OPERATIONAL RADIATION PROTECTION SELF-ASSESSMENT PROGRAM

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INTRODUCTION

An assessment is normally defined as a systematic review of the value or merit of a process, technology or program, with the purpose of finding its possible weaknesses or areas that need to be improved. A Radiation Protection (RP) Manager can implement a self-assessment program to review use of the RP operation procedures in order to identify those aspects of the use of these procedures that are not providing good application performance. The scope of this particular assessment program is not focused on individual RP technicians performance or use of the operation procedures. The assessment is focused on the results achieved through RP procedures implementation inside the Laguna Verde NPP controlled area.

The Laguna Verde NPP (LVNPP) Radiation Protection Operational Procedure self-assessment program [1] includes:

- A manual containing the scope of the program and detailed information about all performance indicators.
- An Access data base to store all the records obtained during each field inspection. Data base also generates reports to be used in discussions with RP field supervisors of each unit.
- An Excel spreadsheet to record and process observations on different time frame basis (per inspection, quarter, semester or year). The Excel spreadsheet program is also used to generate various graphs and to perform statistical analysis of the data
- Semi-annual and annual written reports.

DETERMINATION OF PERFORMANCE INDICATORS

There are different ways or criteria that can be used to select the performance indicators to be used in a RP procedure self-assessment. Performance indicators could be taken from international guidelines (WANO, IAEA, INPO), RP procedures, from weaknesses detected during inspections or from specific topics that the RP management selects to track or monitor.

This LVNPP RP self-assessment was based on the RP operations procedures used to establish, post and control radiologically controlled areas and to control work inside the restricted area. Sixteen (16) different topics were selected to be evaluated as part of the LVNPP self-assessment process and they will be called hereafter performance indicators

After selecting the performance indicators, it is very useful to prepare a written manual that includes a description of each indicator, along with examples of the application of the performance indicator and photos or other explanatory material that may be available or useful to the explanation of the performance indicator. It is also important to ensure that observers involved in the self-assessment process are well trained and qualified to perform field inspections required by the assessment process. Deviations from the self-assessment criteria will be called hereafter observations.

Below is an extract of the posting criteria contained in procedure PR-6452 "Radiation Area Setup and Control" [2]. Our experience shows that when very detailed criteria exist for the control of a process or in a procedure, the number of observed deviations increases.

Extract of procedure PR-6452:

- To attach postings (to solid surfaces such as doors or walls), use glue, silicon or similar substances, that have been approved for use by the chemical group.
- No patches, corrections, or hand writing or stickers of any kind or approved or allowed on postings.
- Posting at the entry of any room must always be located in a continuously visible position (such as on the wall next to the door), to that the sign is clearly visible even when the door is open.

Based on criteria contained in procedure PR-6452, below are some examples of deficiencies that could be found during field inspections:

Examples of potential deficiencies to PR-6452:

- Not enough postings for the area being controlled
- Too many posting for the area being controlled
- Posting located in a position that makes it difficult to see
- Contaminated areas posted as radiation areas
- Roped off radiologically controlled areas with no posting
- Non-standard postings used (postings must be uniform in size, colors and style)

DETERMINATION OF IMPORTANCE DEGREE (IDg)

Importance degree (or weighting factor) is a key parameter used to differentiate or weight the values of different observations based on the significance of the deficiency observed. For instance, the radiological risk is very different between finding a high radiation area open door compared to observing that there are too many posting. IDg´s were obtained or developed per procedure PAG-47 "LVNPP Activities Prioritization Methodology" [3], which contains numerical values and criteria related to nuclear, industrial and radiological safety. Table 1 shows some IDg values for some of the performance indicators of the PR self-assessment program.

Table 1
Examples of Performance Indicators and Importance Degrees

Performance Indicator	PERFORMANCE INDICATOR DESCRIPTION	Importance Degree (IDg)
1	Area Posting	26
2	Access layout to contaminated areas	18
3	Rad Ropes	15
5	Untagged bags	13
7	High Radiation Area Control	42
10	Portable survey instruments	23
12	Hot spot control	23
16	High Activity Materials stored inside Spent Fuel Pool	30

DATA COLLECTION AND RECORDS

All the information is collected in Access data bases and Excel spreadsheets in order to perform the statistical analysis and to generate reports. Figure 1 show the information contained in all the records of the data base. Each record contains a brief description of the observation, name of the person making the observation, data the observation was made a photo (if available), building, level and room where observation was made and the related performance indicator.

