中美应急管理行业和标准线上研讨会
U.S.-China Emergency Management Industry and Standards Webinar

2020年7月28日
July 28, 2020
AGENDA
U.S.-China Emergency Management Industry and Standards Webinar
July 28, 2020
8:30am – 12:00 pm (Beijing local time)

**Location:** Virtual platform – WebEx

8:30am – 8:45am  Signing In

8:45am – 8:50am  Introduction
  - Xu Fang, China Representative, American National Standards Institute (ANSI)

8:50am – 9:10am  Welcome Remarks
  - Carl B. Kress, Regional Director, East Asia and the Middle East, North Africa, Europe and Eurasia, U.S. Trade and Development Agency (USTDA)
  - Tang Wanjin, Vice President, China National Institute of Standardizations (CNIS)

9:10am – 9:40am  Overview of China’s Emergency Management and Standardization
  **Presenter:** Mr. Qin Tingxin, Director of Public Safety Division, CNIS

9:40am – 10:10am  Overview of U.S. Emergency Management Standardization
  **Presenter:** Ms. Mary Mikolajewski, Technical Committee Manager, ASTM International

10:10am – 10:20am  Break and virtual networking

10:20am – 10:50am  Case Study: Prevention of Hazardous Gas Leakage and Best Practices for Operation and Maintenance
  **Presenter:** Mr. Henry Yu, General Manager of China; Vice President of Sales for the APAC region, Purafil
10:50am – 11:20am  Case Study: Production Safety Application and Equipment  
Presenter: Ms. Tian Lijuan, Engineer, Thermo Fisher Scientific

11:10am – 11:35am  Case Study: Risk Assessment Standards for Urban Safety  
Presenter: Mr. Zhang Chao, Assistant Researcher, CNIS

11:35am – 12:00pm  Guided Discussion and Q&A  
Opportunities and challenges: Industry perspective  
Moderator: Xu Fang, China Representative, ANSI  
   ▪ Zou Liang – U.Protec  
   ▪ Mark Ou – 3M  
   ▪ Wallace Lee – Altec

12:00pm  Adjourn
U.S.-China Emergency Management Industry and Standards Webinar

Presenters’ Biographies

July 28, 2020
Carl B. Kress (卡尔·克里斯)

Carl B. Kress is the Regional Director for USTDA’s programs in the Middle East, North Africa, Europe, Eurasia and East Asia. As Regional Director, Mr. Kress is responsible for developing and implementing the USTDA economic development program throughout these regions. He is also Co-Leader of two of USTDA’s worldwide sector teams, energy as well as for healthcare.

Before joining the agency in 2001, Mr. Kress held legal and legislative positions in government and the private sector. His previous experience includes serving as counsel at the U.S. International Trade Commission, as an attorney with the law firm McDermott, Will & Emery where he focused on international trade matters, and on the staffs of members of the U.S. Senate and House of Representatives.

Mr. Kress holds a B.A. degree from the University of California, Berkeley and also received his law degree from the University of California, Los Angeles. He also holds an LL.M. degree in German law from the University of Hamburg, Germany.

卡尔·克里斯是美国贸易发展署负责中东、北非、欧洲、欧亚和东亚项目的区域总监。作为地区总监，克瑞斯先生负责在这些地区制定和实施美国科技发展署的经济发展计划。他还是美国贸易发展署两个全球部门团队的联合领导者，这两个部门分别是能源和医疗保健部门。

在2001年加入该机构之前，Kress先生曾在政府和私营部门担任法律和立法职务。他以前的经历包括在美国国际贸易委员会担任律师，在麦克德莫特、威尔和埃莫里律师事务所担任律师，专注于国际贸易事务，以及美国参议院和众议院的工作人员。克里斯先生拥有加州大学伯克利分校的学士学位，并获得了洛杉矶加州大学的法学学位。他还拥有德国汉堡大学的德国法律法学硕士学位。
Dr. Tang is the researcher and the Vice President of China National Institute of Standardization (CNIS). He is also the committee member and secretary-general of National Technical Committee for Sustainable Urban Development Standardization (SAC/TC567). In his major research field of quality management, he has completed more than 20 scientific research projects supported by government funding, social funds, industry and international cooperation programmes. Dr. Tang has led the establishment of the AQSIQ Center for Defective Product Management and the CNIS Center for Customer Satisfaction Evaluation. He has published 8 books and 80 scientific and research papers, he was the recipient of the special government allowances awarded by the State Council in 2010.
Tingxin Qin (秦挺鑫)

Dr. Qin is the research fellow with China National Institute of Standardization (CNIS), and he also acts as the Director of the Public Safety Division and he is in charge of the standardization activities. In 2006, Dr. Qin started his career in CNIS as a researcher and standardization expert in the field of public safety and standardization strategy.

Dr. Qin also holds several other positions, such as the secretary-general of the National Technical Committee of Basic Standardization in Public Security (SAC/TC 351), member of the Technical Committee of Security and Resilience (ISO/TC292), academic leader in safety production for the municipal government of Beijing, committee member of the Beijing Safety Science and Technology Committee. In his area of expertise, Dr. Qin has led more than 10 national and industrial projects of public safety and emergency management, and contributed to the development of 10 related national standards. His other achievements includes the publication of 20 research papers and academic books.

秦挺鑫，中国标准化研究院公共安全标准化研究所副所长，兼任公共安全标准化领域负责人，研究员。2006年, 他进入中国标准化研究院从事公共安全和标准化战略领域的科研和标准化工作。任全国公共安全基础标准化技术委员会（SAC/TC 351）秘书长，国际标准化组织 “安全与韧性”技术委员会（ISO/TC292）技术专家，北京市安全生产领域学科带头人，北京安全与工程学会委员。从事公共安全与应急管理标准化工作，主持参与国家和行业公共安全与应急领域科技项目10余项公共安全国家标准的研制工作，发表论文20余篇。
Dr. Zhang is an assistant researcher at the China National Institute of Standardization. His areas of research interest include emergency management theory and standardization, the techniques and standardization of risk analysis for urban safety.

He is the convener of the “SAC/TC 351/WG1 general standard of security and resilience”. He is the registered technical expert for “Safety and Resilience” Technical Committee (ISO/TC292), the Member of the "Risk Assessment Professional Committee" at the Society of Science and Technology, standardization expert of the China Standardization Innovation Strategic Alliance, and a distinguished researcher of the Key Laboratory of "Safety Protection Technology and Risk Assessment" at the the Ministry of Public Security. He has contributed to the development of 6 national standards, undertook or participated in more than 10 national and provincial scientific research projects, published 2 academic books, and more than 10 SCI/EI research papers.

张超是中国标准化研究院副研究员，其主要从事公共安全应急管理理论、公共安全标准化理论与实践研究。

他同时担任全国公共安全基础标准化技术委员会（SAC/TC351）“通用”工作组召集人，国际标准化组织 “安全与韧性”技术委员会（ISO/TC292）技术专家及国内技术对口单位联系人，公共安全科学技术学会“风险评估专业委员会”委员，中国标准化创新战略联盟标准化专家，公安部“安全防护技术与风险评估”重点实验室特聘研究员。曾协助编制国家标准6项，承担或参与国家及省部级科研项目10余项，发表学术专著2部，SCI/EI论文10余篇。
In 2010, Mary Mikolajewski joined the Technical Committee Operations division of ASTM International. In her role, she coordinates activities for multiple industries and directs the operations and strategic initiatives related to the standards work of four technical committees. She serves as staff support for the Committee on Technical Committee Operations, a standing committee of the ASTM Board of Directors, which oversees the maintenance of ASTM’s Regulations and various aspects of committee operations.

Mary Mikolajewski 于2010年加入ASTM International的技术委员会运营部门。她负责协调多个行业的活动，并指导与四个技术委员会的标准工作有关的运营和战略计划。她为ASTM董事会常务委员会技术委员会运营委员会提供支持，负责监督ASTM法规的维护以及委员会各个方面的运营。
Graduated from Nankai University, Henry has nearly 20 years of experience in the air purification industry. He has rich and practice experience in petroleum and petrochemical, gas turbine, automotive, microelectronics, municipal and commercial applications.

Henry YU (于庆黎)

Purafil

General Manager, China
Vice President, Sales in APAC region
Tian is an Application Engineer at Thermo Fisher Scientific. She has rich experience in the application and development of professional spectrometer products and technical training. She has expertise in portable spectroscopy technology and its application in the fields of security and food safety to achieve rapid on-site detection of dangerous chemicals substances. As a technical expert, she has repeatedly supported and participated in major event detection projects related to users such as public security, customs, environmental protection and food and drug administration.

具有丰富的专业光谱仪产品应用开发和技术培训经验，主要擅长在安防、食品安全等领域使用便携式光谱技术实现危化品等化学物质的现场快速检测。作为技术专家，多次支持和参与公安、海关、环保和食药监等用户相关的重大事件检测项目。
Xu Fang has been working with American National Standards Institute (ANSI) as the Representative of ANSI China Office since 2012. In this position, he has primary responsibility for overall liaison of ANSI's activities with Chinese government agencies, standard development organizations and various industry groups.

Prior to working with ANSI, Mr. Xu served for American Forest & Paper (AF&PA) China Office as the main contact point for US government, industry and Chinese government for all of aspect of AF&PA China Program. As the representative of US forest industry, he worked with Chinese Ministry of Housing and Urban Rural Development (MoHURD) and State Administration of Forestry on developing and revising a serial of codes and standards pertaining to design, construction and inspection of wood constructions. He has made numerous presentations among Chinese developers, design professionals, importers and consumers and introduced applications of US wood products. Prior to joining in AF&PA, Mr. Xu worked with an engineering firm as the Chief Structural Engineer for more than 13 years. Mr. Xu holds his Bachelor of Engineering degree from Tongji University.

