



Identifying and Overcoming Barriers to Effective Consideration of Human and Organizational Factors in Event Analysis and Root Cause Analysis

S. Dolecki

Canadian Nuclear Safety Commission
Corrective Action Program Owners Group
Toronto, Ontario

August 11, 2011





Outline

- CNSC Mission
- Regulatory Oversight of Human Factors
- Working Group on Human and Organizational Factors (WGHOFF)
 - Project Description
 - Outcomes: Barriers and Recommendations
- CNSC Observations



Canadian Nuclear Safety Commission

Mission:

- Protect the **health, safety and security** of persons and the **environment**; and implement Canada's **international commitments** on the peaceful use of nuclear energy

The CNSC Regulates All Nuclear-Related Facilities and Activities in Canada

- uranium mines and mills
- uranium fuel fabricators and processing
- nuclear power plants
- waste management facilities
- nuclear substance processing
- industrial and medical applications
- nuclear research and education
- export/import control





Human Factors

- Regulatory Policy Statement:
 - “The Canadian Nuclear Safety Commission recognizes that human factors can affect the performance of the facilities and activities that it regulates.” (P-119, 2000)
- Human Factors are the factors that influence human performance as it relates to the safety of a nuclear facility or activity over all phases, from design to decommissioning.



CNSC Human and Organizational Performance Review Areas

Human Performance

Human Factors in Design

Human Actions in Safety Analysis

**Work organization
& Job design**



**Procedures and
Job Aids**

**Organizational
Performance**

Fitness for Duty

**Performance Monitoring and
Improvement**

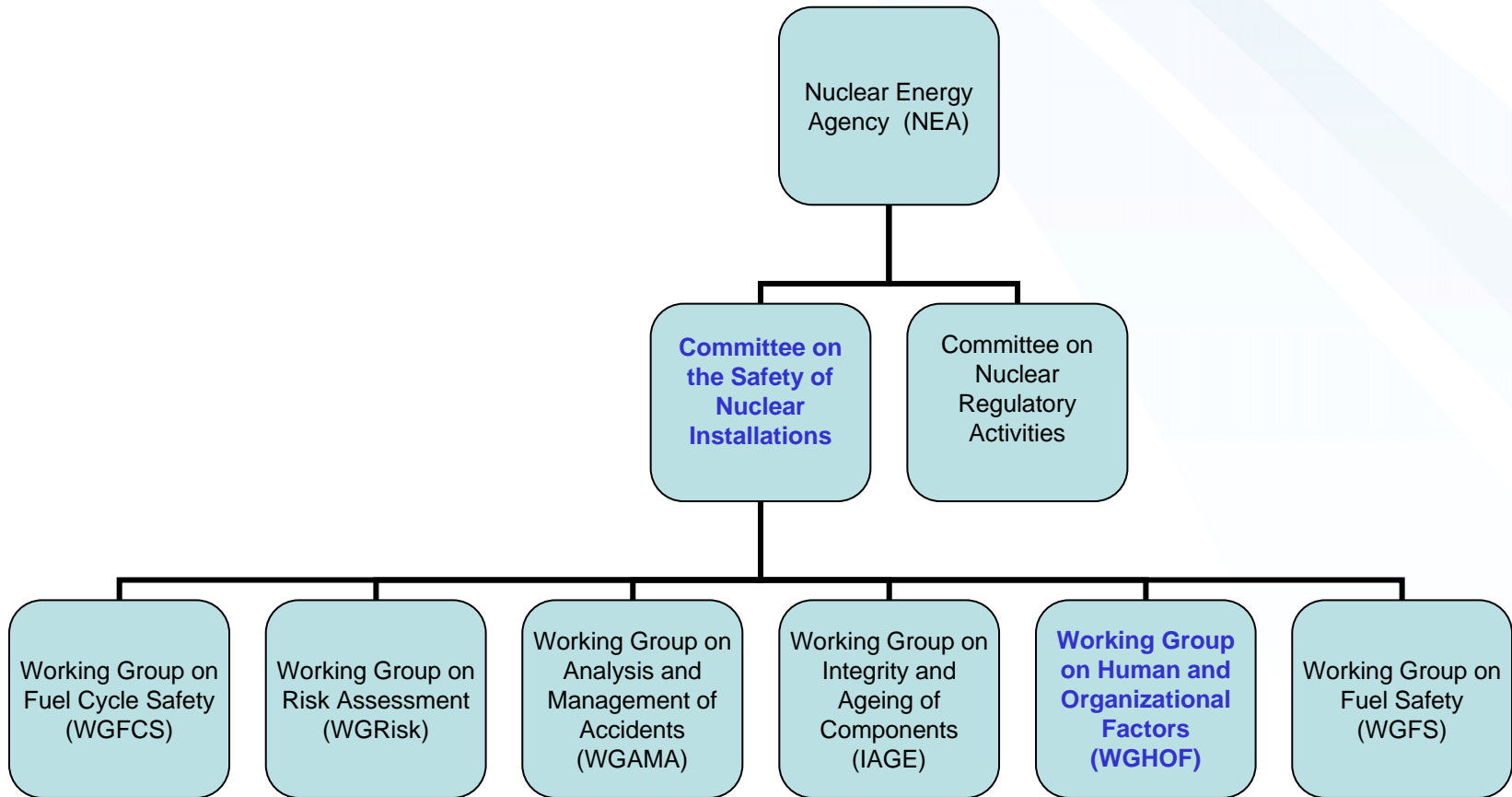
HOF in RCA



Working Group on Human and Organisation Factors (WGHOF)



Organization for Economic Cooperative Development (OECD)





WGHOE Mission

- To improve the current understanding of human and organizational factors
- To advance the use of methods for human and organizational factors assessment
- To address emerging safety issues in order to maintain and improve the safety of nuclear installations in member countries



Human and Organizational Factors in Event Analysis

Project Justification

- estimated that 60 - 80% of the events in the nuclear industry can be attributed to human and organizational factors
