# Curie Reduction on Liquid Effluent Releases At various Power Plants Utilizing Membrane and Media Technology

## ABSTRACT

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This paper will present how Boiling Water Reactors (BWR) and Pressurized Water Reactor (PWR) Nuclear Power Plants have successfully reduced their liquid curie discharges through the effective use of membrane based and media based liquid waste processing systems. Effluent results, from several Nuclear Power Plants in the United States, using membrane and media based technologies will be presented and discussed. Data collected and illustrated in this presentation represents the processing results of over 940 million gallons of liquid waste. The membrane data has been collected from (4) BWRS, which include Nine Mile 1, Nine Mile 2, Pilgrim Station and Browns Ferry. The first, which was Nine Mile 1, began processing liquid waste utilizing membrane technology in 1995. The media processing data has been collected from over eighteen (18) PWRs located in the United States beginning in 1971.

Boiling Water Reactors (BWRs) and Pressurized Water Reactors (PWRs) primary processing goals will be discussed. While PWRs goals include reducing the amount of curies discharged and secondary waste generation, BWRs also include the requirement to recycle and produce as much reactor-grade make-up water as possible. The presentation will demonstrate how membrane based technologies using reverse osmosis (RO) have allowed BWR's to meet their primary goals and achieve "zero" curie release status to the environment. Media based technologies using demineralization with chemical injection, have allowed PWR's to minimize their curies released to the environment and obtain "top quartile" performance ratings.

A brief description of the membrane and media based liquid waste processing technologies that are currently employed at nuclear power plants will be presented including typical equipment requirements and descriptions. As part of the technology descriptions, basic definitions of the types of contaminants that are encountered in liquid radwaste will be provided along with proven removal techniques.

A collection of empirical Nuclear Plant wastewater processing data such as gallons processed, water chemistry, influent curies and curies released will also be presented.

Information provided in this paper will specifically benefit two groups of nuclear facilities: (1) those operating under a zero or minimum liquid discharge scenario, and (2) those facilities that require less than minimum detectable activity (<MDA) concentrations of gamma emitting isotopes in the water discharged to the environment.