许方先生自2012年起担任美国国家标准化机构(ANSI)中国代表处的代表，负责ANSI在中国的相关工作和业务。在此之前，许先生于1999年起担任美国林业及纸业协会中国代表处首席代表，负责美国林产品的贸易政策以及市场推广。在此期间，许先生作为美国林产工业的代表，参与制订了中国数本关于木结构建筑设计、施工、验收以及产品的标准和法规的编写工作，为中国木结构建筑标准的应用和发展起了积极的作用。许先生毕业于同济大学结构工程专业，在加入美国林业及纸业协会之前，曾从事十多年的建筑工程设计与咨询业务，撰写过多篇学术论文。
KEYNOTE SPEAKER

Carl B. Kress
卡尔·克里斯

Regional Director, East Asia and the Middle East, North Africa, Europe and Eurasia, U.S. Trade and Development Agency (USTDA)

美国贸易发展署
东亚、中东、北非、欧洲和欧亚大陆地区区域主管
KEYNOTE SPEAKER

Wanjin TANG
汤万金
Vice President
China National Institute of Standardization (CNIS)
中国标准化研究院 副院长
一 应急管理改革

二 应急管理标准体系

1. 十八大以来，安全生重大事故发生时有发生，威胁我国公共安全。

2. 国民经济与社会发展大形势
   - 一是在2018年GDP巨量以及持续增加情况下，不断压缩事故起数、死亡人数存在巨大困难；
   - 二是不断“融合”现有部门功能。

3. 国家机构改革的内在要求
   这次是建国以来改革力度最大的一次改革，就是“一件事情归一个部门”管理，“一项功能归一个部门”管理。

综上所述，成立应急管理部门是党和政府顺时全国人民的“呼声”，将实现执政基础的稳定，也是破解当前安全生产、应急管理难题的抓手。
这是一次建国以来改革力度最大的一次改革，是破解当前安全生
产、应急管理难题的抓手。

国务院成立应急管理部

2018年3月21日，中共中央印发《深化党和国家机构改革方案》，成立中华人民共和国应急管理部。4月16日，应急管理部正式挂牌。

涉及地震地质灾害、火灾、水旱灾害、生产事故等灾害的
急管理任务，是一个职责多、体量大的管理机构。

国家安监总局、公安部

机关

民政部

国土

资源部

水利部

农业

草原防火

森林防火

地震和地质灾害防治

救灾和物资保障

风险监测和综合减灾

国际合作和救援

地震和地质灾害救援

火灾防治管理

危化品安全监管司

安全生

生产综合协调司

安全生

产执法局

政策法规

宣传教育

科技和信息化

机关人事司

机关财务

政治部

规

划

老干局

新组建的应急管理部先后整合了11个部门的13项职责，其中包括5个国家指
挥协调机构的职责。

顺利完成了机构改革、人员转
属和公安消防、武警森林2支部
队近20万人的转制。

同其它部门的职责边界未全部理清

同其它部门的职责边界未全部理清

在习近平总书记提出要“走向深
蓝”、建设“一带一
带”之“21世纪海上丝绸之
路”战略的大背
景下，海上应
急救援相关的改革并未见大的
动作为。
应急管理改革与应急管理部工作动态

职责

1. 安全生产是企业最基本的责任，是企业生存和发展的基础。安全生产管理的目标是实现企业生产的安全、健康、文明和可持续发展。安全生产管理的基本原则是“以人为本，预防为主，综合治理”。

2. 安全生产管理的核心是风险管理，即通过对风险的识别、评估和控制，实现风险的最小化。安全生产管理的目标是减少事故的发生，保障人员的安全和健康。

3. 安全生产管理的手段是法律法规和标准规范，即通过法律法规和标准规范的制定和实施，实现安全生产管理的目标。

4. 安全生产管理的目的是实现企业的可持续发展，即通过安全生产管理，实现企业的经济效益和社会效益的统一。

事故是一系列相互联系、相互影响的因素的共同作用的结果，这些因素包括人的因素、物的因素和管理因素。因此，安全生产管理的目标是减少或消除这些因素的影响，实现安全生产管理的目标。

安全生的管理

1. 安全生产管理的原则是“以人为本，预防为主，综合治理”。

2. 安全生产管理的手段是法律法规和标准规范，即通过法律法规和标准规范的制定和实施，实现安全生产管理的目标。

3. 安全生产管理的目的是实现企业的可持续发展，即通过安全生产管理，实现企业的经济效益和社会效益的统一。

消防安全

1. 消防安全是安全生产管理的重要内容，即通过消防安全的管理，实现生产安全的目标。

2. 消防安全的管理手段是法律法规和标准规范，即通过法律法规和标准规范的制定和实施，实现消防安全的目标。

3. 消防安全的目的是实现生产安全的目标，即通过消防安全的管理，实现生产安全的目标。

应急管理标准体系

1. 应急管理标准体系的构建

2. 应急管理标准体系的实施

3. 应急管理标准体系的评估

综合减灾

1. 综合减灾是自然灾害预防和应对的重要手段，即通过综合减灾的管理，实现自然灾害的预防和应对的目标。

2. 综合减灾的管理手段是法律法规和标准规范，即通过法律法规和标准规范的制定和实施，实现综合减灾的目标。

3. 综合减灾的目的是实现自然灾害的预防和应对的目标，即通过综合减灾的管理，实现自然灾害的预防和应对的目标。
应急管理体系现状

从各技术委员会职责领域看，应急管理体系的职责范围比较广泛，涉及多个领域，包括灾害救援、生产安全、防灾减灾等多个方面。其中，消防、地震、安全等领域的职责较集中，而其他领域的职责则较为分散。

应急管理体系构建

根据《应急管理标准化工作框架方案》要求，各专业领域应加强协调配合，整合相关标准，形成统一的应急管理标准体系。其中，地震、安全、消防等领域应加强与相关行业的协调，以确保应急管理标准的统一性和协调性。
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1. 应急管理与减灾救灾

2. 应急管理标准体系构建

3. 应急管理与减灾救灾

4. 应急管理标准体系构建

5. 应急管理与减灾救灾

6. 应急管理标准体系构建

7. 应急管理与减灾救灾

8. 应急管理标准体系构建

9. 应急管理与减灾救灾

10. 应急管理标准体系构建

11. 应急管理与减灾救灾

12. 应急管理标准体系构建

13. 应急管理与减灾救灾

14. 应急管理标准体系构建

15. 应急管理与减灾救灾

16. 应急管理标准体系构建

17. 应急管理与减灾救灾

18. 应急管理标准体系构建

19. 应急管理与减灾救灾

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27. 应急管理与减灾救灾

28. 应急管理标准体系构建

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31. 应急管理与减灾救灾

32. 应急管理标准体系构建

33. 应急管理与减灾救灾

34. 应急管理标准体系构建

35. 应急管理与减灾救灾
Helping Our World Work Better

12,800+ ASTM standards operate globally
Applied to just about everything from steel to sustainability
They improve the lives of millions every day

Universal Equality of Opportunity

- ASTM is one of the world’s largest Standards Developing Organizations, with global reach and influence
- Working across political, cultural and geographic borders
- Trusted for market relevance and technical quality
- The choice for many global industries
  - within and outside the US
  - ASTM has an office in Beijing
- ASTM has 110+ Memoranda of Understanding with national and regional standards bodies

ASTM Technical Committees

- Collaborative
  - Consensus participation in a transparent process, open to anyone, anywhere
  - Stakeholders are businesspeople of all sizes, producers, governments, labs, universities, and consumers; we build on the members’ expertise
  - Technical Committees: develop and manage standards, engage and liaise with other stakeholders, support development of strategy

- Dynamic Information
  - Responding to new challenges, new technology, new markets
  - New standards in 16-18 months, revisions in 6-8 months.
  - Mandatory review every 5 years
  - On-line membership tools (networking, web conferencing, balloting and drafting) and information access.

Wide range of topics and uses
- Serving over 90 industry sectors from traditional to cutting edge
- Technical experts (marketplace) decide what standards are needed + content
- Standards are voluntary and global:
  - The choice of many global industries; 50+% sales outside US

- 30,000 volunteer members from 158 nations participating in ASTM
- 148 main committees
- 2,000+ subcommittees
- In 2019:
  - 159 new
  - 1934 revised
  - 12,800+ standards

Importance of Standards

- Roles of Standards
  - Fundamental building blocks for product development
  - Establish consistent practices; universally understood and adopted (or not)
  - Ensure safety, quality, and reliability
  - Enable international trade
  - Market access (or not)

- WTO TBT: International Standards
  - Identifies principles by which international standards are developed
  - International standards have special status under WTO rules
  - Regulations based on international standards are presumed to create unnecessary obstacles to international trade
  - International standards developed according to the WTO TBT Agreement promote trade and public-private cooperation.
ASTM International Standards

ASTM International standards development brings together the public and private sector to solve technical problems. Our international standards:

- Today, there are more than 8,400 citations of ASTM International standards as references in regulations, normative standards, and as the basis of national standards in over 120 countries— including several Asian economies.
- These standards address a range of products— raw materials, tools, infrastructure/construction products, medical devices, environmental aspects of air, soil and water, robotics, the application of additive manufacturing technology, and UAS.

