A Practical Example of the Implementation of an NPP Human Performance Promotion Program and a Safety Culture Peer Review in China

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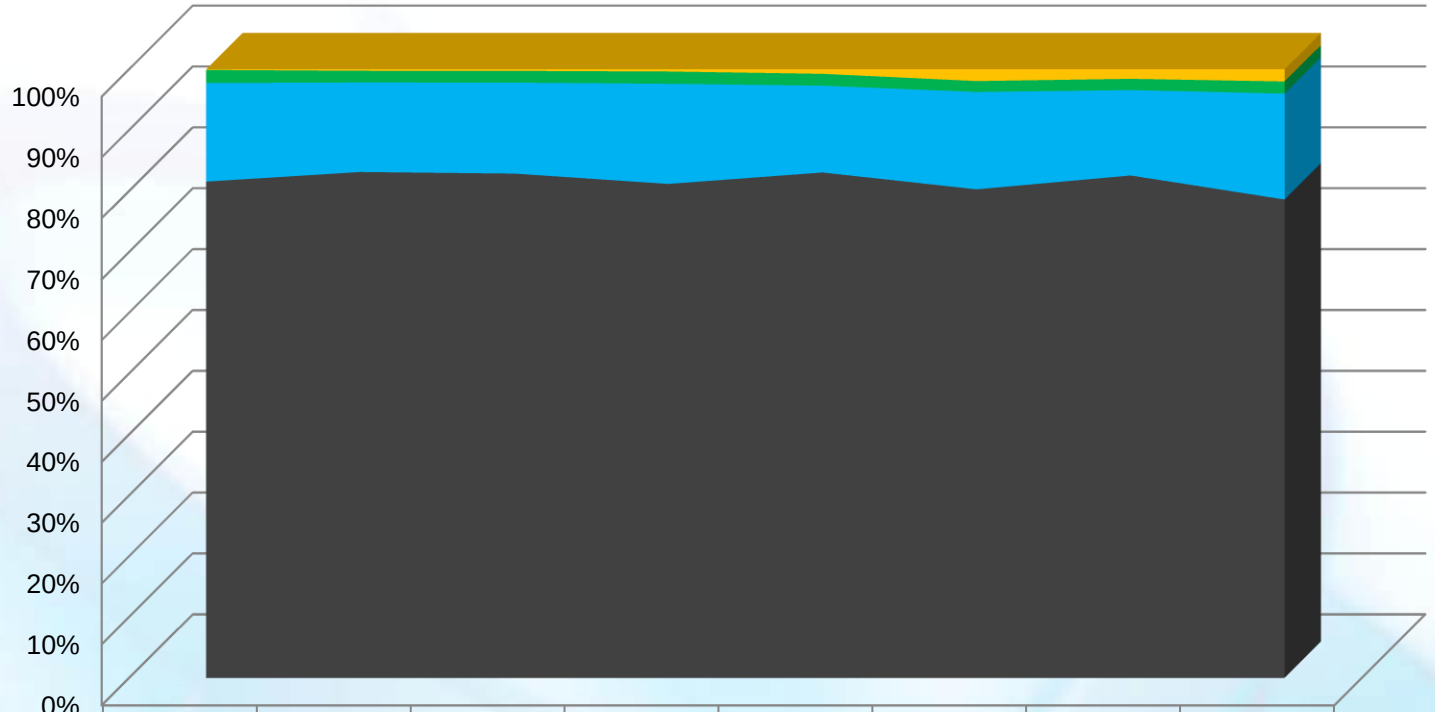
General Information Shared with You from China

