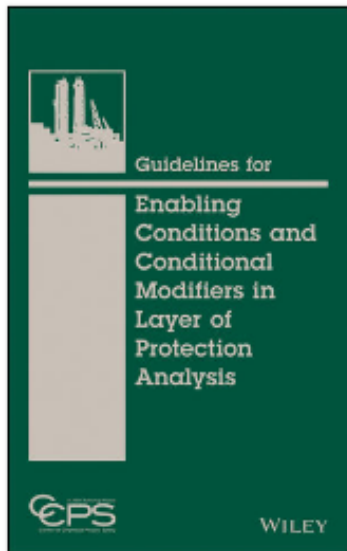
Description

This updated version of one of the most popular and widely used CCPS books provides plant design engineers, facility operators, and safety professionals with key information on selected topics of interest. The book focuses on process safety issues in the design of chemical, petrochemical, and hydrocarbon processing facilities. It discusses how to select designs that can prevent or mitigate the release of flammable or toxic materials, which could lead to a fire, explosion, or environmental damage.

Key areas to be enhanced in the new edition include inherently safer design, specifically concepts for design of inherently safer unit operations and Safety Instrumented Systems and Layer of Protection Analysis. This book also provides an extensive bibliography to related publications and topic-specific information, as well as key information on failure modes and potential design solutions.

2013

Guidelines for Enabling Conditions and Conditional Modifiers in Layer of Protection Analysis



☐ Read an Excerpt

Guidelines for Enabling Conditions and Conditional Modifiers in Layer of Protection Analysis

CCPS (Center for Chemical Process Safety)

ISBN: 978-1-118-77793-0

136 pages

December 2013

Wiley: Guidelines for Enabling Conditions and Conditional Modifiers in Layer of Protection Analysis

- CCPS (Center for Chemical Process Safety) 2013
- <http://eu.wiley.com/WileyCDA/WileyTitle/productCd-111877793X.html>

HAZARD AND OPERABILITY STUDIES (HAZOP)

Version 3 – January 2013

The Environment, Health and Safety Committee Notes on "Safety Issues in the Scale Up of Chemical Reactions" and "Inherently Safer Chemical Processes" published by the Royal Society of Chemistry refer to Hazard and Operability Studies. The Society believes that Hazard and Operability Studies is an issue which is important to all chemists.

This Note is designed to provide guidance to RSC members, particularly those involved in the design and development of chemical processes. It assumes familiarity with basic terms such as 'hazard' and 'risk'. The Note is intended to be an introduction rather than a full or definitive guide. Readers are urged to obtain more detailed information and/or expert advice if this is required.

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1. Introduction

This Note was produced by a Working Party of the Environment, Health and Safety Committee [EHSC] of the Royal Society of Chemistry.

The Society is a registered Charity. Its Royal Charter obliges it to serve the public interest by acting in an independent advisory capacity. In order to meet this obligation the members of the EHSC are drawn from a wide range of backgrounds and serve on the committee as individual experts and not as representatives of their employer.

The EHSC welcomes comments on this Note. Please send your comments to:

2014 Probability of Ignition of a Released Flammable Mass



☒ Read an Excerpt

Guidelines for Determining the Probability of Ignition of a Released Flammable Mass

CCPS (Center for Chemical Process Safety)

ISBN: 978-1-118-23053-4

264 pages

July 2014

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£82.50
€99.00

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Description

Complemented by an estimating tool spreadsheet based on a fixed set of chemicals to assist in risk estimations, *Probability of Ignition of a Released Flammable Mass* converts a "best guess" to a calculated value based on available information and current technology. The text documents and explains the science and background of the technology-based approach. The tool, when populated with appropriate data, yields an estimate of the probability that a defined release of a flammable material will ignite if exposed to an ignition source. This information can be used to make risk assessments with a higher degree of confidence than estimates made before and it provides valuable information for use in the development of a facility's Emergency Response Plan.

