VOLUME REDUCTION OF FILTER MEDIA AT SUSQUEHANNA STEAM AND ELECTRIC STATION

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ABSTRACT

This paper describes the joint efforts between Pennsylvania Power & Light (PP&L) and Scientific Ecology Group, Inc. (SEG) to reduce the volume of waste shipped to the burial site by the Susquehanna Steam and Electric Station (SSES) and the resulting savings realized as a result. The filter media used at SSES for its radwaste filters is composed of a mix of anion and cation powered resins, powered carbon, diatomaceous earth and a fibrous overlay. Due to the nature of this waste stream, dewatering was difficult using systems previously available in the industry. Thus, processing was accomplished by decanting (to concentrate the waste) and solidification. In the continuing effort to dewater wastes of this nature, SEG developed a new fabric filter dewatering system (RDU). To investigate its potential use in large containers, this dewatering system was installed in drum-size high integrity containers and used to test its dewatering capabilities on actual SSES waste. Promising results from these tests warranted a full-scale test. This proved successful and implementation of this processing scheme was immediate. Cost savings were substantial in transportation, burial and processing costs as well as personnel exposure. Also, additional waste volume reduction was found due to the volume reduction capability of the dewatering system (equivalent volume of new filter media approximately 1.2 times that of dewatered product volume).

Additional savings resulted from SSES's continuing effort to minimize radwaste generation. Combined, these have reduced the number of shipments of filter media in 1989 to sixty percent of the number made in 1988 and have reduced costs by approximately fifty percent.

INTRODUCTION

Among the wastes generated at the Susquehanna Steam and Electric Station (SSES) is a filter media from the radwaste filters which process liquid wastes. These wastes include floor drain wastes, spent resin tank decant liquids and ultrasonic resin cleaner wastes. The filter media is composed of a mix of anion and cation powdered resins, powdered carbon, diatomaceous earth and a fibrous overlay. Filters are changed out usually when a high pressure drop occurs across the filter, indicating that the fine particulates in the waste stream are "blinding" the filtering capabilities of the filter media. The result is a filter media waste stream which is difficult to dewater using systems previously available in the industry.

Since dewatering was the preferred method of processing due to its more efficient waste-to-burial volume ratio, various dewatering methods were employed. These were found to be costly due to extensive amount of time required to sufficiently dewater the waste to meet applicable regulations and burial site criteria.

Thus, decanting to concentrate the waste and solidifying became the processing method used. Although this method was as efficient as possible for a solidification process, a dewatering process was still more efficient and desired.

TESTING OF NEW DEWATERING SYSTEM

In the continuing effort to dewater this waste and others of a similar hard-to-dewater nature, SEG developed a new fabric filter dewatering system which offered a larger filter surface area-to-waste volume ratio, along with several other promising characteristics. This dewatering system was installed in drum-size (7 cubic feet) high integrity containers (HIC) for testing at SSES using actual waste. Each dewatering system was fitted with a verification system to detect any evidence of free liquid following dewatering.

A series of dewaterings were performed utilizing several of these small HIC's. The testing showed excellent dewatering flow rates with virtually no drainable liquid evidenced using the verification system. Visual inspection verified the waste to be a "dry cake" with no evidence of free liquid. (It should be noted that core sampling of the dewatered waste was not performed due to radiological concerns). These results were promising enough to warrant performance of the dewatering on a larger scale.

Use of a full-size HIC (179 cubic feet) was the final step in the testing process. This container was equipped with a scaled-up version of the dewatering and verification systems described previously. Again, this system proved successful in providing good dewatering flow rates, negligible drainable liquid and a dewatered product which exceeds all applicable shipping and burial site criteria. Thus, dewatering in this size container replaced solidification for processing filter media at SSES.

SAVINGS

The immediate savings realized by the switch to dewatering were quite substantial. The waste-to-burial volume ratio increase by as much as fifty percent. The comparison in waste volumes buried, number of containers shipped and actual volumes buried (container volumes) are shown in Figs. 1, 2 and 3. The data shown as 1988 is for solidification and 1989 is for dewatering. There was also a less evident savings found in the volume reduction (VR) gained from dewatering the filter media. This VR equates conservatively to at least a twenty percent increase in waste volume per container (i.e., 149 cubic feet dewatered waste equals at least 179 cubic feet of new filter media).

These savings are mirrored in the cost savings to PP&L. Table I show a sample comparison between burial costs for solidification versus dewatering filter media. Figure 4 graphically compares the cost per container and total costs for each processing method. Assuming the number of dewatering containers is half of the solidification containers and the HIC's require overpacking (which they normally do not since the waste is usually Class A), the burial cost savings are quite substantial. Transportation costs are also cut in half.

SSES has also concentrated on good "housekeeping" practices which have resulted longer filter runs on the radwaste filters (i.e., fewer filter change outs) and thus less filter media waste generated. This has reduced the waste volume requiring processing by approximately ten to fifteen percent.

Other indirect savings have been gained in reduced personnel exposure. Since the total number of containers was reduced significantly, the man-rem has also been reduced significantly.

SUMMARY AND CONCLUSIONS

As expected, the use of a dewatering system has resulted in substantial burial and transportation cost savings. However, additional savings were found due to the volume reduction capability of the dewatering system and reduced personnel exposure. Along with the conscientious effort by SSES to reduce radwaste generation, radwaste volumes and related costs have been cut by fifty percent.

