

Input for Consideration
Regarding DRAFT REGDOC-2.1.2
Management System – **Safety Culture**

Submitted by:

John P. S. Froats, P. Eng.

Nuclear Engineer in Residence – UOIT

Principal – Froats & Froats and Associates

Context / Introduction

Please note that I submitted comments on the DIS-12-07 document that circulated for public review prior to the drafting of the REGDOC-2.1.2: Management System – Safety Culture.

It is my view that we have enjoyed an excellent overall Safety Culture in the Nuclear Power Plants (NPPs) in Canada historically. Never perfect, and always in need of constant nurturing and re-enforcement but overall a strength. This has been achieved through combination of several factors including a robust plant design that reflects safety cultural elements in the design phase, a high commitment to training and education resulting in highly competent and committed licensees and an excellent Regulatory Body in Canada.

The focus on Nuclear Safety as an over-riding priority has been a fundamental premise in the Canadian Industry right from the very beginning. There is a routine use of external review in both the Licensees and the Canadian Nuclear Safety Commission and a high level of commitment in Canada to transparency with the public – some of which is on a voluntary or negotiated basis.

The DRAFT REGDOC rightly points out that the CSA N286-12 Management Standard that is the basis document for the Quality Management Program at Canadian NPP's (once referenced in the Licence or Licence Condition Handbook). So, to some degree, the REGDOC is a duplication of the requirement to have a Safety Cultural element as part of the overall managed system. I think there is general agreement that the cultural elements of an NPP need to be built in, rather than 'bolted on' – which tends to favour embedding activities in the core programs to enhance Safety Culture, rather than adding on an additional program.

It is not clear to me as a reviewer, what the intent (drivers) for this document are given there already appears to be a Regulatory requirement established via the CSA N286 Standard being imbedded in the Licencing of NPP's in Canada. The current document has pieces of what appears to be at least three separate objectives:

- Establish Regulatory Requirements for a management program that promotes a 'Healthy Safety Culture'
- Establish an approach (guidance) for the specific tool of safety cultural surveying

- Provide some guidance for Regulatory evaluation of a management program's influence on a 'Healthy Safety Culture'

I think it would benefit from a clear objective that reviewers could use to guide their review.

The document provides an index of links to other existing information on the subject of safety culture and then moves to spend the majority of the DRAFT REGDOC-2.1.2, focusing on the single element of Safety Culture Assessments, which is only one small portion of a set of input information needed to assess adequacy of the safety culture at a facility. In fact, some of what is written in the current version on the subject of safety culture assessment methods seems to be more of a guide to CNSC staff for evaluating programming rather than a set of requirements for the programming itself.

It is my view that there is a need to capture a clear set of Regulatory Requirements (or maybe just expectations). It is also my view that the document needs some further work to focus the content on a clear goal before it is ready to enhance clarity in this area.

Historical Risks that have Brought Focus to the Subject of Safety Culture

The nuclear sector has a strong focus on learning from experience. I think it is worth considering some world experience that might be relevant to our thinking with respect to establishing requirements in the area of safety culture:

1. The Fukushima Daiichi event seemed to have elements of overconfidence in design, over-reliance of mathematical risk tools and Executive influence as contributing cultural factors in the event. Also the fact that the plant only had a few years left to run, no doubt had some influence on the perspective of what kind of risk mitigation investment, was thought to be necessary for the remaining life of the Facility.
2. The Chernobyl Event in the Ukraine, had elements of government and Company Executive influence that convinced staff to take the plant outside its safe operating envelope (weaknesses in knowledge (particularly of the design basis and safe operating environment) in the operating staff has also been pointed to in some accounts of the event). Weakness in procedural adherence culture was yet another contributor.
3. Although a Hollywood dramatization, the current film "Deepwater Horizon" vividly depicts another industrial accident that had at its roots a number of Cultural contributors including;
 - a. Acceptance of low standards
 - b. Acceptance of weaknesses in equipment maintenance
 - c. Heavily incented production goals
 - d. Encouragement / pressure from management and Executives to meet business production 'imperatives'.

Note that the earlier Hollywood dramatization of the Titanic accident had several similar contributors.

4. The Lac Megantic event had cultural contributors that were similar.

In his book, "The Industrial Operators Handbook", Mr. H. Howlett outlines a couple of the above events as well as many others and provides some additional insights on how these large events develop.

So, from historical events, some 'risk elevators' it seems we should be we should be alert to, to preclude major events might include:

- Any decline in the understanding of the design basis and safe operating envelope
- Government pressure influence
- Weaknesses in understanding of the special nature of nuclear power in entities like support organizations, Boards, and stakeholders external to the licensees who have influence on the risk tolerance of the organization
- Reduction in standards of maintenance and testing
- Un-balance in safety as an over-riding priority when challenged by production goals
- Management and Executive influence (either systemic in things such as compensation incentives or on individual behavioural bases).
- Weaknesses in procedural adherence
- Over-reliance and confidence in risk evaluation methods (One lesson from the Fukushima event that was important was that both consequences and probability of an outcome need to be factored into risk decisions.).

