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# UPGRADING OF AMBATALE PULSATOR

BY

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## DECLARATION BY THE CANDIDATE

I declare that the work included in this dissertation in part or whole has not been previously presented for any other academic qualification at any institution for a higher degree.



**Eng. Anoja Sriyani Kaluarachchi**

**October 2006**



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## ABSTRACT

The major drinking water treatment plant in Sri Lanka, the **Ambatale Water Treatment Plant (WTP)** is located on the south bank of the **Kelani Ganga** at **E 79° 56' N 6° 55'**. The Ambatale WTP was constructed in the early 1960s, and produces nearly 90% of total drinking water supply to the Colombo district. The treatment plant was expanded and rehabilitated on four occasions, and brought up to its present capacity of 117 mgd in 2003.

The raw water for all the clarifiers at Ambatale WTP is from the same source, the Kelani Ganga,

The deterioration or ageing of the plant and the operational inconsistencies lower the quality and quantity of water produced at a WTP; if not upgraded regularly.

Increasing the capacity and the efficiency of the Ambatale WTP are necessary due to the increase in domestic and industrial water demands in Colombo.

Increasing the capacity by upgrading the existing treatment units at Ambatale rather than building new ones could reach the goal of production of more drinking water. It saves the capital cost. Furthermore, in case of limited funds, upgrading the existing facilities in an optimal way by improving efficiency is more advantageous.

There are three pulsed sludge blanket clarifiers at Ambatale; a Pulsator (1979), a Superpulsator (1992) and a Pulsatube (2003). These Pulsator clarifiers are using a sludge blanket process combined with pulsed flow and providing combined flocculation & clarification in one vessel. The configurations of above the above three types of clarifiers are almost similar to each other. Therefore conversion of a Pulsator into a Pulsatube clarifier or Superpulsator clarifier could be done by a simple modification to the structure.

The objective of this research is to study the possible options of rehabilitating the Ambatale Pulsator (1979) and identify the best possible rehabilitating option.

A detailed study was undertaken on clarified water quality produced from the Pulsator, Pulsatube and Superpulsator clarifiers at Ambatale, which showed that all these types of Pulsators produce similar quality water when the raw water had high turbidity whereas the best quality water was produced by the Superpulsator under similar operating conditions at raw water turbidities less than 30 NTU.

By installing inclined plates with deflectors within the sludge blanket zone, the Pulsator can be converted to a Superpulsator and it will improve the water clarification efficiency by about 5% and production efficiency by 180%. This would increase the total throughput of clarified water by 21%, and produce water of equal or better quality than at present, as the filters would receive water containing less turbidity, thus increasing the flow rates and lengths of filter runs. This also shows that the total throughput of the treatment plant can be increased by the same amount, with the addition of required filter units and other supporting equipment and plant, without additional clarification units, which require large capital investment.



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