SISC- Integrated System for NPP´s Supervision-Spanish Reactor Oversight Process

Authors: Beatriz Gómez-Argüello (TECNATOM), Teresa Labarta (CSN), Olvido Guzmán (CSN)

Introduction

Acknowledging the new challenges that the deregulation of the electricity market posed, in November 2000 the Joint Committee constituted by the Spanish regulatory body CSN and the nuclear electricity companies (UNESA), approved to set up a joint working group (WG) on the improvement of the efficiency of the regulatory process with the following objectives:

- To compile the ongoing activities developed by the CSN and the nuclear sector focused on this item.
- To select a few representative countries (including those that are design suppliers of Spanish NPP) and analyse their regulatory framework.
- To analyse the proposal issued by NEA and IAEA.
- To identify actions to be developed in order to improve the regulatory process, attending to their scope and priority.

This WG concluded recommending the adoption of a less prescriptive process, addressed to the surveillance process, based on performance and risk significance. It was remarked that this improvement had to be done by both the CSN and NPP licensees as being the parts involved in the process. An important recommendation, common to all the processes analysed, was the need of having written documents establishing the policy of both the CSN and the licensees in every area, and improving the communication and confidence between them.

Taking into account that technology of all major Spanish NPP comes from USA, and that a new regulatory approach (Reactor Oversight Process, "ROP") had started in this country in a consistent and efficient manner, the group recommended the adoption in Spain of a similar system, introducing necessary adaptations to our national context. Once this approach and proposals were accepted, several ad-hoc working groups (CSN-UNESA) were created to deepen into the conceptual new items and to adapt this strategy warranting that present efficient practices are maintained in the implementation of the new system.

One of these groups analysed the applicability of ROP in the Radiation Protection field. The conclusions of this group were that even when there are important differences between Spain and USA in normative and roles assigned to the regulatory body, the adoption of ROP could be possible introducing the necessary modifications and maintaining the conceptual scheme. Main modifications were: to maintain the interaction with NPPs by transferring the conclusions of the assessment of periodic reports, to adapt values to the Spanish situation, and to guarantee the coherence with the official documents referred in the licensee authorizations.

Since September 2004, CSN and UNESA have been working in close collaboration with the help and assessment of Tecnatom in the development of the different SISC aspects of the Radiation Protection area: the system of indicators, the definition of a risk informed baseline inspection program and the inspections procedures; the methodology to assess the inspection findings and indicators; the threshold values to categorize findings and indicators, and the methodology, accessible to all the licensee organization, to identify deficiencies, analyse and categorize them, and make the follow up of the corrective actions taken.

During this current year 2006, we are in the pilot phase of the SISC implementation. The official phase will start in January 2007 and will differ mainly from the pilot phase in the publication of the SISC results.

SISC Description

The SISC program is intended to fulfil the following four goals:

1. To maintain safety by establishing a regulatory oversight framework that provides assurance that plants continue to be operated safely by plant operators.
2. To enhance public confidence in the CSN´s regulatory program by increasing the predictability, consistency, objectivity and transparency of the oversight process
3. To improve the effectiveness, efficiency, and realism of the oversight process by focusing both agency resources and utility resources on those issues with the most safety-significance.
4. To reduce unnecessary regulatory burden as the process becomes more efficient and effective.

SISC establishes seven cornerstones of safety included in three broad strategic areas, as it is shown in figure 1. In addition to the cornerstones, SISC features three "cross-cutting" elements, so named because they affect and are therefore part of each of the cornerstones. Licensee performance that met the objectives of these cornerstones would provide reasonable assurance that public health and safety was maintained.