Advance Public Policy Objectives

- ASTM embraces international principles to develop standards that enable trade, underpin good business regulation, promote private-public collaboration, and improve the integrity of products and materials on a worldwide basis.

F38 Unmanned Aircraft Systems

- Quick facts:
  - Formed: 2003
  - Membership: 480+ members (30 regulators, 25 nations)
  - Standards: 25 approved
  - 26 in development
  - Standards in development:
    - F38.01: Airworthiness
      - Safety-oriented
    - F38.02: Flight Operations
      - Procedure-oriented
    - F38.03: Personnel
      - Individual, Crew and Organization-Oriented
      - Safe practices for the individual and teams responsible for operating the system

Key Standards:

- F38.07.14/D2015: Specification for Detect and Avoid System Performance Requirements
- F2389-2020: Test Method for Assessing the Safety of Small Unmanned Aircraft Impacts
- F3411-19: UAS Remote ID and Tracking

Under Development:

- F3389-20: Detect and Avoid Test Methods
- F3514-19: Specification for Service Provided under UAS Traffic Management (UTM)
- F3594: Guide for Operations Over People

E54 Homeland Security Applications

- Quick facts:
  - Formed: 2003
  - Membership: 480+ members (30 regulators, 25 nations)
  - Standards: 63 approved
  - Under Development:
    - E54.01: CBRNE Sensors and Detectors
    - E54.02: Emergency Preparedness, Training, and Education
    - E54.03: Decontamination
    - E54.04: Personal Protective Equipment (PPE)
    - E54.05: Building and Infrastructure Protection
    - E54.06: Electronic Security Systems
    - E54.07: Operational Equipment
    - E54.08: Response Robots

Key Standards:

- E2951-13: Guide for Operational Access to an Incident or Event Site
- E2915-13: Guide for Credentialing for Access to an Incident or Event Site
- E2842-14: Standard Guide for Credentialing for Access to an Incident or Event Site
- E2601-15: Standard Practice for Radiological Emergency Response
- E2904-14: Standard Guide for Handling Small UAS Risk for Public Safety and Homeland Security
- E2910-12: Guide for Operations Over Aerials
- E2914-12: Guide for Operations Over People
- E2917-12: Guide for Operations Over Aerials

Under Development:

- E54.09: Endorsement. (Just Published)
- WK68829: Under Development

ASTM Has Several Related EMS TCs

Conventional EMS

- ASTM Technical Committee F30 on Emergency Medical Services
  - Over 50 standards
  - EMS Equipment
  - Personnel, Training, Education

Emergency Preparedness, Training, Education

- ASTM Technical Committee F32 on Search and Rescue
  - Over 60 standards
  - Equipment, Testing, Maintenance
  - Management and Operations
  - Personnel, Training, Education

ASTM also has new technical committees addressing new aspects of EMS.
E54.09 Response Robots

Aerial Response Robots – Test Methods Under Development

- Safety: Impact forces; light & sounds; prop guards, sense & avoid; loss power behaviors; loss communication behaviors; lost GPS
- Situational Awareness: Point & Zoom Cameras; Impact Spiral Targets; Impact Omnidirectional Targets
- Sensors: Visible Image Acuity; Dynamic Range, Color Acuity; Thermal Image Acuity; Dynamic Range; Infrared Camera, Audio; and Control Audio System Acuity
- Radio Communications: Line of Sight, Non-Line of Sight, Altimeter Range; Interference Range
- Energy / Power: Endurance Range (with & w/o payload); Dwell Time
- Maneuvering: Follow Lines While in Upl & Down Range; Orientation; Orbit a Point; Precision Landing; Navigate Through Wire Obstacles
- Logistics: Configuration Identification; Packaging for Urban Search & Rescue Equipment
- Guides: Aerial Response Robot Purchasing; Response Robot Training; Response Robot test apparatuses

UAS Public Safety JWG: Overview

Overview
- Formed: 2017
- JWG Members: UAS Experts, Training Providers, Public Safety personnel

Areas of focus
- Accident Reconstruction Mapping
- Search and Rescue (SAR)
- Various environments and events
- Hazardous Chemicals / Hazmat
- Fire-fighting
- Structural Fire Response
- Wildfire Response
- Tactical Operations
- Payload Delivery
- Building Safety & Damage Assessment
- Closed Structure SAR

Professional Qualifications
- Operational Requirements
- Safety Management Systems
- Operational Plan
- Record Keeping / Reporting
- Terminology

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www.astm.org

Thank you
Case Study 案例分享
危险化学气体泄漏应急处理最佳实践
Emergency Gas Scrubber

丰瑞集团

危险化学气体泄漏应急处理最佳实践

Accidental Chlorine Release
一吨氯气罐的泄漏波及附近大约8公里范围（Ref. AWWA RMP）

Dangers of a Chlorine Release
氯气的毒性

2000年10月，田纳西州的查塔努加污水处理厂（MBWWTP）开始了氯气库改造项目。2001年4月安装了一个氯气应急气体处理器（EGS）。当系统报警时可以启动，并能够吸附2000磅（900千克）的氯气。氯气浓度传感器安装在滤库内，测量精度1 ppm，超过立即激活报警，启动EGS装置使氯气不会从厂房泄漏。

风险管理工作：
一级预案：以氯气泄漏的事故点半径2.6英里（4KM）以内，可能影响大约在马里昂和汉密尔顿县的33630名群众。
二级预案：以氯气泄漏的事故点半径1.2英里（2KM）以内，可能影响大约在马里昂和汉密尔顿县的3230名群众。

2004年，专家在区域内模拟氯气泄露环境并进行了针对性的应急演练。

Chlorine- Emergency Gas Scrubber Case Study
氯气泄漏应急系统案例

2000年10月，田纳西州的查塔努加污水处理厂（MBWWTP）开始了氯气库改造项目。2001年4月安装了一个氯气应急气体处理器（EGS）。当系统报警时可以启动，并能够吸附2000磅（900千克）的氯气。氯气浓度传感器安装在滤库内，测量精度1 ppm，超过立即激活报警，启动EGS装置使氯气不会从厂房泄漏。

风险管理工作：
一级预案：以氯气泄漏的事故点半径2.6英里（4KM）以内，可能影响大约在马里昂和汉密尔顿县的33630名群众。
二级预案：以氯气泄漏的事故点半径1.2英里（2KM）以内，可能影响大约在马里昂和汉密尔顿县的3230名群众。

2004年，专家在区域内模拟氯气泄露环境并进行了针对性的应急演练。

Chlorine- Emergency Gas Scrubber Case Study
氯气泄漏应急系统案例（续）

在2009年10月，当工厂工人接连接上一个故障管道到氯气罐的管路时，发生了氯气泄露。
- 工厂工作人员发现一个高密度气体检测器报警后，立即启动了EGS系统。
- 二个工作员和氯气泄露的事故点半径1.2英里（2KM）以内，可能影响大约在马里昂和汉密尔顿县的3230名群众。

事后对氯气泄露数据的分析表明氯气泄漏之后，EGS内的氯气仍剩余于10%的余量。

普拉飞的EGS系统，成功地完全处理了泄漏出来的氯气，和我们设计的一样。在一周内客户再次购买了氯气并完成了泄漏。
The Clean Air Act
美国环保署（EPA）- 洁净空气法案

• 适用于任何有危险物质的场所
• 如果有危险物质的含量超过公布的限制，运营商必须制定风险管理计划（RMPs）
• 必须遵守法规
• 产品含毒性物质的场所
• 运营商必须制定风险管理计划（RMPs）
• 没有规定危险物质的含量
• 运营商必须制定风险管理计划（RMPs）
• 运营商必须制定风险管理计划（RMPs）
• 运营商必须制定风险管理计划（RMPs）

Purafil Dry Accidental Chlorine Release Mitigation Solution
干法过滤装置（普拉飞）- 满足UFC消防条例规定

• 阀值：
  - Cl2 阀值是2,500磅
  - SO2 阀值是5,000磅
  - NH3 阀值是10,000磅

• 运营商必须制定风险管理计划（RMPs）
• 实施预防政策
• 产品的安全报告
• 提供应急计划

• UFC消防条例规定：发生泄漏或事故时，单位最大氯气储存罐中的全部氯化学品必须在30分钟内处理完毕
• 普拉飞干法危化气体泄漏应急系统
• 普拉飞干法危化气体泄漏应急系统（EGS）历史

Purafil Emergency Gas Scrubbing System

Purafil Dry-Scrubbing Media
普拉飞干法气相净化滤料产品

<table>
<thead>
<tr>
<th>滤料名称</th>
<th>化学产品</th>
<th>吸附气体</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSO</td>
<td>Cl2, SO2, NH3</td>
<td>气体，二氧化硫，硫化氢</td>
</tr>
<tr>
<td>Chlorosorb</td>
<td>Cl2, SO2, NH3</td>
<td>气体，二氧化硫，硫化氢</td>
</tr>
<tr>
<td>Chlorosorb Ultra</td>
<td>Cl2, SO2, NH3</td>
<td>气体，二氧化硫，硫化氢</td>
</tr>
<tr>
<td>Odorsorb Ultra</td>
<td>Cl2, SO2, NH3</td>
<td>气体，二氧化硫，硫化氢</td>
</tr>
<tr>
<td>Puracarb</td>
<td>Cl2, SO2, NH3</td>
<td>气体，二氧化硫，硫化氢</td>
</tr>
<tr>
<td>Puracarb AM</td>
<td>Cl2, SO2, NH3</td>
<td>气体，二氧化硫，硫化氢</td>
</tr>
</tbody>
</table>