Nationwide Electric Generation Distribution in China

Reference: China Nuclear Power Report



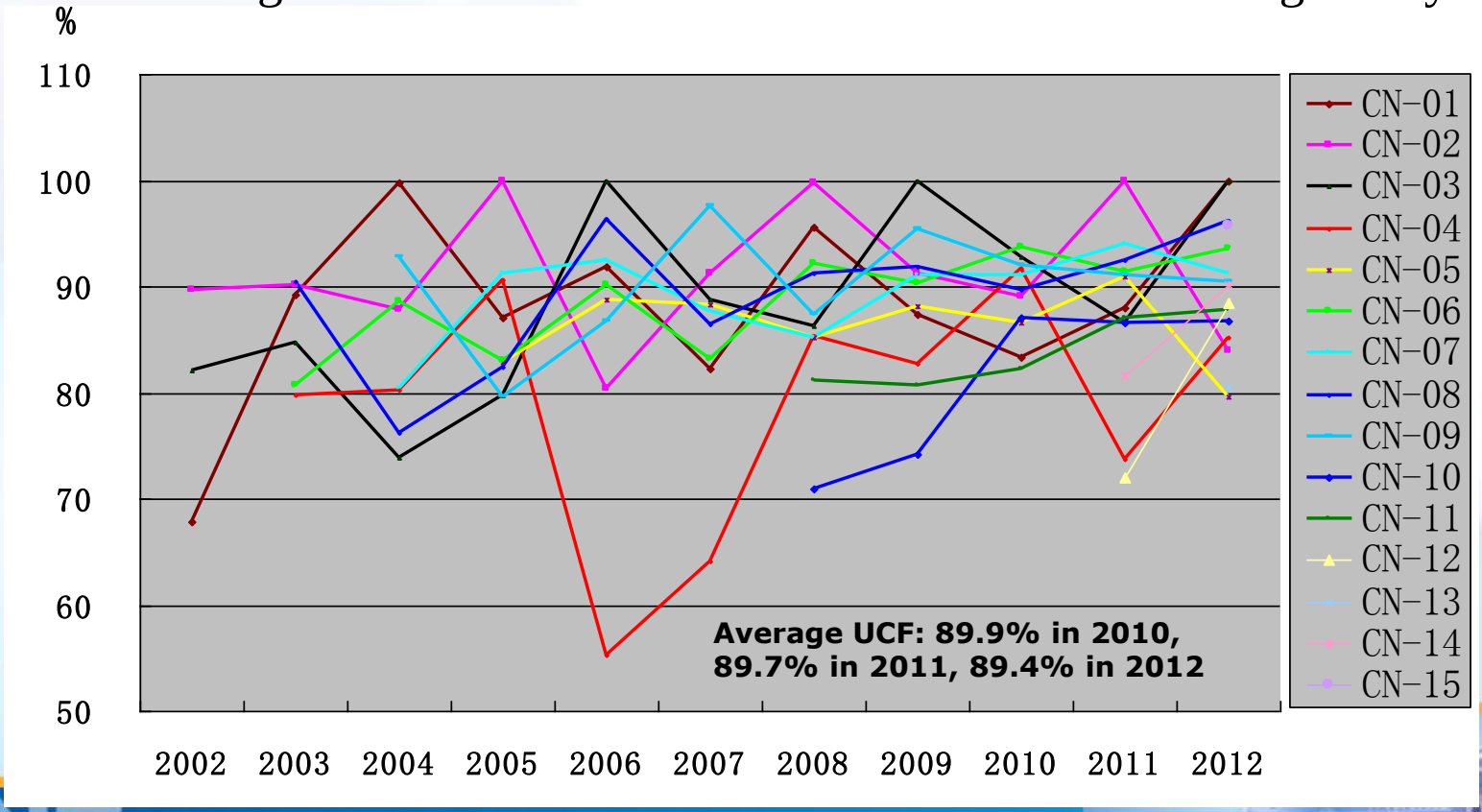
	2005	2006	2007	2008	2009	2010	2011	2012
Others	0.11%	0.25%	0.27%	0.37%	0.75%	1.94%	1.57%	2.01%
Nuclear Power	2.15%	1.93%	1.93%	2.02%	1.95%	1.80%	1.85%	1.99%
Hydropower	16.20%	14.70%	14.94%	16.45%	14.26%	15.99%	14.03%	17.40%
Thermal Power	81.54%	83.12%	82.86%	81.16%	83.05%	80.27%	82.55%	78.60%

