RADWASTE EFFLUENT TRENDS IN U.S. NUCLEAR POWER PLANTS

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ABSTRACT

Radwaste managers at nuclear facilities are often faced with the challenge of "doing more with less". The industry is faced with increasing economic and workforce challenges that forces stations to look outside their facility for innovative radwaste management. Benchmarking of peer facilities becomes an important method of gauging the success of a radwaste program and helps to identify areas for improvement. Therefore, the industry in collaboration with EPRI developed a software benchmarking tool called RadBench Web that was designed to capture and disseminate key radwaste performance parameters. Some of these performance parameters include the following: solid dry and wet waste generation, cubic feet of solid waste disposed, total volume of liquid processed by radwaste system, and influent characteristics of radwaste stream. In general liquid effluents continue to show a decreasing trend from 1993 to 2003 for U.S. PWRs. However, an increasing trend for the past two years have been observed in BWRs. Additional trends from this benchmarking program will be addressed in this paper.

INTRODUCTION

Radwaste managers at nuclear facilities are often faced with the challenge of "doing more with less". The industry is driven by increasing economic and workforce challenges that force stations to look outside their facility for innovative radwaste management tools. Benchmarking of peer facilities becomes an important method of gauging the success of a radwaste program and helps to identify areas for improvement. Therefore, the industry in collaboration with EPRI developed a software benchmarking tool called RadBench Web that was designed to capture and disseminate key radwaste performance parameters. Some of these performance parameters include the following: solid dry and wet waste generation, cubic feet of solid waste disposed, total volume of liquid processed by radwaste system, and influent characteristics of radwaste stream. Using RadBench Web, key trends important in assessing the performance of a radwaste program are developed and discussed in this paper.

Trends in Liquid Effluents

Figure 1 and Figure 2 below represent yearly averages of liquid effluents released from 1993-2003 for both U.S. PWRs and BWRs, respectively. The data was reported by each U.S. station on an annual basis for compliance with 10 CFR 50 and collated by the North American Technical Center (NATC). Liquid effluent activity releases continue to decrease for PWRs. The average activity released in 2003 was 0.061 Ci, representing an approximate 35% decrease from the previous year. However, average liquid mixed fission activity released by BWRs has surprisingly increased for the second year in a row. In 2003, the average liquid activity released was 0.137 Ci, representing a significant increase from the previous year. The value in 2003 is

similar to the average release in 1997. This trend is most likely driven by political and regulatory factors.