• 滤料无毒无害，反应后的滤料可直接填埋
• 宽广的适用温度（50°C到52°C）

Purafil Emergency Gas Scrubbing History
1991年，设计研发，可行性试验，并开始在市场推广
1991年，安装第1台处理装置（500磅）
1993年，在美国田纳西州安装1吨的装置
1996年，美国德克萨斯州安装了6套系统
2002年，第一个美国南部装置在澳大利亚安德本投入运行
2005年，成功投1吨的装置在意大利安德本投入运行
2009年，第一台3吨的装置在美国田纳西州投入使用
到目前为止，全球已有超过350个EGS系统在运行

Media Life Testing
普拉飞滤料使用寿命分析（MLA）

• 普拉飞滤料可以通过实验室的化学分析测定出剩余的活性成分
• 通过已使用的时间，计算出剩余的滤料寿命
• 帮助客户预测滤料更换时间
Emergency Gas Scrubber

Purafil EGS System V.S. Wet Scrubbing System

Wet Scrubbing

Wet Scrubbing System的优点

- NaOH 是一种危险物料（强腐蚀性）
  - 操作时需要佩戴面具，穿好防护服
  - 废弃或降级的碱液需作为危险废物处理
- NaOH 溶液循环系统包括泵，风机，液位计等
  - 泵，阀门，管件易出现泄漏
  - NaOH 碱液化学性能会随着时间的推移而下降
  - NaOH + CO2 >> NaHCO3
    - 降低 NaOH 强度
    - NaHCO3 会存在于内表面上
    - NaHCO3 溶解度很低，必须以机械或化学方法除去
- 排出的氯气浓度在1-5ppm

Wet Versus Dry Scrubbing

Purafil EGS 系统 对比 湿法碱液处理系统

- 从设备的复杂性角度看
  - 湿法过滤设备包含泵，风机，液位计等许多部件
  - 干法过滤设备中仅有风机一个运动部件
- 从维护的易难程度上看
  - 湿法过滤设备需要危险物料这一关键因素来达到很高的效率
  - 干法几乎不需要任何维护
- 从处理系统的效率上看
  - 在任何负荷下，普拉飞的干法过滤处理系统的有毒气体浓度小于5ppb

Transform Wet To Dry Scrubbing

Purafil EGS 系统 改造湿法处理系统 - 锥滤式洗涤塔

- 需要17,250 lbs (7,824 kg) Chlorosorb Ultra 资料 (5% 含量能力)
- 需要387 立方英尺，8.5 x 7 x 6.5 英尺
- 2个带有1英寸进出口的资料填料
- 可以利用现有的管道，罐体，风机等
Purafil Emergency Gas Scrubber Application
普拉飞干法危险化学气体泄漏应急处理系统应用

液氯钢瓶使用企业
精细化工、机械、制药、农药

Purafil Emergency Gas Scrubber Summary
普拉飞干法危险化学气体泄漏应急系统 - 总结

- 能吸附多种有毒气体，如氨气、氯气等
- 设计抗压冲击性能强
- 系统“零”维护
- 直观显示滤料的使用寿命
- 用过的滤料可以直接填埋
- 全球已有超过250个系统在运行

Filtration Group
美国过滤集团介绍

- 超过8000多名员工
- 覆盖103个国家和地区
- 在28个国家设有相关机构
- 2018年营业收入超过16亿美金

Our Client
服务全球领导品牌
Typical
Purafil 1st

更健康,更高效。

Make the world safer,
healthier & more productive.

开发空气质量标准
在多种市场中

We are leaders in the development of air quality standards across a variety of markets.

普拉飞公司介绍

About Purafil

Developing Air Qualities Standards
Across A Variety Of Markets

空气质量标准引领者
在多种市场中

Purafil 1st 历史成就

Purafil Dry Gas Phase Media

普拉飞干式气相净化滤料的工作原理

我们致力于创造世界上最好的空气净化产品，让世界变得更安全、更健康、更高效率。

Make the world safer, healthier & more productive.
Case Study Sharing
Best practices for Handling of Hazardous Chemical Gas Leakage

Henry Yu
General Manager, China
Vice President, Sales in APAC region
Purafil

July 28, 2020
Chlorine Leakage Emergency Treatment System (EGS)
The leak of a ton of chlorine gas tank spreads to the area within 8 kilometers radius (Ref. AWWA RMP)
Toxicity of chlorine

- The IDLH (immediately threatening life and public health) concentration is 10 ppm.
  - Odor threshold – 0.3ppm
  - Irritating to eyes – 1ppm
  - Cough – 20ppm
  - May be fatal – 100ppm
  - Immediately death – 1000ppm
In a leakage accident, the concentration may reach 300,000 ppm.
Case Study – Chlorine emergency responses

• In October 2000, the Moccasin Bend Wastewater Treatment Plant (MBWWTP) in Chattanooga (Tennessee) started the chlorine reservoir renovation project. A chlorine emergency gas processor (EGS) occurred in April 2001
  ▪ When the system alarms, it can be activated and can absorb 2,000 pounds (900 kg) of chlorine.
  ▪ The chlorine concentration sensor is installed in the filter house with a measurement accuracy of 1 ppm. If it exceeds, the alarm will be activated and the EGS device will be activated to prevent chlorine leakage from the plant.

• Risk management plan:
  ▪ The first level plan: within 2.6 miles (4KM) of the accident site of the chlorine gas leak, it may affect 33,630 people in Marion and Hamilton counties.
  ▪ The second level plan: within 1.2 miles (2KM) of the accident site of the chlorine leak, it may affect approximately 3,230 people in Marion and Hamilton counties.

• In 2004, experts simulated the chlorine leakage environment in the area and conducted targeted emergency drills.
Case Study – Chlorine emergency responses

• In October 2009, when factory workers tried to shut off a pipeline connecting an empty to full chlorine tank, a chlorine leak occurred.
   The blocks around the plant, a golf course and a radio station were evacuated in an emergency.
   Emergency workers reported that up to one ton of chlorine leaked from the factory. The worker who caused the accident escaped with only minor injuries.

• Factory officials confirmed afterwards that the Purafil EGS system installed 9 years ago was activated immediately after the disaster and completely removed the chlorine gas leaking from the one ton canister.
   After confirming that the chlorine leak was effectively treated, the plant resumed operation, the evacuation was cancelled, and the block was reopened. The accident was quickly dealt with within an hour. Subsequent sampling and analysis of the filter material showed that after this chlorine leak, the filter material in the EGS still had a margin of more than 10%. 

Purafil's EGS system successfully completely dealt with the leaked chlorine gas, the same as our design. Within a week, the customer purchased the filter material again and completed the filling.
US Environmental Protection Agency (EPA) – Clean Air Act

- Suitable for any place with hazardous substances
- If the content of toxic substances exceeds the published limit, the operator must register with the relevant authority.
  - CI₂ threshold is 2,500 pounds
  - The SO₂ threshold is 5,000 pounds
  - The NH₃ threshold is 10,000 pounds
- Operators must develop risk management plans (RMPs).
  - Implement preventive policies
  - Product safety report
  - Provide external emergency plan
- The UFC fire protection regulations stipulate that in the event of a leak or accident, all chlorine chemicals in the unit’s largest chlorine storage tank must be processed within 30 minutes.
Dry filter device to meets UFC fire regulations

- The device includes:
  - Filter tank, blower, chlorine gas detector
- The filter material has up to 15% chlorine absorption capacity
  - Filter life monitoring
  - The filter material will not degrade
  - The reacted filter material can be directly landfilled
- When leakage occurs, the filter material in the system will gradually react from front to back, and the gas/liquid diffusion will not be hindered
- Designed to meet the maximum leakage situation
  - The initial instantaneous amount of chlorine: 400 lbs/min; the rest evaporates at 80 lbs/min
  - The design is designed to be able to absorb the maximum single storage or usage (such as a typical 1-ton system)
- Less than 5ppb emissions, far better than the requirements of regulations
Emergency treatment system for dangerous chemical gas leakage
The history of the Purafil hazardous chemical gas treatment system (EGS)

- In 1991, design research and development, feasibility test, and start to promote in the market
- In 1991, the first processing device (150 pounds) was installed
- In 1993, the first 1 ton plant was successfully launched in Tennessee, USA
- In 1996, when 6 systems were used in Detroit, the technology was widely accepted by the industry
- In 2002, the first American overseas installation was put into use in Melbourne, Australia
- In 2005, successfully launched the first 1 ton dry ammonia removal treatment system
- In 2009, the first 3-ton device was put into use in Tennessee, USA

So far, more than 250 systems are in operation worldwide
### Purafil dry gas phase purification filter product

<table>
<thead>
<tr>
<th>Chemical filter products</th>
<th>Targeted poisonous chemicals/gas</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSO</td>
<td>Chlorine, sulfur dioxide</td>
</tr>
<tr>
<td>Chlorosorb</td>
<td>Chlorine</td>
</tr>
<tr>
<td>Chlorosorb Ultra</td>
<td>Chlorine</td>
</tr>
<tr>
<td>Odorcarb Ultra</td>
<td>Hydrogen sulfide</td>
</tr>
<tr>
<td>Puracarb</td>
<td>Chlorine, sulfur dioxide, hydrogen sulfide</td>
</tr>
<tr>
<td>Puracarb AM</td>
<td>Ammonia, amine</td>
</tr>
</tbody>
</table>