Unit Capacity Factor Trend of NPPs in China from 2002 to 2012

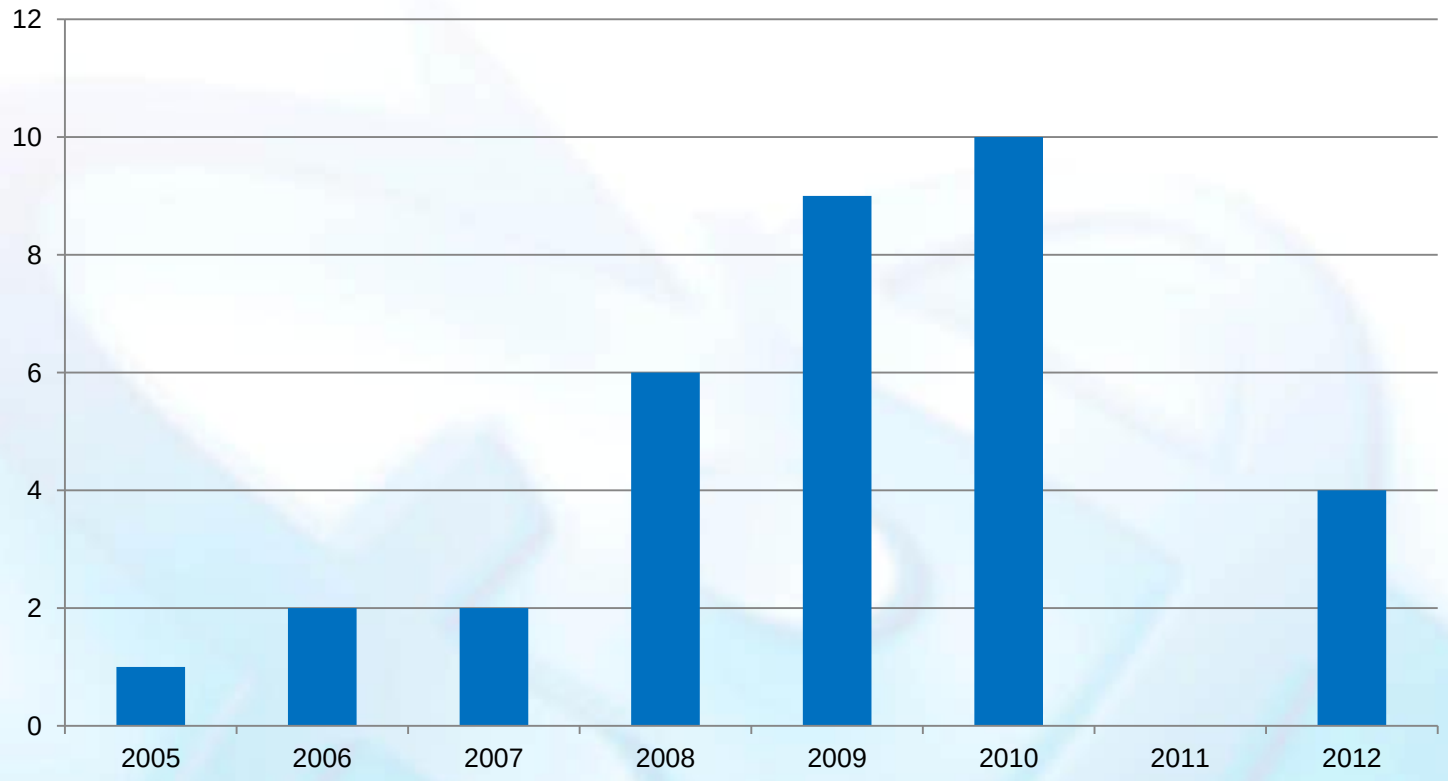
① NPPs in China have operated safely and stably since 1991.