Guidelines for Determining the Probability of Ignition of a Released Flammable Mass

<http://eu.wiley.com/WileyCDA/WileyTitle/productCd-1118230531.html>

HAZOP: Guide to Best Practice, 3rd Edition



Author(s) :	Crawley & Tyler
Release Date:	21 Apr 2015
Imprint:	Elsevier
Print Book ISBN :	9780323394604
eBook ISBN :	9780128035801
Pages:	172
Dimensions:	229 X 152

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HAZOP Guide to Best Practice, 2015, 3rd Edition

Chapter 1. Introduction	6.3 The Study Meetings
1.1 Aims and Objectives	6.4 Coordinating and Reviewing Responses
1.2 Essential Features of HAZOP Study	6.5 Completing and Signing Off the Report(s)
Chapter 2. Process Hazard Studies	6.6 Follow-Up of Actions and Management of Change
2.1 HS 1—Concept Stage Hazard Review	Chapter 7. Recording and Auditing
2.2 HS 2—HAZID at Front-End Engineering Design (FEED) or Project Definition Stage	Chapter 8. Training Team Members, Scribe, Team Leader
2.3 HS 3—Detailed Design Hazard Study	Chapter 9. Company Procedures for HAZOP Study
2.4 HS 4—Construction/Design Verification	Chapter 10. Advanced Aspects of HAZOP Study
2.5 HS 5—Pre-Commissioning Safety Review	10.1 HAZOP Study of Computer-Controlled Processes
2.6 HS 6—Project Close-Out/Post Start-Up Review	10.2 Human Factors
2.7 HS 0—Consideration of Inherently Safer or Less Polluting Systems	10.3 Linking HAZOP Studies to LOPA
2.8 HS 7—Demolition/Abandonment Reviews	Chapter 11. Specific Applications of HAZOP
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Chapter 3. The HAZOP Study Method	11.2 Repeat Designs—HAZOP-by-difference
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Chapter 5. Organizing a HAZOP Study	Appendix 2. The Use of Checklists Within HAZOP Study
Chapter 6. Carrying Out a Study	Appendix 3. An Illustration of HAZOP Study for a Continuous Operation
6.1 Premeeting with Client	Appendix 4. An Illustration of HAZOP Study for a Batch Operation
6.2 Planning the Meetings	Appendix 5. An Illustration of HAZOP Study for a Procedure

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2015 HAZOP /LOPA in China



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402434 Study on Application of LOPA in HAZOP on China Refinery Design

Monday, April 27, 2015

Exhibit Hall 5 (Austin Convention Center)

Mingfeng Cai¹, Zhigang Wang² and Hao Zhou¹, (1)CNPC East China Design Institute, Qingdao, China, (2) China University Of Petroleum (East China), QingDao, China

Recommending the demand of HAZOP and LOPA evaluation method in the design stage from China department of work safety and large scale petroleum enterprises, summarized the feature and analysis process of HAZOP and LOPA, obtained the complementary by comparing the advantages and disadvantages, put forward the feasibility about comprehensive assessment of the two tools. With the example of refinery RDS unit which is in basic design stage, briefly stated the process about comprehensive assessment of the two tools, and verified the feasibility and advantages of comprehensive assessment of the two tools. Affirmed the advantages and put forward shortages of comprehensive evaluation of the two tools through analysis theory and project case. Suggested to continuously improving the analysis process in design stage to make it more adapted to the design of domestic project, improve safety design integrity of the domestic design institutes, protect the device to more steady and safely.

Additional

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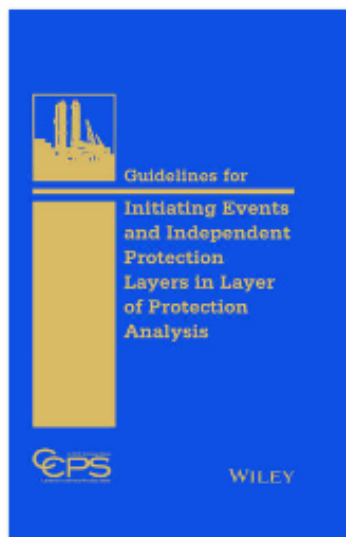
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2015 Guidelines for Initiating Events and Independent Protection Layers in Layer of Protection Analysis



