

# **“Development of an ALARA Assessment Methodology for Power Reactors”**

**Paul D. Saunders  
CENTEC XXI**

## **Background**

Over the past decade utilities have made significant progress towards reducing personnel exposure to levels that are As Low As Reasonably Achievable (ALARA). As a result of this success, utilities are now asking the extent to which the ALARA concept should be pursued (e.g., what is the definition of “reasonable”?) Also, as the industry matures, plant practices and process changes may be implemented external to the ALARA organization. The intent and/or implementation of these plant changes typically results in a positive affect on the applicable program, but such changes may adversely affect the station’s ALARA goals.

The success of ALARA programs is highly dependent on the program’s structure, management and implementation. The programs are heavily impacted by ALARA recommendations, and/or process and plant modifications driven by organizations external to the ALARA Program. Careful analysis of the impact of recommendations and changes, as well as a program’s long-term implementation and consistency, should enhance the ability of program managers to achieve and maintain a successful ALARA Program.

## **Objectives**

The primary goal of this project was to develop a standardized tool and methodology for Health Physics professionals for use when evaluating an ALARA program’s current level of success (self-assessment). The tool was also designed to evaluate the “reasonableness” of recommended ALARA program modifications and the affect of plant process changes.

## **The Approach**

The first phase, development of the evaluation/assessment tool, was initiated in mid-1998 and completed later that year. In conjunction with the New York Power Authority's Indian Point Unit 3 station, a team comprised of EPRI and utility ALARA experts, as well as technical consultants, evaluated several successful ALARA programs. In excess of 300 documents related to utility ALARA program management were reviewed. From that site work and document review, fifteen modules addressing specific program areas were developed. Those modules contain over 500 program assessment criteria. This tool was also designed to assist evaluating the "reasonableness" of recommended program revisions and the impact of plant process changes on the ALARA program.

## **What's a Module?**

It is one of fifteen components of the assessment methodology. Each module contains a detailed set of criteria specific to a primary element of, or organization impacting, a plant's ALARA program. Each assessment module contains sub-topics with assessment criteria that are directly related to that aspect of, or organization's role in, the ALARA program. The modules and criteria are organized in a spreadsheet-based format that can be used to query data and compile assessment results. The following is an example of a module's hierarchy:

**Module Title:** Planning and Work Control

**Sub-topic:** Scheduling – common work areas

**Criteria:** Are controls and services used for several tasks (contamination control areas re-used for several jobs; temporary shielding, same scaffolding used for several tasks, etc.)?

## **What Are the Modules?**

1. Regulation
2. Industry Organization
3. ALARA Program Administration
4. ALARA Program Implementation
5. Planning and Work Control
6. Engineering
7. Work Practices
8. Health Physics Program Management
9. Chemistry Management and Source Controls
10. Radwaste Program Management
11. Operations
12. Maintenance & Instrumentation and Controls
13. Decontamination
14. Specific Maintenance and Evolutions
15. Technology

## **Testing the Methodology**

The second phase included beta testing the “tool” by performing a detailed program assessment at a site using the ~500 assessment criteria developed in the first phase. The highly successful Indian Point Unit 3 ALARA program was used for the beta assessment. The results of this project, and the Indian Point 3 assessment are contained in the EPRI report “Optimized Site-Specific ALARA Assessments: PWR Methodology Development”, report TR-113362, July 1999.

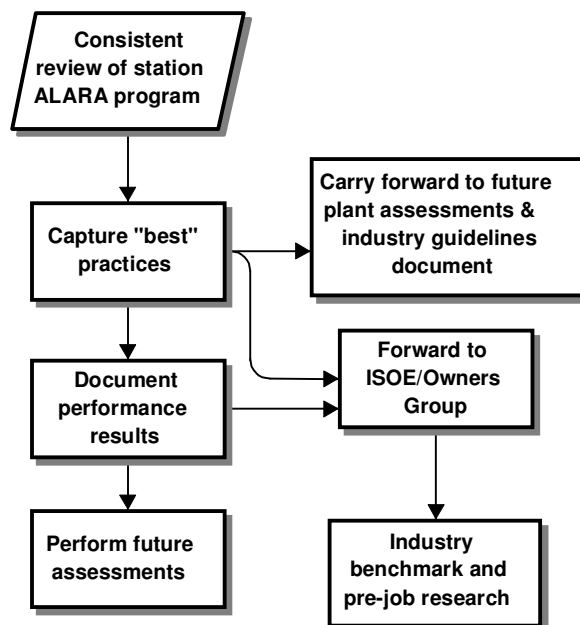
## **The Benefits**

The primary benefits of this approach include:

- ◆ assistance in ensuring regulatory compliance,
- ◆ recommendations for improvement,
- ◆ accurate, and consistent, industry benchmarking,
- ◆ a logical approach for evaluating program input for applicability,
- ◆ continued reductions in personnel exposure, and
- ◆ aid in defining “reasonable” program resource commitments and costs.

One of the most significant benefits of this process is the review of utility information using a standardized process by a core group of individuals. This approach provides a mechanism for carrying experiences forward to other stations. Additionally, consistent reviews should help to alleviate personal exposure benchmarking concerns, such as when

an individual station's results are negatively affected by their physical arrangement and/or organizational structure. This data collection effort can, and should, be structured to support a direct link to the existing ISOE and PWR/BWR Owner's Group's databases. There is no interest or need to develop "another" stand-alone database.



### **Industry Implementation**

EPRI's Low Level Waste Management Program has very successfully performed liquid and solid radwaste assessments. Those program analyses have identified and provided guidance for plant radwaste program improvements, resulting in millions of dollars in tangible savings for utilities. While it is clear that ALARA/exposure improvements will not result in significant "utility bucks" savings, the overall program improvement attained with the LLW assessments can be duplicated using this ALARA assessment methodology.

Since the beta testing at IP-3, three individuals with a combined total of >70 years of power plant Health Physics experience, performed a complete program assessment at the Calvert Cliffs Nuclear Power Plant.

### **The Future**

A number of other US utilities and the Ontario Power Generation group have approached EPRI expressing interest in having assessments performed in 2000. Additionally, a BWR assessment module is being developed in 2000.

The current plan is for this assessment methodology and experience to evolve into industry ALARA guidelines. Those would be developed using a methodology similar to EPRI's very successful solid and liquid radwaste guidelines documents. Industry Health Physics professionals attend several meetings over a period of one to two years, review experience from the ALARA assessments performed-to-date, and draft the guidelines document based on that and other information.