② INES Level II or higher event does not take place.

③ The discharge of radioactive effluents is far below the state regulatory limits.



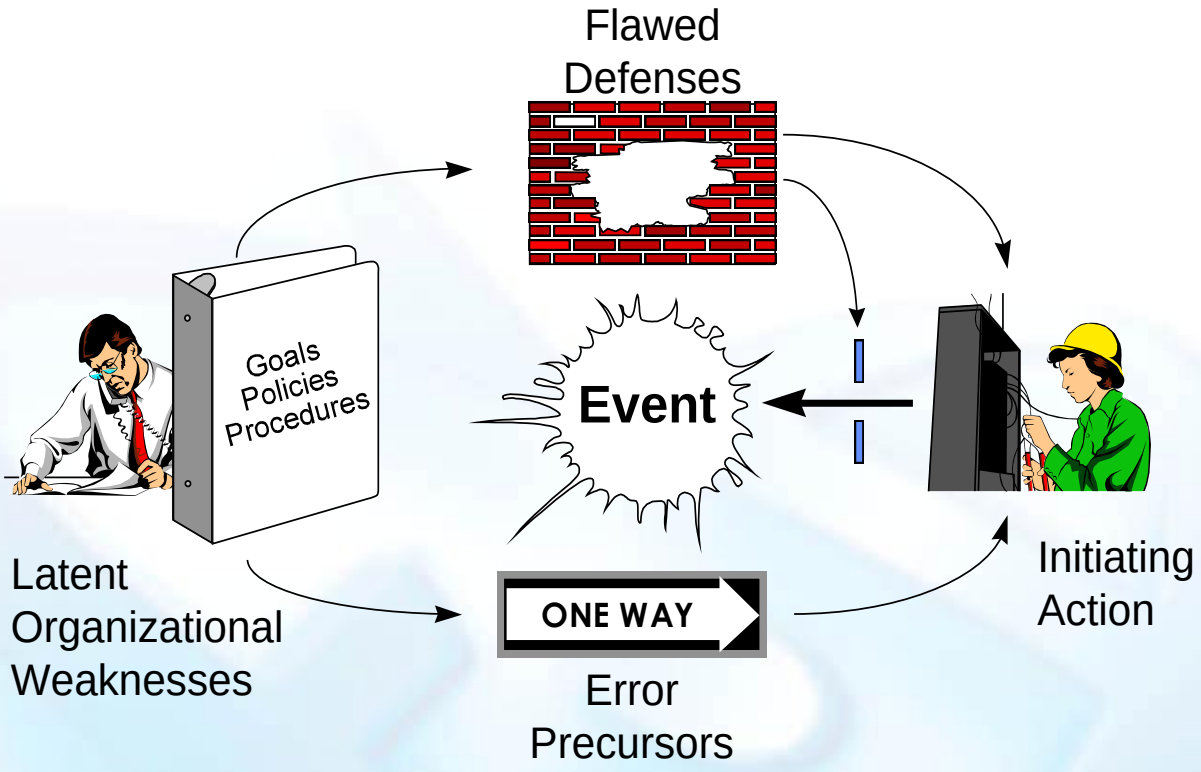
Status of NPP Units Constructed in China



Activities of NPP Human Performance Promotion Program

---- The program started systematically in 2009 at utility (CNNC) level

HU Theory We Followed



Mechanism of Events

HU Theory We Followed

Organization Strategy

1. Equipment Performance
2. Administration
   - ✓ Training & Qualification
   - ✓ Plan & Guidelines
3. Culture Management
   - ✓ Learning & Understanding
   - ✓ Propaganda
4. Oversight Management
   - ✓ HU Committee & Working Group
   - ✓ Assessment
   - ✓ Corrective Actions
   - ✓ Continuous Improvement