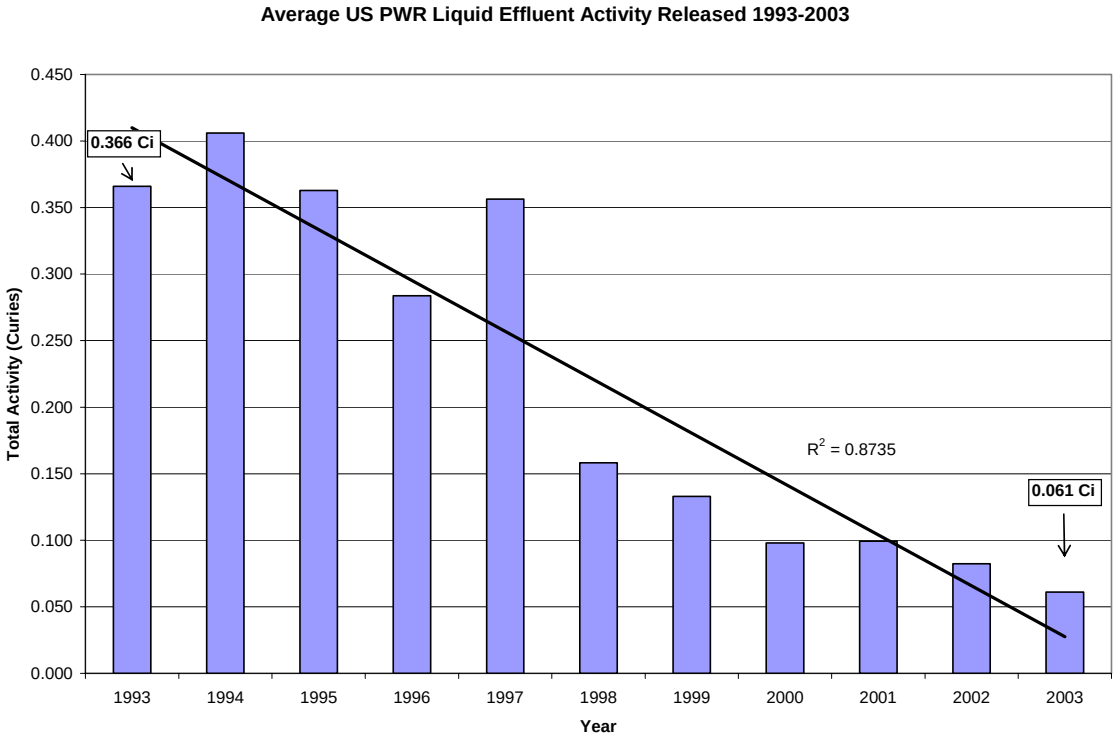

Fig. 1. Average U.S. PWR liquid effluent activity released 1993-2003

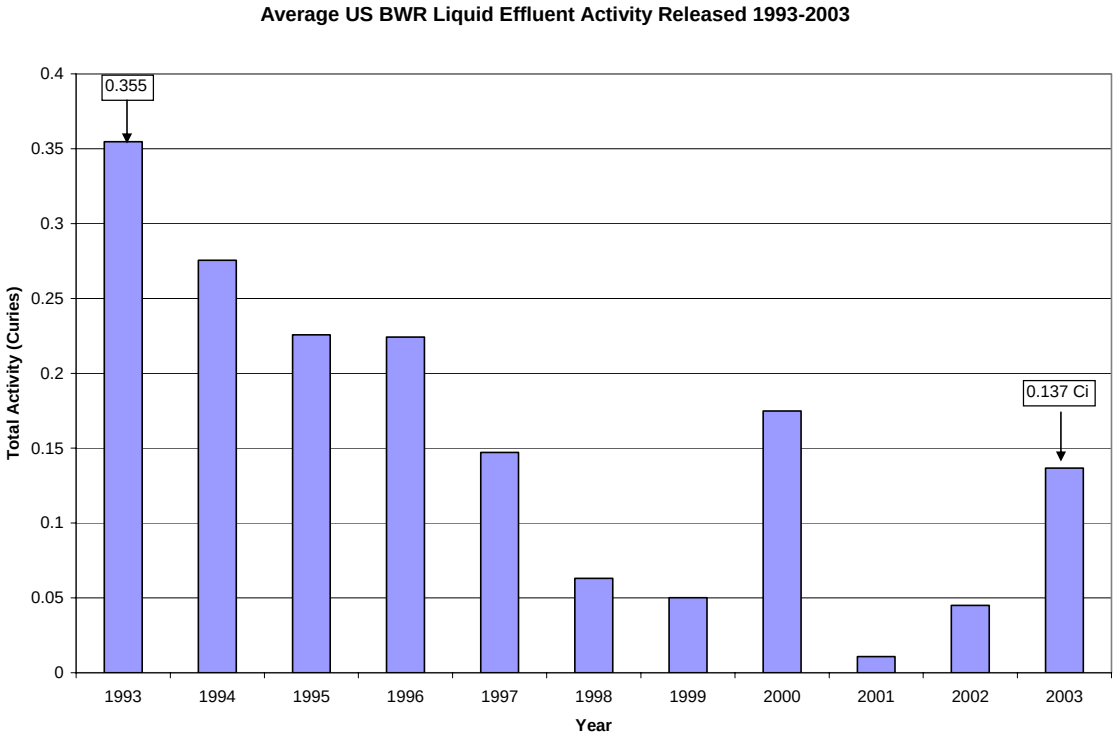

Fig. 2. Average U.S. BWR liquid effluent activity released 1993-2003

Trends in Total Volume of Liquid Radioactive Waste Processed

Figure 3 below shows the distribution of "First Pass" waste processed in 2003 for 28 U.S. PWRs. The average volume processed is approximately 687,500 gallons. "First Pass" waste processed includes the generated high quality, high activity waste (i.e. equipment drains), low quality, low activity waste (i.e. floor drains), and miscellaneous or special project waste that is processed through the liquid radioactive waste (LRW) systems. The average for 2003 is similar to the averages from the previous two years.