- The filter material is non-toxic and harmless, and the reacted filter material can be directly landfilled
- Wide applicable temperature (50°C to 520°C)
- 340°C spontaneous combustion test
Purafil Media Life Analysis (MLA)

- Purafil filter media can show the remaining active ingredients through laboratory chemical analysis
- Through the used time, the remaining filter life can be estimated
- Can help customers predict the filter replacement time.
Hazardous chemical gas leakage treatment device

- Chlorine Gas Detector
- Filter Tank
- Blowing Unit

FRP

Aluminum
Dry EGS system v.s. Wet lye treatment system
Wet lye treatment system

Maintenance of wet lye system

- **NaOH** is a dangerous material (strongly corrosive)
  - During operation, you need to wear a mask and protective clothing
  - Discarded or degraded lye should be treated as hazardous waste
- **NaOH solution circulation system** includes pumps, fans, level gauges, etc.
  - Pumps, valves, pipe fittings are prone to leakage
- The chemical properties of **NaOH lye** will decrease over time
  - **RedNaOH + CO2 >> NaHCO3**
    - **uce NaOH strength**
    - **NaHCO3 will be present on the inner surface**
    - **NaHCO3 has very low solubility and must be removed mechanically or chemically**
- The concentration of discharged chlorine gas is 1-5ppm
Dry EGS system vs. Wet lye treatment system

- **From the perspective of equipment complexity**
  - Wet filtration equipment includes pumps, fans, level gauges and many other components
  - There is only one moving part of the fan in the dry filter equipment

- **From the perspective of ease of maintenance**
  - Wet filtration equipment requires hazardous materials as a key factor to achieve high efficiency
  - The dry method hardly needs any maintenance, and the filter material is also non-toxic and harmless

- **From the efficiency of the processing system**
  - Under the design load, the toxic gas concentration after wet treatment is 1-5ppm
  - Under any load, the concentration of toxic gas emitted by Purafil's dry filtration treatment is less than 5ppb
# Dry EGS system vs. Wet lye treatment system

<table>
<thead>
<tr>
<th>Test system type</th>
<th>Purafil EGS</th>
<th>Wet lye treatment system</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test system type</td>
<td>Test with deep groove filter</td>
<td>Full scale 1 ton washing liquid filter</td>
</tr>
<tr>
<td>Test the filter at the maximum initial loading rate of chlorine</td>
<td>800 lb/min</td>
<td>19-99 lb/min</td>
</tr>
<tr>
<td>Maximum chlorine emission concentration</td>
<td>0±5ppb</td>
<td>2,200 ppb</td>
</tr>
<tr>
<td>Test limits</td>
<td>N/A</td>
<td>The large amount of released chlorine vapor cannot be directly loaded on the test scrubber</td>
</tr>
</tbody>
</table>

### Performance comparison

<table>
<thead>
<tr>
<th>Performance comparison</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wet Lye</td>
</tr>
<tr>
<td>Purafil EGS</td>
</tr>
</tbody>
</table>

### Economic benefit comparison

![Cumulative Cost Graph](image)

- **Cumulative Cost**
  - **Wet**
  - **Dry**

### Initial investment vs. After 20 years

- **Wet Lye**
  - Initial investment: $100K
  - After 20 years: $265K
- **Purafil EGS**
  - Initial investment: $120K
  - After 20 years: $127K
Purafil modified wet processing system - Cross flow scrubber

- Requires 17,250 lbs (7,824 kg) Chlorosorb Ultra media (15% removal capacity).
- 387 cubic feet required, 8.5 x 7 x 6.5 feet
- 2 packed beds of filter material with 1 inch inlet and outlet area
- Existing pipelines, tanks, fans, etc. can be used.
Purafil modified wet processing system – Conclusion

• In addition to a variety of toxic and harmful gases, chlorine, hydrogen sulfide, ammonia, sulfur dioxide, etc.

• Designed to be extremely resistant to load impact

• System maintenance

• Visually display the service life of the filter material

• The used filter material can be directly landfilled

• More than 250 systems are already in operation worldwide
About Purafil
Purafil – the global leader in the gas filtration industry. Founded in 1969, with operations in 72 countries

- Chemical filter media and filter life analysis
- Dangerous chemical gas leakage treatment system
- Air purification equipment
- Environmental corrosion analysis and report
- Circuit board failure analysis
- Environmental monitoring instrument and test piece
- Comprehensive technical solutions
Purafil maintains ISO 9001 quality management system certification

Purafil’s quality system manual clearly states:

- Technical indicators of filter media
- Test methods for quality inspection and control
- Test instrument calibration steps
- The format of the product quality inspection report

More than 30 ISO procedures cover the selection and preparation of raw materials, production processes, QA/QC testing and product packaging.

- Moisture content
- Chemical modifier content
- Bulk density
We provide more than 20,000 tests and analyses every year, and the analysis report uses 12 languages to ensure that customers’ air purification requirements meet the most stringent environmental protection standards.

**U.S. headquarters:**
- Detect the type and quantity of toxic gases in the air
- For toxic and harmful gases in the air, evaluate the adsorption capacity and life of the filter material

**China operations:**
- In order to meet the continuous growth of the Chinese market and quickly respond to market demand, new laboratories and manufacturing facilities are added in China.

**Product development cooperation:**
- Actively seek technical cooperation with scientific research units and original equipment manufacturers.
The principle of Purafil gas filtration

- **Physical adsorption** – pollutants entering the pores of the filter material and are adsorbed on the surface of the filter material
  - Adsorption occurs on the surface of the filter material
  - Generally, the filter material with the larger specific surface area adsorbs more pollutants
  - Reversible adsorption process, there is the possibility of secondary pollution
- **Chemical adsorption** - chemical reaction between pollutants and filter media
  - Special chemical formula, irreversible process
  - The gaseous pollutants are converted into harmless substances and kept inside the filter material to prevent secondary pollution

Purafil's filtration uses chemical adsorption to effectively remove harmful substances in the gas.

- High efficiency, large capacity, long service life
- Eliminate secondary pollution
- Filter life can be monitored and predictable
"We are committed to creating the best air purification products in order to provide our customers with better quality of life and business."
重大事故应急救援

—有毒、有害、易燃、易爆物进行及时分析
—对灾害性物质的特殊性，分险险情防控和紧迫需求的时限性

现场侦检

—化学工业产品越来越多，由于自然或人为原因，在生产、存储和运
输等环节上，事故不断发生。
—面对复杂多变的灾情，必须迅速准确地查明事故原因，了解有毒有害
物质的泄漏情况，才能科学地制定救援方案。

专业化、职业化、科学化

重大事故应急救援

—化工生产
—港口储运
—交通道路
—物业管理
—紧急救援
—消防安全

现场侦检

—选择合适的洗消剂和灭火剂
—对参与救援的消防人员做好针对性的安全防护
—确定灾害处置方案，为后继救援行动提供强有力的支撑
—科学调度救援资源，及时控制并清除

科学化、专业化的检测和救援设备，是实现现场侦检技术解决方案的关
键。
事故现场侦检的基本要求
• 准确——检测方法可靠性高，对危险物质的分析判断准确
• 快速——在现场极短的时间内提供分析结果
• 简便——检测操作手段便捷
• 灵敏——检测浓度低

赛默飞现场便携式侦检技术解决方案
• 随时分析-开机即用
• 随地分析-坚固耐用，小巧便携
• 随人分析-操作简单，结果明确

固体、液体检测技术

技术原理
拉曼光谱
• 检测原理：拉曼光谱是一种具有高灵敏度和特征性的振动光谱散射分析技术。
• 傅里叶变换红外光谱（FT-IR）是另一种基于振动光谱的吸收光谱分析技术。

红外光谱
• 具有良好的普适性，对固体粉末、颗粒和非含水液体都能得到很好的分析结果。
• 在识别各种有色的物质时极为有效，不受物质发荧光的影响。
• 适用于热敏感性材料和深色易燃、易爆物质。

拉曼光谱
• 特别擅长分析液体、半固体、白色或浅色固体。
• 非接触式扫描，可透过透明容器，避免与具有潜在危险性的未知物质进行直接接触。
• 非破坏式扫描，保护操作人员安全和保存物证。

固体、液体检测技术

优势特点
内嵌庞大的数据库和算法，拉曼谱库12650种，红外谱库11500种，包括：
• 危险化学品
• 工业原料
• 炸药
• 化学战剂
• 实验室试剂

专为现场使用设计：
• 重量轻，小巧便携
• 防水防尘抗震，经过MIL-STD-810G和IP67测试
• 无需样品制备，操作简单，结果简明

快速提供全面信息：
• 1分钟获取化学物质名称、CAS号
• NFPA 704危险品标识
• 防护装备、消防信息和急救措施指导信息

固体、液体检测技术——应用场景

针对重大危险源的日常普查管理和紧急现场处置
化工生产
• 对生产、存储的化学品进行安全确认，避开不安全区域和危险

港口码头
• 对化学品火灾或爆炸现场物质检测，确定起火原因和事故范围

针对突发交通事故、恐怖袭击和危化品泄露的紧急现场处置

固体、液体检测技术
应用案例

天津8·12危化品仓库火灾爆炸事故

- 仓库内存放多种危险化学品，现场化学物质发生连续爆炸
- 事故现场发现大量爆炸后散落的白色固体物质，拉曼和红外检测结果显示为不同的化学物质：硝酸钾、氰化钾、电石、三氯异氰脲酸、糖、咖啡因等
- 通过检测结果，推断爆炸原因和影响范围，确定处置方案