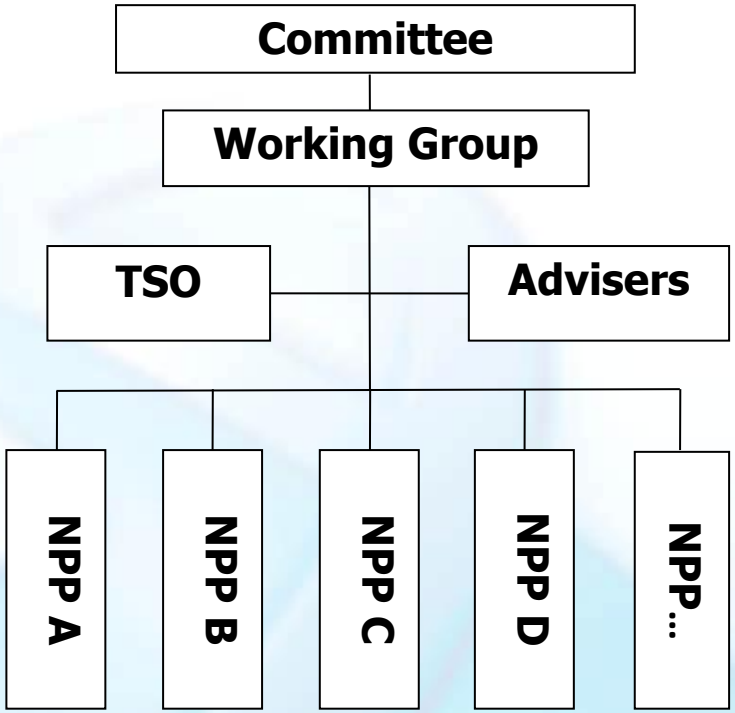
Personnel Strategy

1. Human Error Prevention Tools
2. Utilization of those tools in periods of work preparation, implementation and feedback respectively.

Road Map

Step 1: Organization

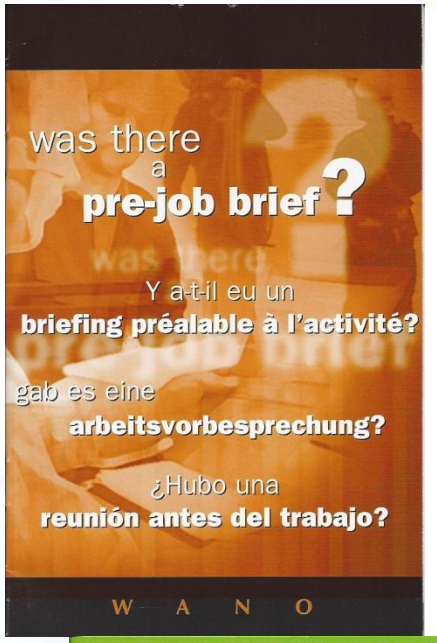
- NPP human performance promotion committee
- NPP human performance working group
- Members come from CNNC HQ, all NPPs and TSO (RINPO)
- Duties of all parties involved.

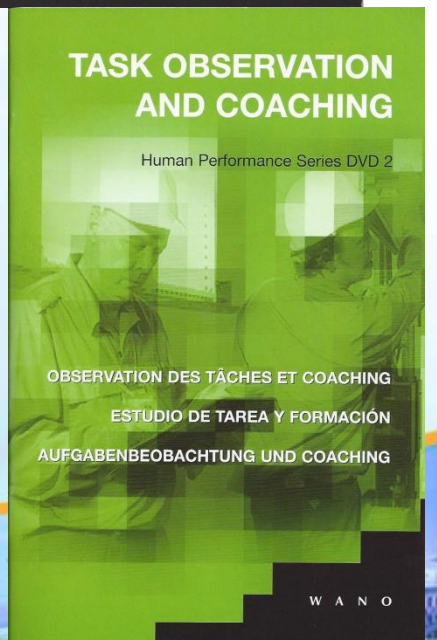


Road Map

Step 2: Investigation & Plan

- International HU Seminar
  - Train the Trainer Program
- Five-year HU Development Program and Yearly Plan
- Localization of Overseas Products (e.g. Video Clips)
  - WANO Pre-job Briefing
  - WANO Task Observation & Coaching
  - Utility Human Error Prevention Tools
  - The Practical Coach.