Figure 1
Example of a Self-assessment Data Base Record

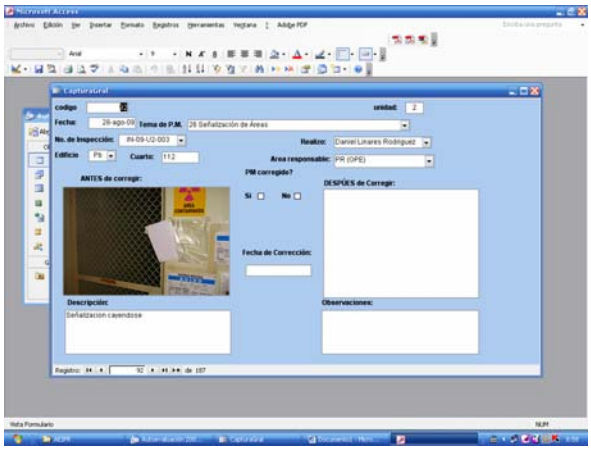
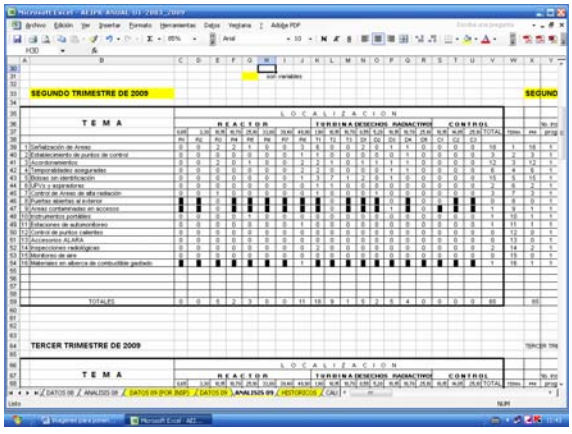


Figure 2 shows the Excel spreadsheet containing all the performance indicators and number of observations by building and level, which can be generated for any for specific time frame, such as per quarter or semester or per a single inspection. Black boxes represent elevations where it is not possible to have observations, for example, open doors to non restricted areas apply only to 10:15 elevation (ground level).

Figure 2
Example of a typical Self-assessment Spreadsheet



FEEDBACK TO RP UNIT SUPERVISORS

Another important aspect of the assessment program is providing immediate feedback to the RP Unit supervisor after observations are made to ensure that he/she identifies and takes expedited corrective

actions if appropriate/necessary. For this reason, the evaluator issues a report at the end of the inspection that is discussed with the RP Unit supervisor to validate the observations. Each inspection report includes a brief description of each observation, one photo, location, and pertaining details, an example is shown in figure 3.

Figure 3
Example of the Inspection Report Delivered to the RP Unit Supervisor

STATISTICS

Information from the periodic inspections is valuable because it allows the RP section to identify weaknesses, identify trends and identify areas for improvement in the RP operational program. For example, we can identify how many times (frequency of) the same types of deficiencies are observed, or determine what locations have more observations.

For the statistical analysis, the results are presented graphically either by inspection, or by any time frame of interest (quarter, semester or year). Examples of the options are:

- Frequency of observations by performance indicator. Figure 4a
- Frequency of observations by location. Figure 4b
- Rate of observations by performance indicator. Figure 4c
- Pareto Control Chart by performance indicator and importance degree (IDg). Figure 4D
- Historical trend of observations by performance indicator. Figure 4e

Pareto charts are very usefull to identify the most important areas for improvement because they identify which indicators contain 80 % of the total observations (dotted red line in figure 4.d).

Observations Rate is an normalization value used to compare indicators that have different frecuency of field inspections in a period of time, The rate is obtained as the total number of observation divided by the number of inspections for any given indicator.