交通火灾事故

- 2018年2月2日，上海南京西路发生一起交通事故，肇事面包车着火
- 车内发现盛有不明液体的铁桶，通过现场使用手持式红外化学物质鉴定仪检测，结果显示为二氯乙烷，高度易燃，吸入有毒
- 在塑料瓶中检测出汽油，这些易燃物质成为车内着火的原因

气体检测技术——红外气体摄像

Thermo Scientific™ OPSAL EyeGas
红外气体摄像仪

技术原理
- 采用中红外3.2-3.4 μm波段，对石油和天然气等易燃气体组分很敏感
- 泄漏气体与环境背景温度不同
- EyeGas摄像机的光谱带和泄漏气体发出的光谱一致

优势特点
- 实时视频摄像，直接定位泄漏点
- 可远距离观测气体泄露情况
- 高灵敏度，低温热成像
- 多种有机挥发性气体检测，如甲烷、丁烷等

应用：
- 易燃气体泄露检查，发现泄露点，预防爆炸事故

气体检测技术——有毒挥发气体分析

Thermo Scientific™ TVA 2020C
有毒挥发气体分析仪

技术原理
- FID（火焰离子化）是一种高灵敏度通用型检测器，它几乎对所有有机物有快速响应，重复性好
- PID（光离子化）是一种能够检测极低浓度挥发性有机化合物和其它有毒气体的检测器
- TVA 2020C是唯一将FID和PID检测器结合的主动泵吸式便携挥发气体分析仪

优势特点
- 操作简便，体积小，适合工厂和野外场所
- 本安1级1区防爆
- 可快速连续分析和记录无机和有机挥发气体
- 内置数据记录功能，可选配蓝牙和GPS

应用：
- 应急监测、泄漏与修复监测、有毒废弃物现场评估、污染源调查等

东海“桑吉”邮轮事件

- “桑吉”轮与散货轮相撞，随即起火燃烧并且持续剧烈燃爆
- “桑吉”装载了10多万吨凝析油（极其易燃易爆，燃烧产生有毒的烟雾）
- 使用TVA 2020C对事故现场毒烟毒气进行检查，发现中含硫量非常高，并为现场搜救人提供污染范围信息
**Thermo Scientific™ PDM 3700**
- Personal Dust Monitoring Instrument
- Features: Real-time data, easy-to-use control panel, compact design, IP67 protection
- Applications: Indoor or environmental dust monitoring, on-site治理, quality assurance, etc.

**Thermo Scientific™ pDR-1500**
- Personal Dust Monitoring Instrument
- Features: Small size, lightweight, easy to operate, good environmental adaptability
- Applications: Personal inhalable dust real-time monitoring, occupational environment dust pollution monitoring, etc.

**Thermo Scientific™ RadEye Series**
- Handheld Radiation Detection Device
- Features: Most advanced general-purpose handheld radiation detection device, patented natural background subtraction technology (NBR), extremely high sensitivity.
- Applications: Radiation detection, gamma dose rate measurement, area monitoring, ability to locate radioactive sources, different models for α, β, γ, neutron radiation detection in various scenarios.

**Thermo Scientific™ FH 400 Series**
- NBR γ Dose Rate Meter
- Features: High-speed, high-sensitivity detection of radionuclides, capability to identify 125 radionuclides based on ANSI-compatible library, Hysteresis patent technology provides a 97% confidence level in 2 seconds for radionuclide identification, real-time display of isotope counting rate, QCC patent spectrum analysis technology can identify mixed isotopes in 1 second,具备核素识别、能谱分析、剂量测量、剂量率计算、总剂量和数据报告等功能.
- Applications:国土安全、环境监测和应急响应等领域

**Thermo Scientific™ AQ4700**
- Portable Multi-parameter Water Quality Monitor
- Features: Easy operation, high sensitivity, can test multiple water samples simultaneously, compliant with international standards ISO11348.
- Applications: On-site and laboratory water quality analysis, useful in various fields such as environmental pollution, emergency incidents, etc.
2012年8月6日，加利福尼亚州里士满的雪佛龙炼油厂4号原油装置发生灾难性破裂。管道释放出易燃、高温的轻瓦斯油，部分汽化成一大片云层，吞没了19名雪佛龙员工。

碳氢化合物流体的释放、点火和燃烧导致覆盖周围区域的大量蒸汽和微粒羽流，导致社区警报系统3级警报和当地居民的紧急避难。

在事件发生后的几周内，大约15000人从周围社区寻求治疗疾病，包括呼吸问题，胸痛，气短，喉咙痛和头痛。

加利福尼亚州雪佛龙里士满炼油厂2012事故调查：最终技术报告发现包括管道部件由于损坏机理硫化腐蚀而极度变薄。

美国石油学会API 939C规范阐明：炼油工业中管道和设备的硫化腐蚀是导致设备更换、计划外停机以及与重大财产损失和伤害相关的事


事故和天然气工艺过程的机械完整性要求

- 在石油精炼、化工、电力等行业，为避免管道和其他组件发生故障产生灾难性后果，需要进行无损分析，包括
- 用于维护周转存储在库房的组件。
- 精确鉴定并确保所安装的组件是正确的，这非常关键。确保设施安全，符合行业规范，才能减少故障和失败。

PMI - 材料可靠性鉴定

- 在石化、炼油、电力等产业，为避免管道和其它组件发生故障而产生灾难性后果，需要进行无损分析，包括
- 用于维护周转存储在库房的组件。
- 精确鉴定并确保所安装的组件是正确的，这非常关键。确保设施安全，符合行业规范，才能减少故障和失败。

便携式XRF是石油石化行业进行PMI的标准工具

主要检测:
- 钢的合金类型
- 材料点阵
- 焊接点阵
- 材料类型
- 材料焊缝
- 材料表面
- 钢的焊缝
- 焊接点阵
- 原始材料
- 焊接材料
- 长度
- 角度
- 焊缝宽度

Thank You!
Fire Emergency and Detection Technology Solutions
Chemical analysis site and safety
July 2020
Emergency Rescue for Major Accidents

- Chemical production
- Port storage and transportation
- Transportation and logistics
- Chemical Resistance/Emergency
- Radiation pollution

- Fire accident
- Explosion accident
- Leak accident
- Nuclear accident

- Increasing demand for industrial products. Natural and human-caused incidents, leakage, fire explosion accidents continue to occur in production, storage, and transportation sectors.

- Various types of hazardous chemicals. It is impossible for firefighting commanders to analyze physical and chemical properties and disposal measures of each type of hazardous chemicals. Only through scientific and technological means.

- Facing complex biochemical accidents, only professional rescue and efficient equipment can make rescue fast and effective.

- Radioactive accidents are highly concealed and harmful, which require high-end emergency rescue technology.

Onsite Detection

- Is the prerequisite for emergency rescue work
- Is the key to the success of accident handling

- Choose the right decontaminant and fire extinguishing agent
- Perform targeted personal protection for firefighters involved in rescue
- Determine the disaster response plan to provide strong support for follow-up rescue operations
- Conducive to grasp the initiative of emergency rescue, and ultimately control and eliminate the danger

——Timely analysis of toxic, harmful, flammable and explosive substances
——Determine the type and distribution of pollutants and the limits of the polluted surrounding environment
The basic requirements of the accident scene inspection:

- Accuracy – High reliability of the detection method, accurate analysis and judgment of hazardous substances
- Rapid – Fast-provided analysis results in a very short time onsite
- Convenience – Convenient means of detection and operation
- Sensitivity – Low detection concentration
Onsite Portable Detection Technology Solutions

- Ready to use and analyze
- Analysis-robust, compact and portable analysis – Easy to use; accurate results

Fully assist fire protection to improve on-site emergency detection capabilities

Onsite Portable Detection Solution

- Liquid; Solid
- Gas; Dust
- Radiative Components
- Soil; Water

Thermo Fisher Scientific
Solid and Liquid Detection Solutions

Technical Principles

**Raman spectroscopy (Raman)** is a vibrational spectral scattering analysis technique with high sensitivity and high characteristics. Fourier Transform Infrared Spectroscopy (FT-IR) is another absorption spectrum analysis technique based on vibrational spectroscopy. Infrared and Raman spectrometers quickly collect the spectrum of chemical samples and match them with a database of known materials to identify the type and composition of substances.

Technical Characteristics

**Raman spectroscopy**

- Good at analyzing liquid, semi-solid, white or light-colored solid
- Non-contact scanning, which can penetrate transparent containers to avoid direct contact with potentially dangerous unknown substances
- Non-destructive scanning to protect the safety of operators and save physical evidence

**infrared spectra**

It can get good analysis results for solid powder, granules and non-aqueous liquids. It is extremely effective in identifying various colored substances and is not affected by the fluorescence of substances. Suitable for heat sensitive materials and dark flammable and explosive materials.
Detection Technology for Solid and Liquid

FirstDefender RM/RMX
Handheld (Raman) chemical substance identification equipment

Thermo Scientific™
Gemini
Handheld (Raman and infrared combo) analyzer

Quickly and accurately capture unknown chemical types on site
Intuitively and clearly understand the level of chemical hazard
Quick access to protective equipment, fire protection information and first aid measures, etc.