Figure 4 displays the distribution of "First Pass" waste processed in 2003 for 17 U.S. BWR stations. On average, 9,000,000 gallons of radioactive waste from a BWR was processed through the LRW system in 2003. This average is consistent with the averages from the previous two years.

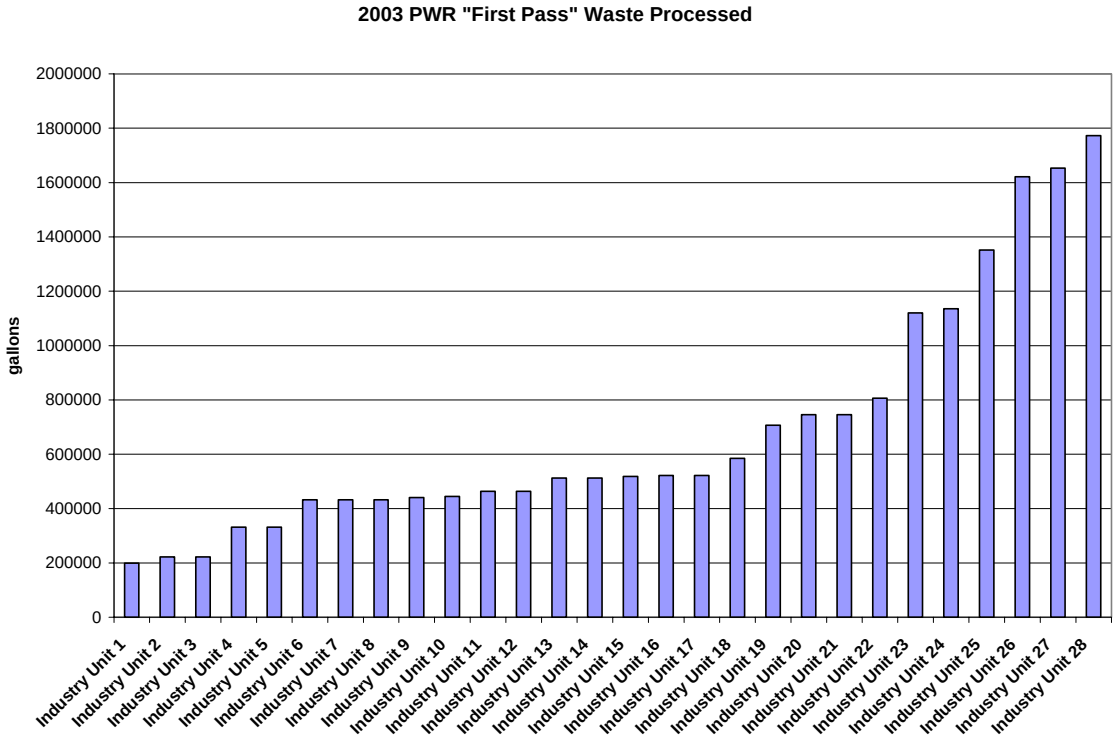

Fig. 3. 2003 PWR "First Pass" waste processed

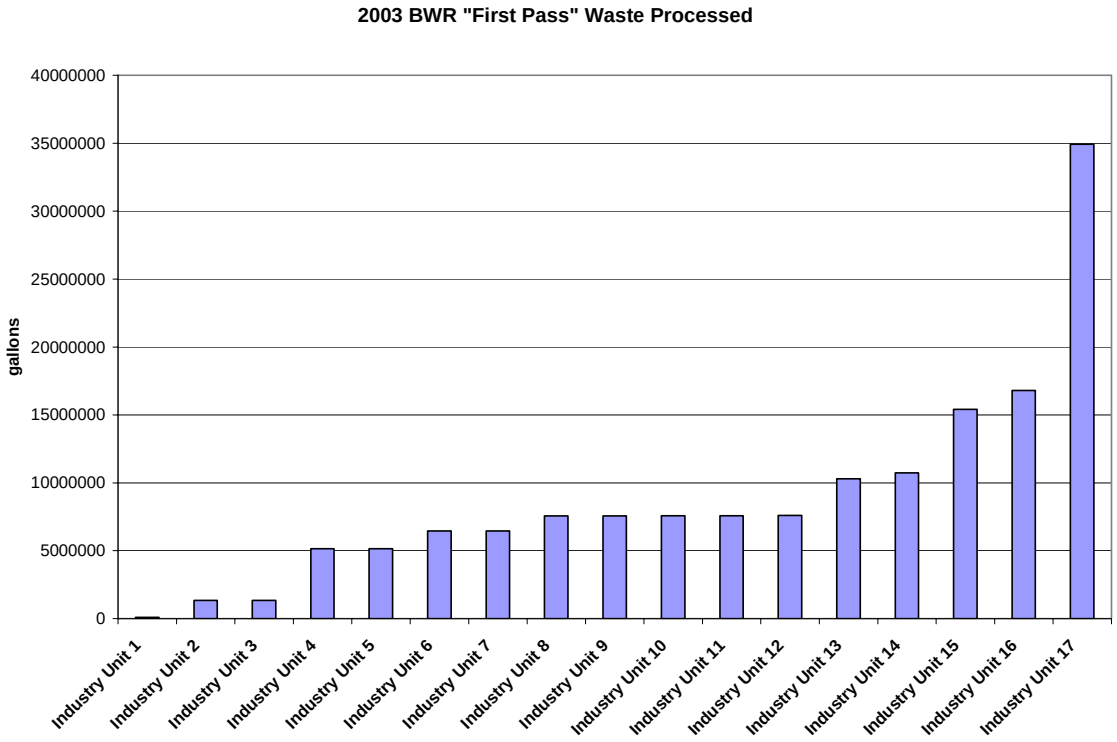

Fig. 4. 2003 BWR "First Pass" waste processed

Trends in Total Generation of Wet Solid Waste

Figure 5 below shows the distribution of the generated total wet solid waste from 31 U.S. PWR stations in 2003. This total includes the net generated waste from Class A filter cartridges, Class A bead resin, Class A powdered resin, Class B/C filter cartridges, Class B/C/ bead resin, Class B/C powdered resin, carbon, and other miscellaneous wet solid waste. The average total generation in 2003 was 456 ft3, which represents less than half the amount in 2002.

Figure 6 shows the distribution of the 2003 generated total wet solid waste from 17 U.S. BWR stations. Industry Unit 17 reported a much greater amount of wet waste than the other stations. This data is questionable and a request has been made to the station to obtain additional information and clarification. In the meantime, data from that station will not be included in the calculated average. The calculated average (excluding Unit 17) for 2003 was 2,300 ft3 of waste, which is similar to the average from 2002.