- the importance of correctly identifying the HOF causes is understood, but there is still a tendency to focus on the technical aspects of events
- history of prominent events across the major hazards sectors shows that HOF lessons fail to be learned



Project Problem Statement

- HOF causes of events are difficult to identify and correct

Objectives:

- Identify/discuss the barriers to adequate treatment of HOF in RCA
- Develop recommendations to improve the treatment of HOF in RCA



Project Activities: HOF in Event Analysis

CSNI accepted WGHOE proposal to examine
Consideration of HOF in Event Analysis

Survey of licensees (NPPs & research reactors)
from 11 countries (26 respondents)

Common themes identified from survey

Workshop held in 2009 with representatives from 10 countries

Recommendations made to improve consideration of
HOF in Event Analysis based on international experience

Report published
<http://www.oecd-nea.org/nsd/docs/2010/csni-r2010-8.pdf>



Workshop: Themes for Discussion

- Senior Management and Organizational Issues
- Methodology/Tools
- Team Composition/Learning



Senior Management and Organizational Issues: Barriers

- Events with a clear indication of HOF causes are attributed to technical factors
- Managers are not typically trained in RCA or HOF
- Organizational issues can have an impact across organizational units - tendency to focus on what can be easily fixed
- Organizations may be unwilling to be self critical because of potential repercussions (internal/external)
- HOF issues are typically understood as human performance - errors at the individual worker level
- Public reports - often difficult to manage reaction and ensure that the information is taken in the proper context



Senior Management and Organizational Issues: Recommendations

- Organizational level of sponsor commensurate with the significance of the event
- RCA/HOF training specifically designed for senior management
- Senior managers must demonstrate the appropriate behaviours to indicate the value they place on the RCA process
- Adopt / develop a check list for use by managers identifying the elements of a quality RCA report
- Ensure a balance between the quality of an investigation and the timeliness of reporting
- Ensure that conditions do not develop where there is a reluctance to produce comprehensive reports
- RCA teams must have the authority to conduct the RCA without interference