Guidelines for Initiating Events and Independent Protection Layers in Layer of Protection Analysis

CCPS (Center for Chemical Process Safety)

ISBN: 978-0-470-34385-2

384 pages
February 2015

Guidelines for Initiating Events and Independent Protection Layers in Layer of Protection Analysis

CCPS (Center for Chemical Process Safety)

ISBN: 978-0-470-34385-2

February 2015

<http://eu.wiley.com/WileyCDA/WileyTitle/productCd-0470343850.html>



Impressum

Layer of Protection Analyse (LOPA) zur risikobasierenden Bewertung von Szenarien

Guideline zur Anwendung für prozessbedingte Störungen
bei der Sicherheitsanalyse von technischen Anlagen

2. Auflage 2017

Dipl.-Ing. Dr. Reinhard Preiss und Dipl.-Ing. Dr. Michael Struckl (Editoren)

Medieninhaber:

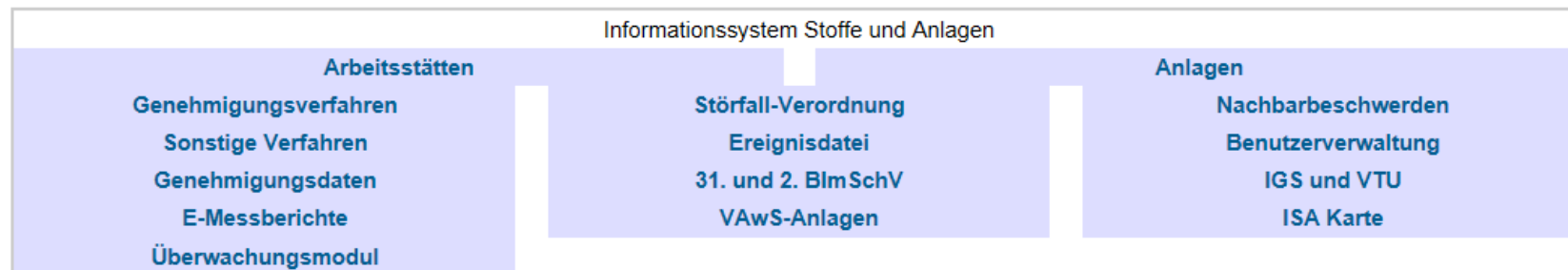
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ISA bietet u.a. eine umfangreiche Datensammlung zur Überwachung von Anlagen, zur Beurteilung von Stoffen, Hilfen bei der Terminverfolgung, der Erstellung von Texten und zur Auswertung von Daten, d.h. generell zum Vollzug von Vorschriften des Immissionsschutzrechts. Hauptsächlich sind Daten zu genehmigungsbedürftigen Anlagen nach BImSchG erfasst, aber auch zu ausgewählten Anlagenarten nichtgenehmigungsbedürftiger Anlagen.

Die  **regelmäßig stattfindenden Auswertungen** finden Sie an dieser Stelle.

Landesamt für Natur, Umwelt und Verbraucherschutz NRW - Informationssystem Stoffe und Anlagen ISA
<http://www.lanuv.nrw.de/anlagen/isa.htm>



IGS - Informationssystem für gefährliche Stoffe

Benutzername:
Passwort:
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Für Ersteinsatzkräfte:

Informationssystem **Feuerwehr**
IGS-Fire

Informationssystem **Polizei**
IGS-Polizei

IGS-Mobile:
Polizei



Für Behörden:

Sicherheit im Umgang mit Gefahrstoffen
IGS-Stoffliste

Informationssystem für den Arbeitsschutz
IGS-Check

Recherche im GSBL-Datenbestand
IGS-GSBL

Vorschriftensammlung Technischer
Umweltschutz
VTU

Public ohne Registrierung:

Gefahrstoff-Informationen für die
Öffentlichkeit
IGS-Public

Vorschriftensammlung Technischer
Umweltschutz für die Öffentlichkeit
VTU-Public

IGS-Mobile:
IGS-Public