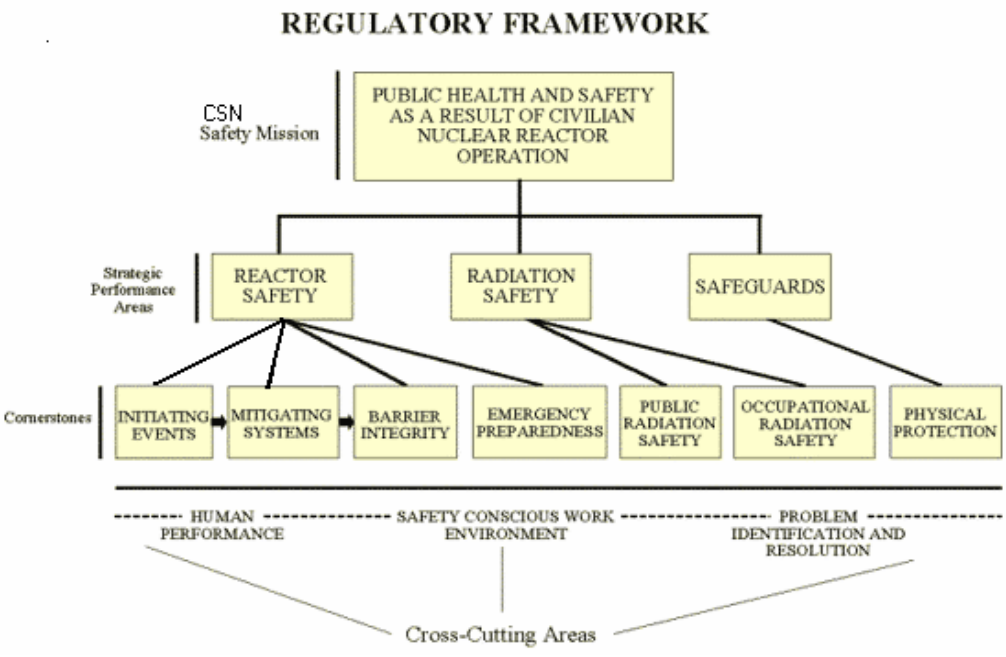

Figure 1- SISC

Licensee performance within each cornerstone is measured by a combination of performance indicators (PIs),reported by the licensee, and inspection findings resulting from CSN's inspection program. Both PIs and inspection findings are evaluated and given a colour designation based on their safety significance (green, white, yellow and red).

PIs have been developed for each of the cornerstones to provide an objective indication of licensee performance. A performance indicator is a quantitative measure of a particular attribute of licensee performance that indicates how well a plant is performing when measured against

established thresholds. Licensees submit this data quarterly, and the CSN regularly performs verification inspections of their submittals.

CSN also evaluates the licensee performance through different inspections, as it can be seen in figure 4. A risk-informed baseline inspection program, common to all nuclear plants, has been developed to both independently verify the PIs and to inspect those aspects of licensee performance not adequately covered by a PI. The risk-informed baseline inspection program establishes the minimum inspection effort that all licensees would receive, regardless of their performance. Inspections beyond the baseline will be performed at plants with performance below established thresholds, as assessed through information gained from performance indicators and CSN inspections. Additional inspections may also be performed in response to a specific event or problem which may arise at a plant.

Once the CSN inspectors have found specific inspection issues, it is necessary to determine their importance and their implication in the regulatory actions, if any. This process begins with the screening of the inspection results to determine which issues are Minor findings, findings of low significance which are only required to be documented and solved by the licensee through the Corrective Action Program (CAP). The “Screening Process” also defines which inspection issues are greater than minor. These will be evaluated through the "Significance Determination Process" (SDP), which identifies those inspection findings that would not result in a significant increase in risk and thus need not be analysed further (a green finding), and those inspection findings that result in a higher risk significance (white, yellow, or red).

The "Significance Determination Process" (SDP) helps CSN´s inspectors to determine the safety significance of inspection findings. Each SDP supports a cornerstone associated with the strategic performance areas. The SDP objectives are to characterize the safety significance of inspection findings, using best available risk insights as appropriate, to provide all stakeholders an objective and common framework for communicating the potential safety significance of inspection findings, to provide a basis for timely assessment and/or enforcement actions associated with an inspection finding and to provide inspectors with plant-specific risk information for use in risk-informing the inspection program.