Methodology and Tools: Barriers

- Investigation may not be pursued to the point where HOF issues can be identified
- Definition of the scope of the investigation will determine if HOF issues will be identified
- Identification of organizational issues through Apparent Cause Analysis (ACE) is unlikely
- Analysis tools are not always used correctly: e.g. Event and Causal Factor Charts used for presentation versus analysis
- Perceived subjective nature of HOF in RCA -burden of proof is higher
- Perception: lack of formal or adequate training for RCA methodologies and HOF issues



Methodology and Tools: Recommendations

- Differentiate between human performance issues and organizational issues
 - look beyond “human error” as a root cause
 - “Just” or “blame-free” culture
- Use multiple analysis tools to ensure convergent validity of data to support conclusions
- Clear instructions, examples and case studies to identify HOF in RCA
- Develop a formal trending program
 - integrate results from lower level event investigations, self assessments, external assessments etc. to identify organizational issues



Team Composition/Learning: Barriers

- Investigator skill in RCA methodology and HOF knowledge is necessary to identify HOF issues
- Challenge to develop and maintain investigator skills as fewer and fewer RCAs done (~2-3/unit/year)
- Lack of RCAs conducted may limit the learning opportunities from the identification of organizational issues
- In the absence of immediate and measurable improvements, the organization may be reluctant to accept report conclusions identifying HOF causes



Team Composition and Learning: Recommendations

- Review of corrective actions for implementation and for effectiveness in addressing root cause
 - organizational issues take a long time to change
- RCA training qualification
 - complete 2-3 RCAs per year
 - proof of practice
- HOF specialist available for investigations
- Communicate RCA results widely to promote HOF understanding in the organization and to encourage learning



CNSC requirements related to non-conformances and corrective actions

- Certain events are reportable to CNSC
(*General Nuclear Safety and Control Regulations* (29(1), S-99))
- Recurring or serious deficiencies shall be
 - Analyzed to determine their causes
 - Corrected to prevent recurrence (CSA N286.5-95, 3.12)
- Systematic or serious problems shall be evaluated for the root cause and eliminated.
 - The extent of the root cause analysis shall be based on the significance or extent of the problem (CSA N286-05, 5.11)

