

EPRI Project Titled “Strategies for Managing Liquid Effluents – Options, Actions & Results”

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Project Overview

There are a variety of factors that can impact the quality and effectiveness of an effluent management program. Developing a strategy to balance the effects of mixed fission products, activation products, tritium, gases, on and off-site dose, liquid volumes and unprocessed liquid waste streams can present a severe challenge to utility program managers. Additionally, across the industry station goals related to liquid effluent activity, on and off site exposure, and liquid release volume continue to be lowered. Conversely, the costs associated with processing liquid radwaste and disposing of the resultant solid waste continues to rise.

A team of ~20 utility and other industry experts from the liquid radioactive waste (LRW) processing, liquid and solid effluents, and chemistry disciplines have been assembled and are developing a document for evaluating a station’s LRW effluents strategies.

Objective

The primary objective of this project is to develop a tool that can be used to review and analyze a plant’s liquid effluents strategy. It can also be used to evaluate a proposed revision to an existing program to ensure that once implemented, the change(s) is successful.

The intention is to provide sensible guidance relative to long-term liquid effluents program success without prescribing a single path to attaining that end. It is designed for use by both domestic and international BWR and PWR reactors.

This presentation contains a project overview, program review methodology content logic, and the current status of this important utility project.

Content Logic

The document content targets effluents program managers, but it also contains effluents guidance directed specifically at senior station management. The senior management brief targets a holistic approach to managing effluents, focusing on the careful evaluation and coordination of all aspects of a liquid effluents program including the following factors:

- Regulatory compliance,
- Environmental responsibility,
- Cost,
- Liquid effluent quality,
- Airborne effluents,
- Solid waste effluents,
- Dose to on-site personnel,
- Dose to offsite personnel,
- Regional environmental policies,
- Reactor design and location,
- Legal and financial liability, and
- Political liability.

The actual effluents program review process is divided into 3 phases and 30 distinct steps that guide the user through a process of queries and relevant information. The primary steps in the review process – without details contained in the actual document - are as follows:

Phase I – Current Performance Review

- 1) Draft a program review statement - why is this evaluation being performed?
- 2) Assemble a multi-discipline site team.
- 3) Assemble or locate the required documentation.
- 4) Define current plant-specific processing/treatment practices and installed options.
- 5) Define current effluent goals.
- 6) Identify current & historical plant-specific performance values for effluents processing/treatment.
- 7) Benchmark current industry effluents performance.

- 8) Define plant-specific sources of batch processing liquid effluents.
- 9) Define plant-specific sources of other release liquid effluents.
- 10) Model liquid effluent environmental dispersion.
- 11) Define plant system chemical applications (corrosion & pH control, etc.).
- 12) Review pending changes to plant system chemical applications.
- 13) Identify pending changes to plant operating strategies and integrate their impact into the evaluation.
- 14) Identify and review the status of source-term reduction initiatives.
- 15) Review the EPRI Radioactive Liquid Processing Guidelines and Radwaste Desk Reference documents for applicable information.
- 16) Perform a baseline economic analysis.
- 17) Define target performance and cost goal(s) of the strategy review.
- 18) Review alternate or advanced processing options relative to goals and restrictions.

Phase II – Strategy Definition & Evaluation

- 19) Validate existing, or define a proposed strategy
- 20) Evaluate a proposed strategy's compatibility and its impact.
- 21) Review that proposal's impact on insurance premium and liability position.
- 22) Review the potential impact on all reporting requirements.
- 23) Perform a second economic analysis that includes projections for the proposed strategy.
- 24) Develop a comparison matrix; current values versus projections for proposed strategy (goals).
- 25) Review the initial program review statement relative to that comparison matrix – modify the statement, goals or strategy as necessary.
- 26) Present proposed strategy to Senior management.
- 27) Document and archive the final decision and its basis.

Phase III – Post Implementation Validation

- 28) Perform a third economic analysis that includes post implementation results.
- 29) Add the post implementation performance to the previously developed comparison matrix.
- 30) Validate the decision and results following implementation

A technology compatibility checklist was also developed as part of this project. It is captured as an appendix to the document and is intended to prompt review and/or evaluation of issues to ensure that a selected liquid processing technology is compatible with a host of considerations including plant equipment, waste streams, and effluent program strategies.

Following completion of the review and improvement implementation process, it is equally important to validate that the analysis, decisions, and implementation result in a coordinated effluents strategy in line with target goals. The document contains a table that allows the user to input the program attributes that should be reviewed as part of that validation. The table includes the program element, current value or result, proposed strategy projected value and the post implementation value. It addresses program elements such as released activity, airborne activity, solid waste data, liability impact and others.

Finally, the document contains additional, relevant information to enhance the overall strategy review process. Overviews of available processing technologies and insurance liability and premium considerations are included as appendices, in addition to reference documents and technical support contact information.

Benefits

This tool will help utilities structure a balanced effluents program; developing liquid strategies that are carefully coordinated with the site's airborne and solid effluents programs and goals. Additionally, using this tool and implementing resultant strategies very clearly indicates that the station is aggressively pursuing improvements to, or maintenance of, long term environmental stewardship, regulatory compliance and cost efficiency. Finally, the use of this document in conjunction with a multi-discipline team will serve to heighten the awareness of the plant staff regarding their impact on the liquid effluents program.

Status

The task force has conducted two of three meetings as part of the development process. The document continues to be reviewed and fine-tuned. The third and final meeting is being conducted immediately following this meeting and the final document review will be accomplished via the internet. The committee's report is slated for delivery to EPRI in the fall of this year to accommodate an end-of-year industry publication date.

Finally as this project evolved, it became clear that many of the attributes of the final product such as checklists, tables and cost analyses were well suited for conversion to a simple analysis program. This would allow users to enter site-specific parameters and generate data useful for determining the optimal site effluents management strategy. This extent and usefulness of this option continues to be evaluated by the committee and EPRI.