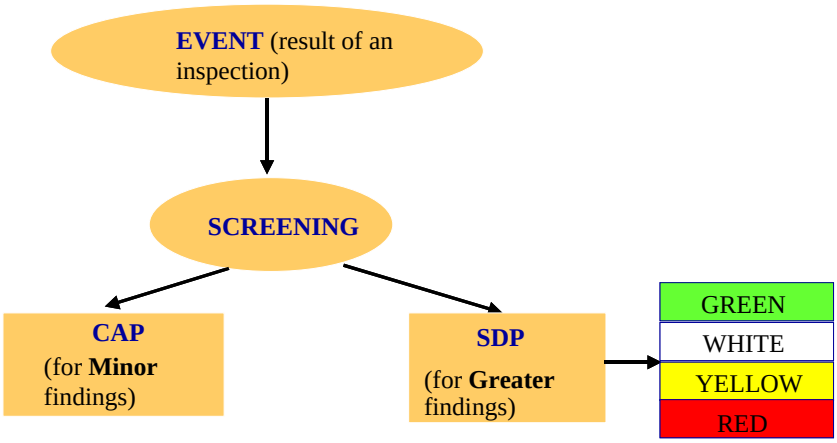

Figure 2- Inspection result process

Risk-informed thresholds have been developed for both the PIs and inspection findings to establish performance bands. These performance bands provide for increased regulatory action as licensee performance degrades, as indicated by crossing more risk significant thresholds.
A "green" coding indicates performance within an expected performance level in which the related cornerstone objectives are met; "white" indicates performance outside an expected range of nominal utility performance but related cornerstone objectives are still being met; "yellow"

indicates related cornerstone objectives are being met, but with a minimal reduction in safety margin; and "red" indicates a significant reduction in safety margin in the area measured.

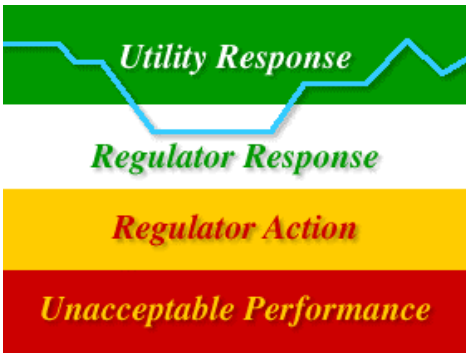

Figure 3- Threshold Bands

The PIs and inspection findings are used as assessment inputs to the Action Matrix. Every Spanish NPP has a temporary position in this matrix, which reflects the licensee's safety performance. The first level of the Action Matrix corresponds to the Licensee Response column, for plants with all the indicators in green and with only green findings (if any). The next four columns correspond to four levels of regulatory response increasing as plant performance declines. These four levels determine the appropriate level of agency response, including supplemental inspection and pertinent regulatory actions ranging from management meetings up to and including orders for plant shutdown. This approach to enforcement is intended to be predictable by linking regulatory actions to performance criteria.

Communication is one of the “revolutions” brought by SISC in the Spanish Regulatory framework. Although to met the goals of the SISC program its results would be public, it is still pending the definition of the different levels of information for utilities, stakeholders and public in general.