TruDefender FT/FTX
Handheld (infrared) chemical substance identification equipment
Solid and Liquid Detection Solutions

Advantage and Characteristics

- Built-in huge database and reliable algorithm, 12,650 types of Raman spectrum
- 11,500 types of infrared spectrum database, including:
  - Hazardous Chemicals
  - Industrial raw materials
  - Explosive
  - Chemical warfare agent
  - Laboratory reagents, etc.

- Designed for on-site use:
  - Lightweight, compact and portable
  - Waterproof, dustproof and shockproof tested by MIL-STD-810G and IP67
  - No sample preparation, simple operation, concise results

- Provide comprehensive information quickly:
  - Get chemical substance name
  - NFPA 704
  - Protective equipment fire protection information and first aid measures guidance information
Solid and Liquid Detection Solution – Scenarios

- Daily supervision and management; emergency on-site disposal of major hazards
  
  **Chemical Production**
  - Check and confirm the production and storage of chemicals, and carry out safe classification and placement

  **Port and Transporting**
  - Detection of substances at the chemical fire or explosion sites to determine the cause and scope of the accident

- Emergency on-site handling for sudden traffic accidents, attacks and leakage of hazardous chemicals
Other Scenarios and Case Study

Tianjin 8·12
Fire and explosion accident in hazardous chemical warehouse

- The warehouse stores a variety of dangerous chemical goods, and the chemical substances on the scene exploded and continuously leaked and spreaded.
- A large number of white solid substances scattered after the explosion were found at the scene of the accident, and the results of Raman and infrared detection showed that they were different chemical substances: Potassium nitrate, potassium cyanide, calcium carbide, trichloroisocyanuric acid, sugar, caffeine, etc.
- Infer the cause and scope of the explosion based on the results of the investigation and determine the disposal plan.
Other Scenario and Case Study

Traffic-related fire accident

- On February 2, 2018, a traffic accident occurred on Nanjing West Road, Shanghai, and the van caught fire.

- An iron drum containing an unknown liquid was found in the car. The result was detected by a handheld infrared chemical substance identification instrument on the spot. The result showed that it was dichloroethane, which is highly flammable and toxic by inhalation.

- In addition, gasoline was detected in plastic bottles. These flammable substances became the cause of fire in the car.
Gas Detection Technology – Infrared Gas Camera

Thermo Scientific™ OPGAL EyeCGas
Infrared Gas Camera

Technical principle:

- Using mid-infrared band between 3.2-3.4 μm, it is very sensitive to flammable gas components such as oil and natural gas
- The leaked gas has a different background temperature from the environment
- The spectral band of the EyeCGas camera is consistent with the spectrum emitted by the leaking gas

Advantages:

- Real-time video camera to directly locate the leak
- Can observe gas leakage from a distance
- High sensitivity, low temperature thermal imaging
- Various organic volatile gas detection, VOCs (such as methane, butane, etc.)
- Obtained certification for use in hazardous areas

Application: Check for flammable gas leaks, discover leaks and prevent explosion accidents
Gas Detection Technology – Infrared Gas Camera

Thermo Scientific™ OPGAL EyeCGas
Infrared Gas Camera

Leakage detection

Equipment  Pipes  Remote
Gas Detection Technology – Toxic Volatile Gas Analysis

Thermo Scientific™ TVA 2020C
Toxic Volatile Gas Analysis

Technical Principle
- FID (flame ionization) is a high-sensitivity general-purpose detector, it has a fast response to almost all organic substances, wide dynamic linear range, and good repeatability
- PID (photoionization) is a detector that can detect very low concentrations of volatile organic compounds and other toxic gases
- TVA 2020C is the only active pumping portable volatile gas analyzer that combines FID and PID detectors

Advantages:
- Simple operation, small size, suitable for factories and field places
- Intrinsically safe class 1 zone 1 explosion-proof
- It can quickly and continuously analyze and record inorganic and organic volatile gases
- Built-in data logging function, optional Bluetooth and GPS

Application: Emergency monitoring, leakage and repair monitoring, toxic waste site assessment, pollution source investigation, etc.
East China Sea "Sanji" cruise incident:

- Cruise ship "Sanji" collided with a bulk carrier, caught fire and continued to explode violently.
- "Sanji" is loaded with more than 100,000 tons of condensate (extremely flammable and explosive, produces toxic smoke).

**Approach:** Use TVA 2020C to inspect the toxic smoke and gas at the accident site, it was found that the sulfur content was very high, and the pollution range information was provided to the on-site search and rescue personnel.
Dust Monitoring

**Thermo Scientific™ PDM 3700**
**Personal Dust Monitor**

Measure instant, high-quality particulate matter concentration, Cumulative concentration and limit percentage data

Technology: Using the oscillating balance method with excellent accuracy

Features:
- Ergonomic wearing and light weight
- Meet the explosion-proof certification of the Ministry of Coal Mine Safety and Health, suitable for various hazardous locations

Application: real-time personal inhalable dust monitoring, occupational environmental particulate pollution monitoring, etc.

**Thermo Scientific™ pDR-1500**
**Portable Particle Inspection Monitor**

Real-time accurate determination of particle concentration of PM₁₀, PM₂.₅, PM₁₀

Technology: Adopt turbidity measurement method, real-time volume flow control technology and relative humidity compensation function

Features:
- Small size, light weight, easy to operate
- Strong environmental suitability
- There is a wireless data transmission module to realize real-time transmission of monitoring data

Application: Indoor or environmental particle monitoring, on-site governance, quality verification, etc.
RadEye is the most advanced universal portable radiation meter
• Using patented natural background subtraction technology (NBR), with extremely high sensitivity
• The device was selected as the only recommended device in the orphan source search and security activities conducted by the International Atomic Energy Agency (IAEA)
• It can be used for radiation detection, Gamma dose rate measurement and area monitoring. Its excellent performance makes it useful for searching and positioning radioactive sources
• Different models, suitable for real-time detection and nuclide identification of α, β, γ, neutron radiation in different scenarios

Can be used in nuclear emergency, border defense, customs, anti-terrorism, security and other fields
Thermo Scientific™ RIIDEye Portable Radiation Analyzer

- Accurately identify radionuclides, and expand the ANSI compatible library of 88 nuclides to 125
- Hysteresis patented technology provides a 97% confidence rate for nuclide identification within 2 seconds
- Real-time display of isotope measurement rate, QCC patented spectrum analysis technology can identify mixed isotope within 1 second
- With functions such as nuclide identification, energy spectrum analysis, measurement, measurement rate calculation, total measurement and data report

Thermo Scientific™ FH 40G Series NBR γNBR γ Measurement Equipment

- Fast response, high sensitivity
  - Can be used to screen human radioactivity
- Adopting dual sodium iodide and plastic scintillator detectors, patented natural local subtraction technology (NBR), with excellent energy response and radiation response capabilities
- The FHT 672E-10 detector has extremely high sensitivity, especially suitable for detecting hidden radiation sources, and measuring the environmental dose equivalent rate $H^* (10)$
- Widely used in the fields of homeland security, environmental monitoring and emergency response
Radiation Measurement Technology – Scenarios

- Identify lost radioactive sources
  - In June 2007, a radioactive source was lost in Hebei Province
  - Searching for radioactive sources in the ruins of the Wenchuan earthquake in Sichuan in 2008
  - In June 2013, the Am-241 radioactive contamination incident of a foundry company in Tangshan, Hebei
  - In May 2014, Nanjing Industrial Flaw Detection Radioactive Source Ir-192 Loss Event

- Emergency monitoring after a nuclear accident
  - Leakage at the Fukushima nuclear power plant in Japan in March 2011

- Emergency Plan for Nuclear Attack
  - Responding to "dirty bomb" attacks
Water Quality Testing Solution

**Thermo Scientific™ AQ4700 Portable Water Toxicity Analyzer**

Using luminescent bacteria for biological toxicity detection

**Features:**
- Simple, fast and sensitive operation
- It can detect the comprehensive biological toxicity of a variety of samples, in line with the international standard ISO11348
- The instrument is small and light, equipped with a carrying case, suitable for field operation

**Application:** Water toxicity analysis in various fields such as environmental pollution and emergency accidents helps to determine the scope of pollution and decontamination measures

**Thermo Scientific™ Orion Star A Series Portable multi-parameter Water Analyzer**

**Features:**
- Simultaneous measurement of parameters such as pH/ISE (ion concentration)/conductivity/dissolved oxygen
- Can save 5000 sets of measurement data, in line with GLP standards
- Portable waterproof design, protection grade IP67

**Application:**
- On-site and laboratory water quality analysis
Soil Detection Solution

Thermo Scientific™ XL3/5 Handheld XRF Analyzer

- Using X-ray fluorescence spectroscopy technology, non-destructive testing, fast speed, simple operation, the whole process only takes a few seconds to complete.

- Closed design, waterproof, dustproof and corrosion-proof, can be used in various environments.

- Suitable for rapid detection of metal materials, soil heavy metal pollution, etc.

- Fast and non-destructive identification of elements in explosives.