Road Map

Step 3: Establishment of CNNC Own HU Management System

- Training Textbook & Reference
  - Fundamental, severe accidents, HU events
- Human Error Prevention Manual
  - 11 human error prevention tools
- Technical Guidelines
  - Questioning attitude, Post-job brief
- Training Materials
  - PPT, domestic video clips, examination questions
- NPP HU Management Guidelines
- HU Event OE Manual
  - In OP, MA, CY areas

Road Map

Step 4: Training, Propaganda, Workshop and Competition Activities

- Classroom training + Computer Aid
  - For managers
  - For plant and contractor's employees
- Poster
- E-learning
- Workshop of Human Error Prevention Tools Application
- Knowledge and Skill Competition of Human Error Prevention

HU Poster (1/2)

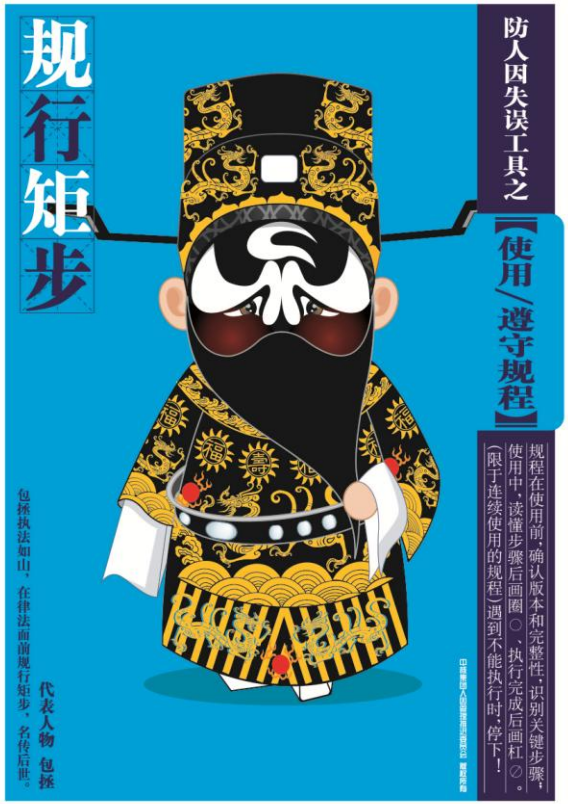

谋定而动
防人因失误工具之
【工前会】
工作前分析任务，识别关键步骤，预测可能发生错误的情景，预见应该使用哪些防人因失误工具。注意开会时使用《确认单》。
亮未出茅庐而知天下三分，降中对流传千古。谋定而动终成西蜀霸业。
代表人物 诸葛亮


察疑停报
防人因失误工具之
【不确定时暂停】
当对工作有疑问或不确定时，我们应该暂停手中的工作，向相关领导报告。
司马懿空城之下小心谨慎，察疑停报以图万全之策。
代表人物 司马懿


思行合一
防人因失误工具之
【自检】
工作前，集中注意力，确认正确的工作对象。预想主要操作步骤、操作的后果。执行操作。执行后检查确认操作的结果。
大丈夫处世当如关云长，做我所想，想我所做，思行合一。
代表人物 关羽

HU Poster (2/2)


防人因失误工具之
【他检】
双检合璧
二人同行，监护人大声读出执行要求，执行人复述，监护人确认说："对的"，执行人执行操作。
代表人物 刘备与孙权
吴蜀联盟有如双剑合璧，力克百万曹军数次南征。