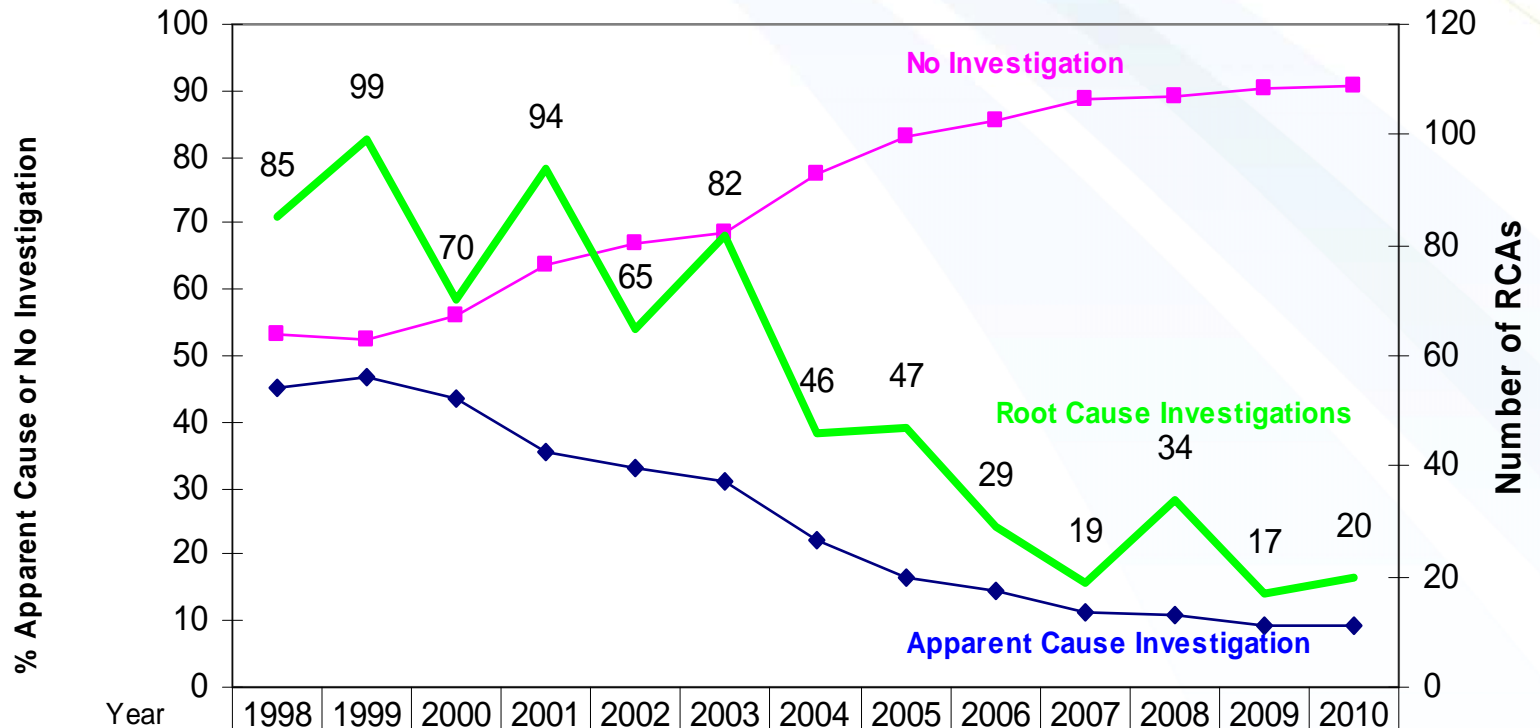


CNSC's observations on RCA and corrective actions

- Few ACEs and fewer RCAs; events are usually classified as no further evaluation / trending
 - trending programs not well established
 - RCA seldom used to investigate trends or near misses
- Recurring events:
 - root causes were not correctly identified
 - corrective actions ineffective
- Organizational & design factors are seldom identified and corrected
- Corrective Actions:
 - procedural change when design change would be a more robust solution
 - coaching individuals versus addressing institutional weaknesses
- Frequency of RCAs is often inadequate to maintain RCA knowledge and skills
- Senior managers can facilitate effective consideration of HOF in RCA



Canadian Example: Event Investigation Trends



	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
■ No Investigation %	53	52	56	64	67	69	78	83	86	89	89	90	91
◆ Apparent Cause %	45	47	43	36	33	31	22	17	14	11	11	9	9
▲ RCA number	85	99	70	94	65	82	46	47	29	19	34	17	20



Working Group on Human and Organizational Factors (WGHOFF)

Recent Work:

- Justification of Organizational Suitability
www.oecd-nea.org/nsd/docs/2009/csni-r2009-11.pdf
- Improving Human Performance in Maintenance
www.oecd-nea.org/nsd/reports/2009/NEA6153_TOP_11_ENG.pdf
- Human performance and the operation of new nuclear plant technology
www.oecd-nea.org/nsd/reports/2009/nea6844-TOP12-Eng.pdf
- Oversight of Safety Culture

Upcoming Event:

- Leadership and Management for Safety, Including safety culture - Regulatory Approaches & Methods
www.oecd-nea.org/nsd/workshops/chester2/



Canadian Nuclear
Safety Commission

Commission canadienne
de sûreté nucléaire



Thank you!

nuclearsafety.gc.ca

Canada

Canadian Nuclear Safety Commission

CAPOG
August 11, 2011