Figure 4a
Frequency of Observations per Indicator

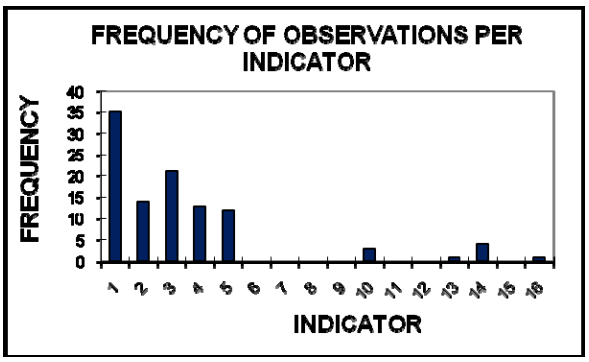


Figure 4b
Frequency of Observations per Location

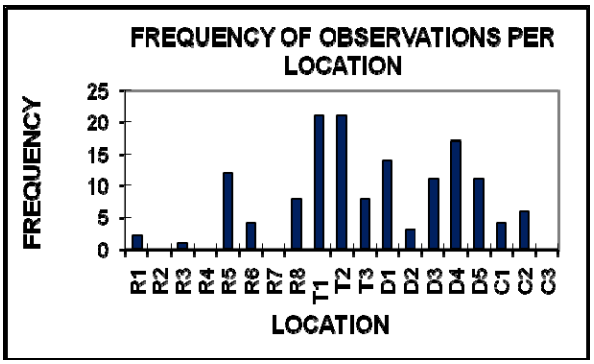


Figure 4c
Observations Rate by Indicator

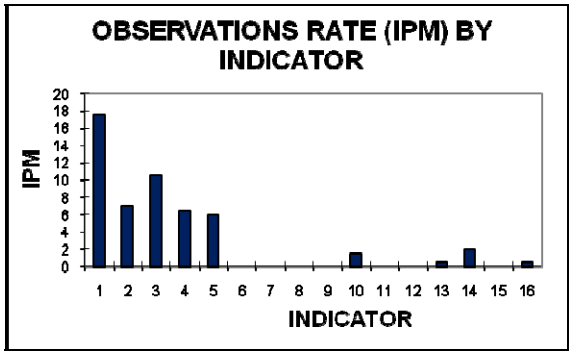


Figure 4d
Pareto Control Chart by Indicator Based on Importance Degree

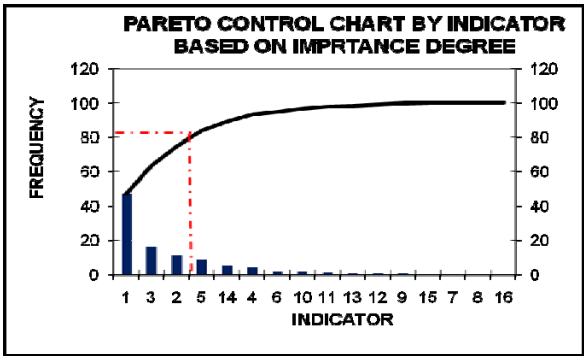
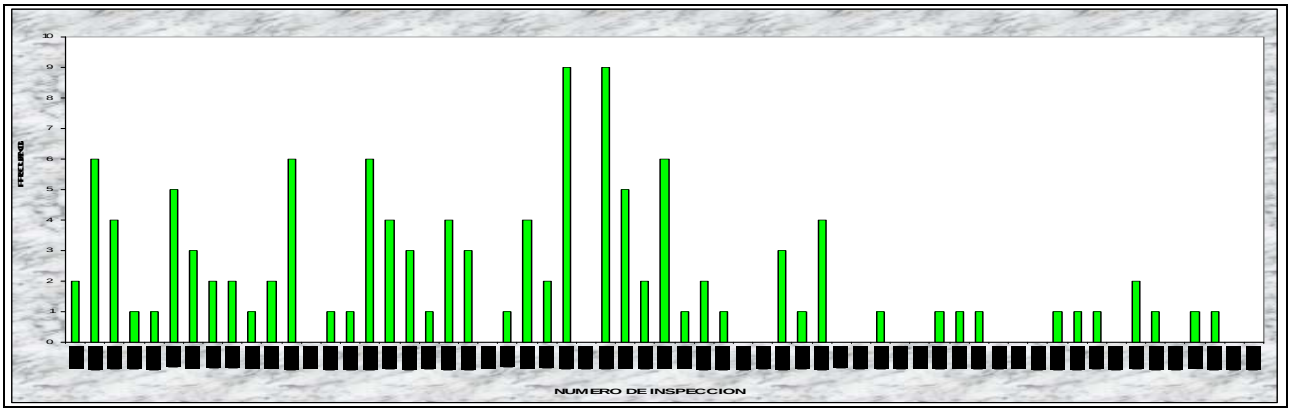


Figure 4e
Historical trend of observations for a Specific Performance Indicator



CONCLUSIONS

An assessment program is intended to improve the quality of the process being evaluated. The results will be as detailed as the criteria or concepts contained in the procedures or practices under evaluation. This kind of evaluation program has been in use at Laguna Verde NPP since 2004. In addition to the quantitative data obtained through the use of the assessment program, RP supervisors and senior RP technicians have learned a lot during feedback meetings with the independent evaluators.

REFERENCES

1. Laguna Verde NPP Radiation Protection Self-assessment program.

2. Technical Procedure LV-PR-6452 “Radiation Areas Setup and Control” rev. 14

3. Administrative Procedure LV- PAG-47 “LVNPP Activities Prioritization Methodology” rev. 1