DESIGN/OPERATING EXPERIENCE ON A UTILITY BOILER WASH TREATMENT SYSTEM

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Discussion by

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It might not appear at first that this paper has significance in the field of Solid Waste Processing, since it applies to cleaning wash water from cleaning the fireside surfaces of utility boilers burning gas and oil.

It is generally believed that systems which burn municipal solid waste (MSW) do not require treatment of boiler wash water, since this can be used to quench the ash and thus be discharged into the ash before the ash residues are trucked to landfill.

However, the wash water from boilers burning MSW when tested would probably fail the EPA toxicity test for heavy metals such as lead, cadmium and chromium if it were not discharged into the ash. Upon further thought, it might make the ash residue itself fail the test if too much was added in a short time.

With the controversy about the toxicity of ash residues, and local opposition trying to close WTE plants on the basis of the ash residues, or with high costs of ash disposal, it behooves us to look at alternatives such as described by the authors.

The system installed at PG&E at Contra Costa is fundamentally simple, although the prohibition of storing hazardous wastes on site forced the inconvenient use of portable storage containers rather than simple lagoons or tanks. It consists basically of pumps, tanks and a filter press. Clean water is discharged and filter cake is suitable for landfilling.

The authors have given details about the system design and operation which facilitate calculations of systems which could be used in WTE facilities, if economically justified.

For example, if the fly ash was washed, to remove soluble heavy metals, it could safely be used as a component of cement, but the leachate would have to be treated. It would need pH control and adjustment to force the metals to precipitate out.

Perhaps the authors would comment on this application of a system to treat quench tank water or fly ash leachate, and give some idea of how much it would cost to install and operate. Their comments indicate that ash is a useful additive in making the filter press work: in this case there would be plenty of ash. Also, systems with acid gas scrubbers would have excess lime available.

For instance, a 1000 TPH facility might have 1000 lb/hr of fly ash plus 1000 lb/hr of lime. The authors say that the press can remove about 20 cubic feet of cake at 50% moisture in 2.5–4.5 hr, say an average of 3.5 hr. If the dry ash is 50 lb/ft^3, the cake would represent 1000 lb. One press would handle about 300 lb/hr, and this plant would need three of this size filter. Perhaps the authors could suggest other methods of handling the ash.

Discussion by

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This paper describes the design and start-up experiences of the boiler chemical cleaning treatment facility at Pacific Gas and Electric Company's Contra Costa Power Plant. It is a unique treatment facility designed specifically to meet the requirement that no hazardous wastes would be "stored" or otherwise left on-site. The paper provides valuable information on system design concept development, interaction with regulatory agencies, and resolution of start-up problems.

Caustic injection for pH control is critical to the formation of metal hydroxides in the boiler chemical cleaning waste. Since the cleaning waste pH is less than two, injection of caustic to the waste is used to increase the pH value high enough so that metal hydroxides can be precipitated and removed by filter press. If pH is too low, the filter press filtrate will contain an excessive amount of metal ions which will not be able to meet the discharge limits. If pH is too high (greater than 8.5), the filtrate will not be able to discharge either, even if metal ion concentrations meet the discharge limits. Table 1 shows the pH value of a typical filter press filtrate is 7.5, which is rather low for the treatment process. Acid injection for filtrate pH adjustment may be required if it is too high to discharge. In Fig. 1 of the paper, it shows that caustic is injected in two places, one at transfer pump suction and the other near upstream of the discharge/recirc. pump. The paper does not provide any optimum pH values used in the treatment process, nor how is pH being controlled with respect to caustic feed.

With respect to after-use of the rental tanks, the paper does not discuss any procedures for inspecting, rinsing or cleansing of them prior to returning to the supplier. Could this be part of supplier's responsibility?

As to the waste spills from pumps, piping as well as equipment and rain water inside the bermed area, the paper does not address how these are being handled and treated.

The paper presents a simple but effective method for treating boiler chemical cleaning waste and provides design information for future installations.

Discussion by

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ABSTRACT

This paper describes the design and start-up experience of a hazardous waste treatment facility which renders boiler acid cleaning wastewaters nonhazardous. This facility was designed and constructed to remove the Pacific Gas and Electric Company Contra Costa Power Plant site from the hazardous waste storage site listing.

CONCLUSIONS

This is a very good paper in that it describes in detail the design, construction and startup phases of the boiler acid cleaning wastewater treatment facility. This enabled PG&E to comply with the EPA's request to remove the Contra Costa site from the list of hazardous waste storage sites.

The detail presented in this paper, which included regulatory, design and startup problems with solutions, is such that one could design a similar facility for another site with a relative degree of confidence. Presented are preliminary designs specifications and layouts, and typical boiler wastewater and processed water analyses. The latter includes the allowable concentration of heavy metals in processed waste water to make it nonhazardous.

A rather interesting aspect of this operation is the rental of temporary surge tanks, rather than the installation of permanent tanks which would have resulted in the site being classified as a hazardous waste permanent storage facility.

COMMENTS ON SUBJECT PAPER

This paper is organized in a logical manner. The legislative background pertaining to hazardous waste storage and disposal in California is presented. This is followed by a detailed statement of design problems including design options and constraints. These include options to rebuild the existing wastewater storage ponds to comply with EPA regulations or to eliminate the storage ponds and make the site nonhazardous. Typical water analyses prior to and after treatment are presented as are design specifications and layout.

In general, the organizations and scope of this presentation is relatively complete. The total approach could easily be applied to other projects with a high degree of confidence.