防人因失误工具之
【使用/遵守规程】
规行矩步
规程在使用前，确认版本和完整性，识别关键步骤；使用中，读懂步骤后画圈〇，执行完成后画杠⊘。（限于连续使用的规程）遇到不能执行时，停下！
代表人物 包拯
包拯执法如山，在律法面前规行矩步，名传后世。


防人因失误工具之
【三向交流】
语尚往来
语者说出要传递的信息，听者复述听到的信息，最好将听到的信息记录在纸上，语者确认对方复述的内容说："对的"。
代表人物 鲁肃
子敬几经往来吴蜀之间，通情达意，不厌其烦，终联孙刘之力，玄定天下三分之势。

Road Map

Step 5: Keeping HU Promotion Program Ongoing

- Establishing close tie between HU Training and Basic Safety Qualification (8+1)
  - ① Industry Safety
  - ② **Safety Culture**
  - ③ Quality Assurance
  - ④ Emergency Response
  - ⑤ Radiation Protection
  - ⑥ First Aid
  - ⑦ Fire Protection
  - ⑧ Security
  - ⑨ **Human Performance**
- Plant Employees first, then extending the coverage to contractor's employees

Road Map

Step 6: Evaluation

- Conducting utility observation & coaching activity of human error prevention tools application on site during outage
  - It was implemented once in 2011.
  - 10 reviewers from HQ & other NPPs worked on site one week.
  - PO&C was drafted and used.
  - **Employees know human error prevention tools and in the course to use them skillfully.**

Road Map

Step 7: Continuous Improvement

- Post-based human error prevention tools development.
- Establishment of human performance laboratory.
- NPP HU program self-assessment.
- HU performance indicators and benchmarking.
- Developing HU event OE manual in more areas.
- ……

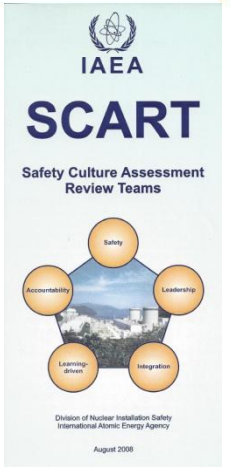
HU Conclusion

1. The “I don’t know” problem was solved. More efforts will made to solve “I don’t do it skillfully & naturally” problem.
2. The NPP performance of safe & reliable operation is enhanced and the number of Licensing Operational Event (LOE) decreases year by year.
3. The program starts from knowledge import and ends at localization of implementation.

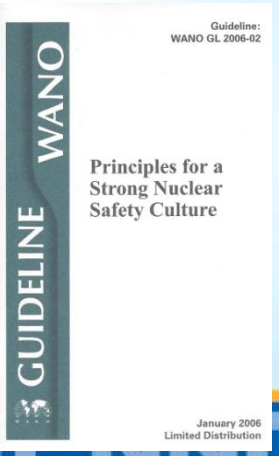
Nuclear Safety Culture Peer Review Practices

Road Map

Step 1: Investigation and Scheme



- IAEA SCART Seminar
- WANO NSCA TSM
- The reasons why NSCA is selected:
  - Up to 2011, NSCA was conducted more than 100 times in US NPPs.
  - NSCA uses shorter site duration (One week).
  - The survey and interview analysis software used in NSCA demonstrate that the **quantitative analysis** can be achieved.
  - WANO published 《Principles for a Strong Nuclear Safety Culture》 in 2006.