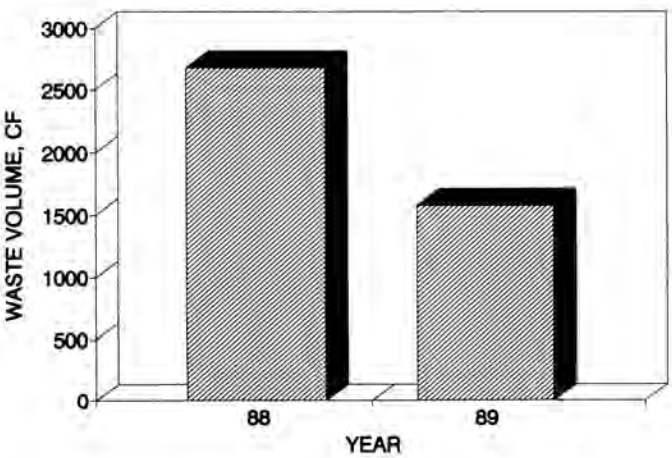

Fig. 1. Volume Generated Filter Media at SSES.

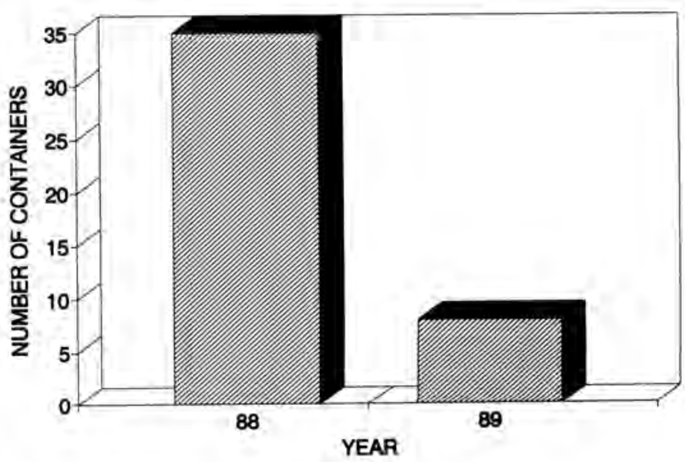

Fig. 2. Containers Shipped Filter Media At SSES.

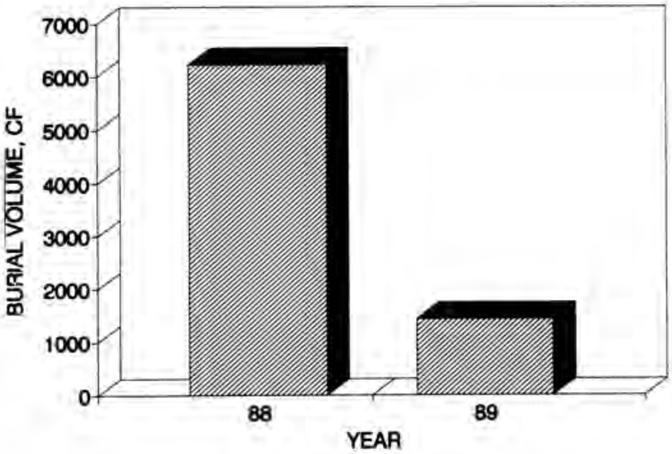

Fig. 3. Burial Volume Filter Media at SSES.

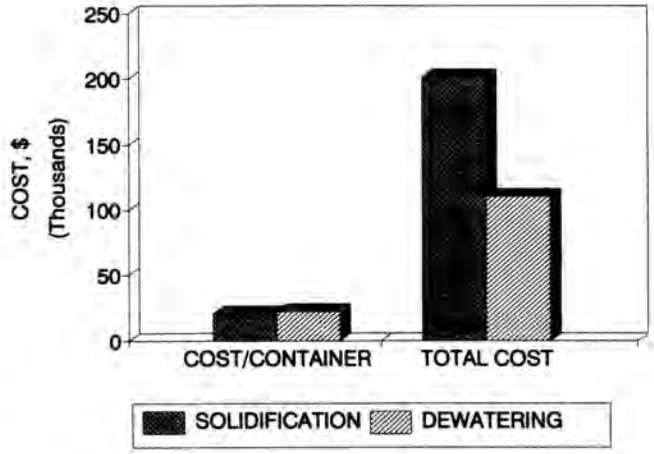

Fig. 4. Burial Cost Comparison Dewatering vs Solidification.

TABLE I
Comparison of Burial Costs for Dewatering Versus Solidification

	DEWATERING		SOLIDIFICATION
Container	HIC		Steel Liner
Burial Volume	178.9 CF		177.9 CF
Base Disposal Charge $38.71/CF	$6,925		$6,886
Weight Surcharge 5K-10K lbs. =	$ 800	10K-20K lbs. =	$1,125
Curie Surcharge 15-25 Curie =	$4,170	5-15 Curie =	$3,150
Cask Handling Fee =	$1,200	=	$4,990
Class B/C Poly HIC Surcharge[1] =	$4,990		N/A
Barnwell County Tax 2.4% =	$ 434	=	$ 388
Capacity Assurance Charge $20/CF =	$3,578 =	=	$3,558
	$22,097		$20,097
Number of Containers Buried	5		10
Cost	$110,485		
Savings	45%		$200,970

Footnotes: [1]If waste need not be overpacked (i.e., stabilized), this cost is eliminated.