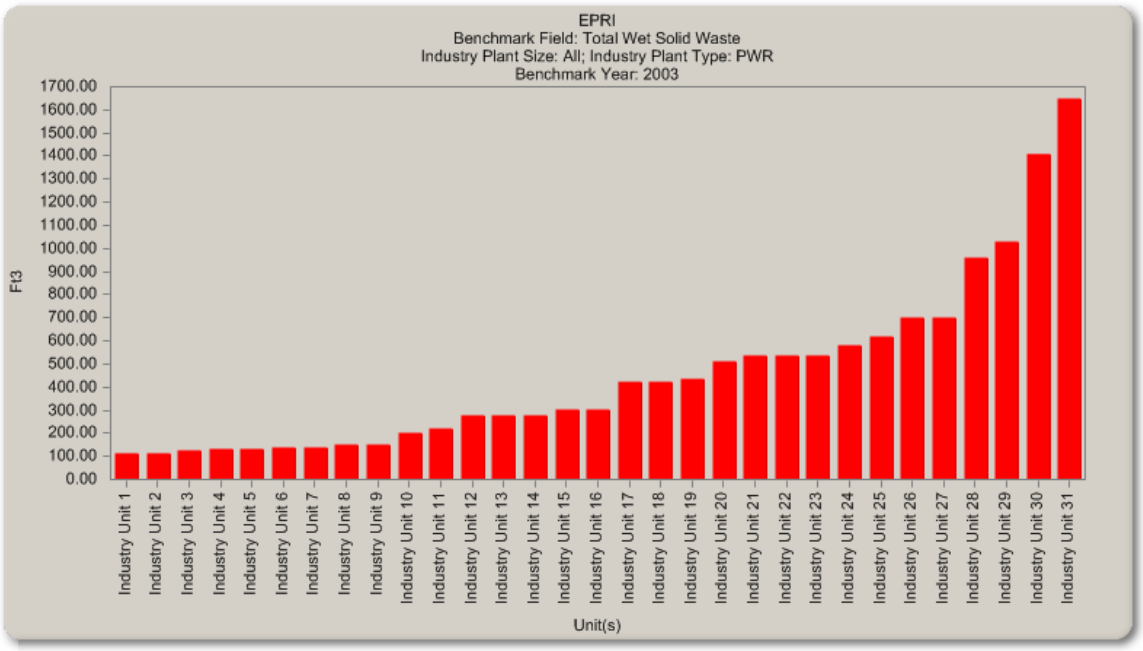

Fig. 5. U.S. PWR total wet solid waste generated in 2003

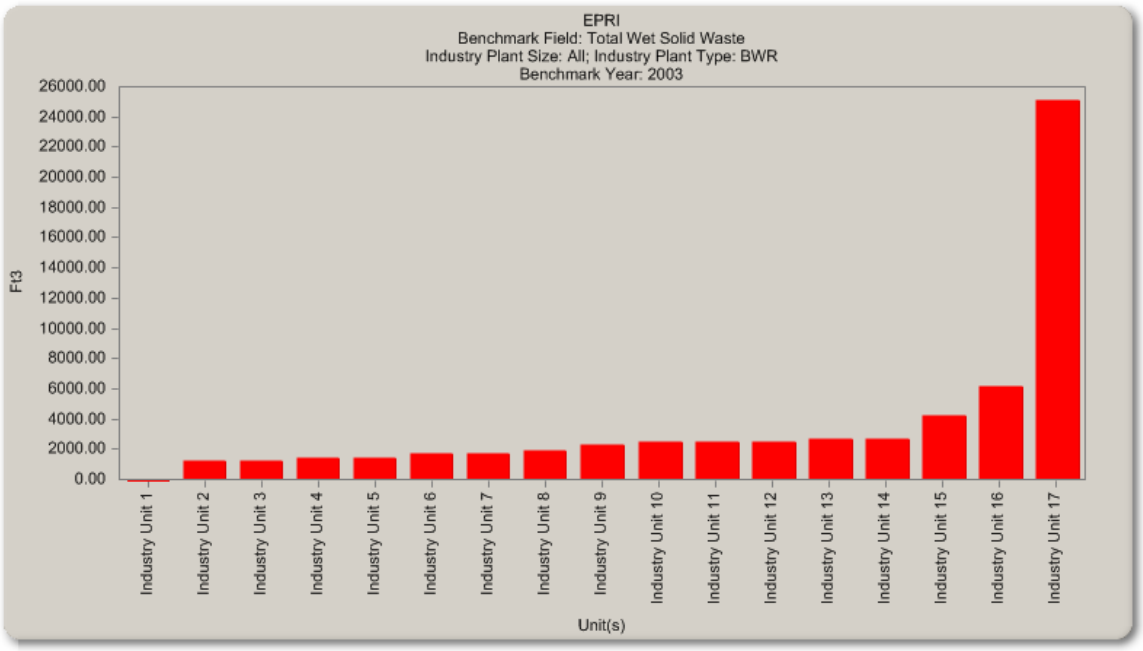

Fig. 6. U.S. BWR total wet solid waste generated in 2003

CONCLUSION

The EPRI RadBench Web application was instrumental in collecting key data parameters for tracking radwaste program performance and in generating the main trends seen in this paper. In reviewing the data, a downward trend continues to be observed for PWR effluents. However, for the past two years, effluent trends in BWRs have been increasing. All stations are well within any regulatory limit; however this increase in BWR effluents raises some concern. The total volume of liquid radioactive waste processed in 2003 for both PWRs and BWRs were consistent with the volume processed in previous years. A significant decrease is seen in the total volume of generated wet solid waste from PWRs. Regulatory and disposal concerns may be the driving factors for reducing the amount of generated wet solid waste. However, the total volume of generated wet solid waste from BWRs remains consistent with the volume generated in the previous year.

As the radwaste facilities in U.S. nuclear power plants continue to face increasing economic and workforce challenges, benchmarking of peer facilities becomes an important method of gauging the success of a radwaste program and helps to identify areas for improvement.