Internationally, some other Countries have decided to focus their Regulatory oversight on some leading indicators that they believe to be effective in the detection of erosion in licensee performance of which safety cultural weaknesses may be a contributor. The CNSC also monitors key performance indicators – an aspect that is probably worth including in this REGDOC.

Some Key Changes in the Canadian Regulatory Framework since DIS-12-07

A strong, clear Regulatory Framework is also a key influence on Safety Culture. Since the Discussion Paper was published:

- A significant number of key changes have taken place in the Regulatory Framework including:
 - Periodic Safety Review
 - Requirements for Aging Management and Life Extension
 - Design of New Plants
 - Focus on Beyond Design Basis Requirements
 - The Administrative Monetary Penalty Structure (the application of which can influence licensee tolerance for deviation from requirements)

Some things we do in Canada today that contribute to a strong safety culture

It seems to me as well, that we do several things today, that have resulted in the strong safety culture we have enjoyed historically – so many elements are already in place – if it is the intent to 'codify' or collect elements into one place perhaps some of what is currently working well should be included:

- All Canadian NPP's are committed to a cycle of structured external reviews that look at elements of programming including those things that affect safety Culture
 - WANO Reviews and or OSART reviews are completed at a relatively high frequency
 - Targeted external assessments are utilized – particularly for major events
 - Periodic review of causal factors that are contributing to lower level events
- Resident CNSC inspectors conduct inspections and assessments in a mix of announced and unannounced means

- There is a strong commitment to an extensive licencing program for control room staff which includes elements of safety cultural education
- Leadership development initiatives include education on safety culture and its importance
- Corporate policy documents clearly state that nuclear safety will be an overriding priority
- There are a great many performance indicators some of which can provide insights to organizational weaknesses so they can be identified and corrected by the required Corrective Action programming
- Historical clarity and strength around the role of the Design Authority and the 'internal technical conscience' embodied in the Chief Nuclear Engineer role has contributed.
- We typically use Safety Culture Surveys, as an input to consider – but not in isolation – as one of many sources to help managers and executives identify areas that need attention.
- IRRS Missions are held regularly with results made public and are used to strengthen Regulatory oversight which is also a key influence on culture

Some National Reports submitted for the conduct of the 7th Convention on Nuclear Safety highlight the use of existing indicators as part of safety culture assessment. Some regulatory bodies around the world have expressed opinion that regulatory assessment via inspection program observation is an important element. It is apparent that there are some good ideas available internationally on utilization of some of the performance indicators available as a part of assessing safety culture.

Specific Comments for Consideration

The following specific points are provided, together with the above contextual commentary, in support of trying to evolve the REGDOC:

- So, it seems to me, the current draft if intended to give an overview of elements of safety culture programming misses some key elements. Alternatively, If it was intended to be a guide to conduct of safety culture assessment then the title and focus needs to be adjusted accordingly.
- The "safety culture reference framework" put forward in section 2 is an adaptation of a number of IAEA documents. INPO has had a framework available for several years (Traits of a Healthy Nuclear Safety Culture) which is already used extensively. It is not clear that creating another version of framework is beneficial.
- The framework put forward in section 2 is missing some important elements highlighted above
- Section 3 and 4 might more appropriately be placed in a separate document providing guidance on safety culture assessment. As written, it is my view that there is too much of a focus on safety culture assessment and reporting on the results. More of a focus on measures and the aggregate picture of the various elements that influence culture might be more appropriate (the survey tool is only one piece – an input to aggregate with a lot of other information including assessment and observation from a strong CNSC site presence.
- It would appear that Appendix A is intended to establish requirements – requirements might better be clearly established in the front of the document.

- Appendix B provides some good background information – but seems to focus on providing some guidance for Regulatory evaluation. It may also be more suited to a separate document with a clear focus.
- There is too much focus in the document on analysis of the survey results. While you will do some analysis to look for trends etc... there is little benefit in performing several layers of analysis. It is only a perception survey and beyond a certain point, there is nothing to gain by more detail.
- Traditionally Regulatory documents set requirements as to 'What' is to be done with guidance about how separated.

- o Statements like:

1. The Licensee of the NPP shall have a process of measurement in place to warn of cultural weaknesses that influence the likelihood of future safety significant events.

Measurements may include feedback from safety culture assessments, safety oversight entities, external reviews, backlogs and so on.

2. The Licensee shall reflect the importance of a positive safety culture in the recruitment, appointment and performance of executives whose role has a strong influence on the attitudes and beliefs of the organization.

may be more of the kind of Regulatory requirement level than the current content.

3. I would suggest that respect and understanding for the design basis of the facility needs to feature as one of the elements.

I hope that you find the feedback useful to progress the important work in this area. This area of safety Culture is complex. To quote a colleague who I respect very much "Every action or inaction by leaders is what sets and reinforces culture - and thereby drives safety behaviors."

So in the end, getting the right leaders with the right personal set of values and personal integrity has to be a key part of the answer. And, Regulatory observation of key decision making and risk management against some well defined criteria, by competent observers has to be an ingredient of evaluation. Surveying can give some insights but is only one part of the data gathering and understanding.

Best regards,



John P. S. Froats, P. Eng.

Nuclear Engineer in Residence, UOIT

Principal, Froats & Froats and Associates