<table>
<thead>
<tr>
<th>Explosive Type</th>
<th>Main Elements</th>
<th>XRF Rapid Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Black powder</td>
<td>Potassium nitrate, sulfur, charcoal</td>
<td>K, S</td>
</tr>
<tr>
<td>Detonator</td>
<td>Lightning mercury [Hg(ONC)2], lead azide Pb(N3)2</td>
<td>Hg, Pb</td>
</tr>
<tr>
<td>Fireworks</td>
<td>Potassium chlorate, potassium perchlorate, sulfur, metal powder (Al, Mg, Cu, Ti)</td>
<td>K, S, Al, Mg, Cu, Ti, Rb, Cs, Sr</td>
</tr>
<tr>
<td>Permanganate</td>
<td>Potassium permanganate, sulfur, graphite</td>
<td>K, Mn, S</td>
</tr>
<tr>
<td>Thermit</td>
<td>Iron oxide, aluminum powder</td>
<td>Fe, Al</td>
</tr>
</tbody>
</table>
Thermo Fisher has 70,000 employees in more than 50 countries around the world to serve the global scientific causes

Thank You!
研究背景

城市公共安全风险评估标准研究

研究背景

我国城市化发展迅速

2000年-2018年我国城市化率

2000年-2018年我国城市化率发展趋势

研究背景

城市集聚效应与风险

城市集聚效应与风险

研究背景

城市公共安全风险评估标准研究

研究背景

城市运行

移动出行-生产运行

移动出行-生产运行
研究背景

城市非常规突发事件风险

研究背景

完善突发公共风险管理体系

建立健全突发事件风险评估标准规范

开展全国自然灾害综合风险调查

加强安全生产风险管控和隐患排查治理体系

构建全过程、多层级环境风险防范体系

健全公共卫生、食品药品安全检验检测和风险防控体系

完善立体化社会治安防控体系

提高关键信息基础设施的风险防控能力

研究背景

双重预防机制

全面开展安全风险辨识

科学评定安全风险等级

有效管控安全风险

实施安全风险公告警示

建立完善隐患排查治理体系

研究背景

着力加强风险管理

2019年11月29日，中共中央政治局第十九次集体学习——我国应急管理体系和能力建设

我国各类事故隐患和安全风险交织叠加、易发多发，影响公共安全的因素日益增多。

要加强风险评估和监测预警，加强对危化品、矿山、道路交通、消防等重点行业领域的安全风险排查，提升多灾种和灾害链综合监测、风险早期识别和预报预警能力。

研究背景

城市公共安全风险评估实践需求
研究背景
风险管理助力城市安全

国内外现状

ISO 31000 系列标准

国内外现状

城市公共安全风险评估标准研究

风险管理框架

国内标准与规范性文件

国内外现状

风险管理原则、框架、流程

风险评估方法

国内外现状

我国城市公共安全风险评估基本框架

城市公共安全风险评估

风险管理相关国际、国外标准

风险管理相关国家、地方标准

基本框架

评估背景

评估方法与依据

自然灾害风险评估

事故灾害风险评估

公共安全风险评估

社会安全风险评估

风险应对措施

附件一

X区公共安全风险源（点）汇总

附件二 常用风险评估方法简介

国内外现状

风险管理相关的国际、国家标准

风险管理相关的国家、地方标准

标准编号 标准名称

风险管理原则、框架、流程

风险评估方法

国内外现状

风险管理原则、框架、流程

风险评估方法

风险管理原则、框架、流程

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风险管理原则、框架、流程

风险评估方法

国内外现状

风险管理原则、框架、流程

风险评估方法
### 国内外现状

### 城市公共安全风险评估标准研究

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### 研究进展

- 风险识别流程
  - 基本内容
  - 基本要求
  - 推荐方法
- 风险清单编制流程
  - 基本流程及主要阶段方法与要求,情景应用
研究进展
城市公共安全风险分析

### 城市公共安全风险分析流程

1. 风险识别
2. 风险评估
3. 风险控制

#### 确定风险后果的损害参数表
- 损害参数的确定
- 后果的量化

#### 确定风险后果的临界值
- 临界值的设定
- 后果的分类

#### 确定风险后果等级
- 等级的划分
- 后果的等级

#### 风险源的潜在危险性
- 性质(致灾因子)
- 影响范围
- 强度

#### 承灾载体
- 种类
- 风险源
- 承灾载体分析
- 范围内承灾载体对象(暴露要素)
- 承灾载体受损程度
- 物理损失

#### 后果计算
- 综合后果分析
- 人
- 基础设施
- 经济
- 生态环境
- 社会环境

#### 单一风险源风险分析流程
- 单一风险源风险分析模板

### 城市公共安全风险评估情景构建流程

#### 情景构建
- 情景分析
- 事件演化过程分析
- 事件可能后果分析

#### 任务梳理
- 划分情景响应阶段
- 形成情景任务列表

#### 情景描述
- 情景概述
- 背景信息
- 初始事件

#### 情景筛选
- 筛选准则
- 情景来源
- 筛选方法

#### 情景开发
- 形成应急能力列表

#### 情景应用
- 情景展现
- 应急预案
- 应急演练
- 风险评估
- 应急能力建设

#### 评价与改进
- 评价
- 改进

### 科研项目支持
- 城市公共安全风险评估系列标准研究
- 项目支持的城市公共安全风险评估系列标准研究获得的项目支持

### 研究进展

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<td>研制城市公共安全风险清单编制要求标准</td>
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<td>2</td>
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<td>研制城市公共安全风险识别、风险分析和情景构建标准</td>
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<td>3</td>
<td>“冬奥会安全风险评估技术、标准研究及应用”(总局技术保障项目,2019YJ059)</td>
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<td>“重要设防建筑、港口及海洋科考领域灾害与风险防控技术标准研究”</td>
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“十四五”设想

风险处置
- 风险保留
- 风险规避
- 风险转移
- 风险控制

安全管理

风险管理

应急管理

产品和文档的真实性、完整性和可信性

社区韧性

安保

联络组

发展中国家合作组

联合国合作组

大型活动安全指南

供应链安全

危机管理

安全发展城市

国际化交流

国际标准

全会及论坛

安全

双重预控体系

谢谢！
Risk Assessment Standards of Urban Public Safety

China National Institute of Standardization
Division of Public Safety and Standardization
Zhang Chao

Research on Risk Assessment Standards of Urban Public Safety

- Background
- Current Situation
- Latest Development
- Forecast

Background

Rapid urbanization in China

Urbanization rate & development trend

Operational Risks

Unconventional Emergencies

Effect and Risks

Agglomeration effect in urban development

Operational Risks

非传统突发事件

Urbanization rate & development trend

Operational Risks

非传统突发事件
**Risks Management within Emergency Management Framework**

- Improve the emergency risk management and control system
- Establish and improve emergency risk assessment standards
- Conduct a national comprehensive risk survey of natural disasters
- Strengthen safety production risk management and hidden danger investigation and governance system
- Build a whole-process, multi-level environmental risk prevention system
- Improve public health, food and drug safety inspection and testing and risk prevention and control systems
- Improve the three-dimensional social security prevention and control system

**Background**

**Network Optimization Expert Team**

Develop a group of safe development demonstration cities that are compatible with the goal of building a well-off society in all respects.

- 2020: Build a safe and developed city that is compatible with the basic realization of socialist modernization.
- 2035: Accelerate the establishment of a safe development city based on the central urban area, driving the surrounding areas, radiating counties and townships, and benefiting the people's livelihood.

**Network Optimization Expert Team**

- Dual Prevention System on Risk
  - Carry out security risk identification and assessment
  - Effectively manage security risks
  - Implement security risk announcement and warning
  - Establish and improve the hidden danger investigation and management system

**Network Optimization Expert Team**

- Risk Assessment Principles
  - Beijing
  - Shanghai
  - Shandong
  - Chongqing
  - Tianjin
  - Qingdao
  - Quanzhou
  - …

**Risk Management Framework**

**Urban City Risk Management**

**Risk Assessment & Urban Safety**

- Communicate and negotiate
- Monitor and check
- Register, monitor
- Deal,预案
- Optimal, controlled
- Control, check
- Risk Identification
- Risk Analysis
- Risk Evaluation
- Risk Disposition

**Risk Management Framework**

**Urban City Risk Management**

**Risk Assessment & Urban Safety**
### Current Situations

#### Standards & Guiding Principles

<table>
<thead>
<tr>
<th>National and local standards related to risk assessment</th>
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<tbody>
<tr>
<td>GB/T 24353-2009 Risk management principles and implementation guidelines</td>
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<td>GB/T 27921-2011 Safety Production Risk Assessment techniques</td>
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<tr>
<td>DB 11/T 1478-2017 Business Units (Beijing): 2013 Risk management guidelines</td>
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<td>DB41 T 1645-2018 Regional Security Risk Assessment Network Optimization Expert Team</td>
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<td>SA/SNZ HB 89 UK City Risk Registry, UK Country Risk Registry</td>
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#### Risk Assessment for China Urban Safety

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<th>Basic Framework</th>
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<tr>
<td>1. Risk assessment background</td>
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<tr>
<td>2. Risk assessment methods and tools</td>
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1. Typhoon
2. Heavy rain and storm surge brought by the typhoon, which affect the safety of sea, land and air transportation, ports and docks and construction sites, and cause the collapse of trees and billboards, and even traffic accidents. The typhoon caused a lot of casualties and casualties, and the relatively serious impact was “Santo”; in 2011, there were 2 typhoons that affected Luohu District, namely “Haima” and “Nasa”, and 2 typhoons that affected Luohu District in 2012, namely “Vicente” and “Ivan”. The typhoon that caused the most rainfall and the longest rainfall duration in Luohu District in the past 10 years. The typhoon that caused the most rainfall and the longest rainfall duration in Luohu District in the past 10 years. The typhoon that caused the most rainfall and the longest rainfall duration in Luohu District in the past 10 years.