Figure 4 shows the complete view of the SISC process

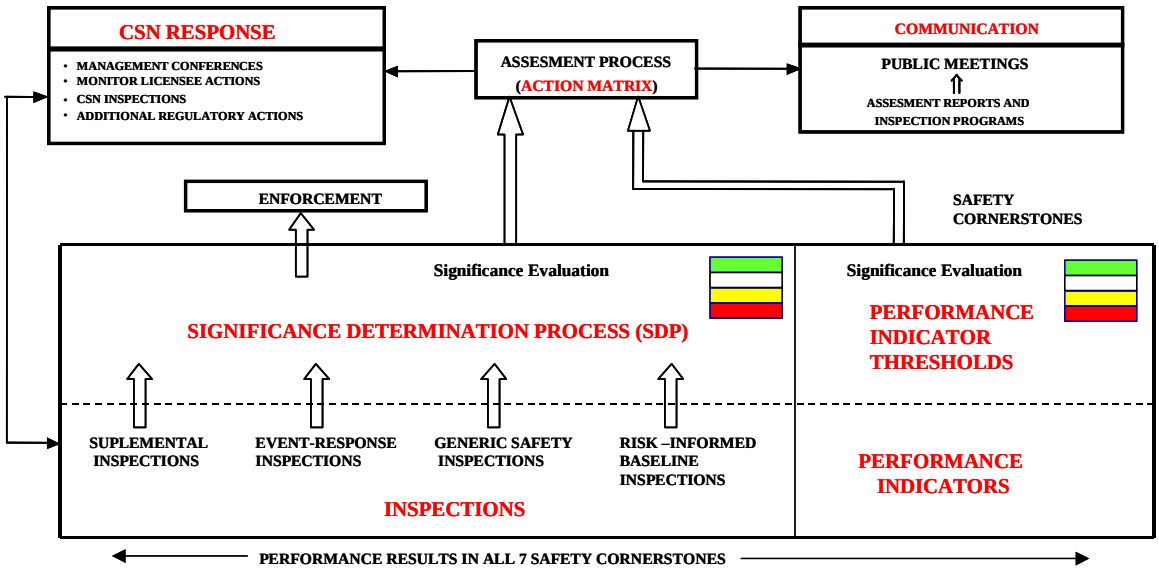

Figure 4-SISC Process

Radiation Safety Area

Relating the Radiation Safety area, the following elements corresponding to the two safety cornerstones (Occupational Radiation Safety and Public Radiation Safety) have been defined: performance indicators, inspection procedures, and significance determination process.

A very important task in the SISC project has been the definition of the performance indicators of the Radiation Safety area, which have been deeply analysed and widely discussed.

The indicator of the Occupational Radiation Safety cornerstone is defined as "Occupational Exposure Control Effectiveness". This indicator monitors the control of access to and work activities within radiologically-significant areas of the plant and occurrences involving degradation or failure of radiation safety barriers that result in readily-identifiable unintended dose. It is calculated as the sum of the following occurrences: Occurrences in Restricted Permanence areas, occurrences in Prohibited Access areas (non conformance with the radiological protection manual requirements in these two areas), and unintended exposure occurrences.

The indicator of the Public Radiation Safety cornerstone is defined as "Radioactive Effluent Control" and it is calculated as the sum of the following: Non compliance with the monthly dose restriction (10 μSv) and Uncontrolled Releases.

Relating the inspection procedures, SISC has introduced important changes in the procedures of the radiation safety area. Procedures pay a special attention to the inspection of the events introduced by the licensee into the Corrective Actions Program (CAP). Besides, there is a relevant role of the site inspectors, who develop a significant part of the baseline inspection.

The Occupational Radiation Safety cornerstone focuses the inspection efforts in four main aspects: ALARA, access control to radiation areas, instrumentation and radiation protection equipment and radiation safety training.

The Public Radiation Safety cornerstone focuses the inspection efforts in five main aspects: Liquid and gaseous effluents, Environment monitoring program (PVRA), radioactive waste control and management, clearance activities and transportation of radioactive materials.

The Significance Determination Process of the Occupational Radiation Safety cornerstone has four different areas of evaluation: ALARA findings, overexposure findings, potential overexposure findings and failures in the system of dose assessment. Red findings in this area are related with personnel overexposures which exceed 5 times the official effective dose limit.

The Significance Determination Process of the Public Radiation Safety cornerstone is divided in four different areas of evaluation: radioactive liquid and gaseous effluents, PVRA, potentially contaminated solid materials and radioactive transportation. In this area, different situations can reach the red classification: exceed the public dose limit due to effluent releases, or due to solid materials founded outside controlled area and not fulfilment of the radiation and contamination limits stated in the transport legislation (ADR) which affect significantly to the public.