Road Map

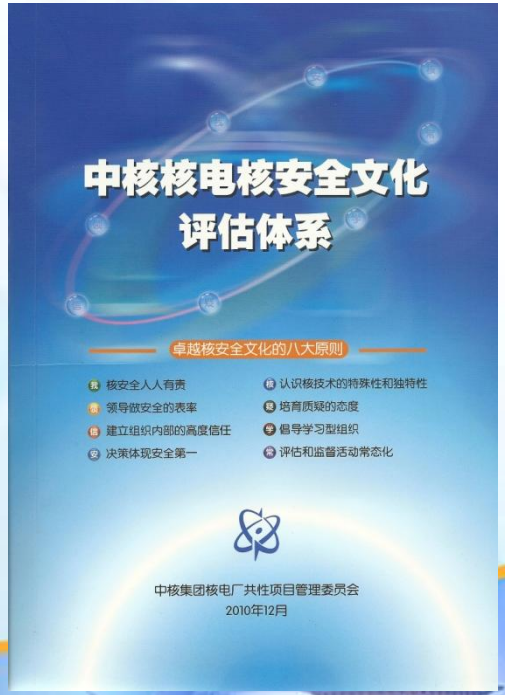
Step 2: Site Observation of NSCA

- To dispatch 3 engineers to USA in the duration of three weeks.
- To observe two NSCAs at different NPPs.
- One week stayed at INPO for learning & discussing.

Road Map

Step 3: Chinese Edition of PO&C, Manual & Software

- To work out PO&C based on WANO GL 2001-07, 2002-01, 2002-02, & 2006-02 (8 principles and 56 attributes)
- 650 pages Manual to guide the method of each activity in the full process (meeting, questionnaire, interview, data collection, etc.).
- Software in Chinese to achieve statistics function.



Road Map

Step 4: Peer Review Activities

- 10~12 reviewers from HQ & other NPPs buildup the team.
- Survey to all employees, around 60 site interviews, meeting observations and data analysis are typical type of activities.
- Once for an NPP per year.
- Two safety culture peer reviews were conducted.
- Two more were planned to be conducted in 2013 and 2014 respectively.

SC Comments

1. Safety culture peer review is at its initial stage in CNNC. Employees need time to correctly link facts with principles/attributes.
2. After first run of peer review, the results of 4 reviews will be analyzed for better understanding.
3. We are underway to seek the most suitable way for safety culture assessment in China.

Posters

核安全人人有责

领导做安全的表率

建立组织内部高度信任

决策体现安全第一

Posters


核 认识核技术的特殊性和独特性
核
我了解工作中「核」的有关知识了吗？
卓越核安全文化的八大原则
我 核安全人人有责
领 领导做安全的表率
信 建立组织内部高度信任
学 提倡学习型组织
核 认识核技术的特殊性和独特性
安 决策体现安全第一
常 评估监督活动常态化
疑 培育质疑的态度
中核核电


核 培育质疑的态度
疑
今天我「质疑」了吗？
卓越核安全文化的八大原则
我 核安全人人有责
领 领导做安全的表率
信 建立组织内部高度信任
学 提倡学习型组织
核 认识核技术的特殊性和独特性
安 决策体现安全第一
常 评估监督活动常态化
疑 培育质疑的态度
中核核电


核 提倡学习型组织
学
今天我学到了什么？
卓越核安全文化的八大原则
我 核安全人人有责
领 领导做安全的表率
信 建立组织内部高度信任
学 提倡学习型组织
核 认识核技术的特殊性和独特性
安 决策体现安全第一
常 评估监督活动常态化
疑 培育质疑的态度
中核核电


核 评估监督活动常态化
常
评估和监督是否已经形成了「惯例」？
卓越核安全文化的八大原则
我 核安全人人有责
领 领导做安全的表率
信 建立组织内部高度信任
学 提倡学习型组织
核 认识核技术的特殊性和独特性
安 决策体现安全第一
常 评估监督活动常态化
疑 培育质疑的态度
中核核电

Final Conclusion

1. Four years human performance promotion program implementation awakens and consolidates NPP employees' **consciousness** on human error prevention and safety culture, and points out the direction to strive for, which guarantees NPP safe and reliable operation.
2. TSO can make great contributions on program implementation due to:
   - Long term, experienced personnel, full time working in the area.
   - Cross-plant and cross-organization experience.
   - Institutional advantage.

Thank You
for Your Attention !