CHAPTER VI

RECOMMENDATIONS AND CONCLUSIONS

6.1 Recommendations

It is a well known fact that the solid waste disposal is a hard, tough but an unavoidable task for the Bangkok Metropolitan Administration (BMA) with no persuasive profit can be earned from them. The workers of the BMA. are facing daily not only a hard and unpleasant work but also a great health hazard. The alarming conclusion made here is that the present mishandling, misdisposal and mismanagement have presented a high hazards on human's health, both the workers and the public. Recommendations made here will therefore focus on human's health hazards caused by the leachate from solid waste disposal site.

At the On-nuch disposal site the total volume of the leachate from a dumping yard is drained to the leachate storage pool everyday. Theoretically, it should pass a wastewater treatment plant there and be treated before being drained to the Klong Ta Khe Kob. In practice, it passes the improper function treatment plant and the low quality water still flow to the Klong Ta Khe Kob. Sometimes, when the leachate loading is high, it often floods on the ground surface and is drained directly to the canal. It is recommended that the efficiency of the wastewater treatment plant

should be improved and the loading capacity of a leachate storage pool should be enlarged to prolong the detention time. It should be better, also, if the permanent dyke should be built to retain the flooded leachate in their own land or territory instead of draining directly to the public canal.

At the Nong Kham disposal site, the leachate from the dumping yard was drained to the storage pool and seepage to the earth pit behind the dumping yard. Fortunately now the dumped solid waste is being removed to dispose at Kamphangsan district in Nakorn Pathom province by using sanitary landfill method. Eventhough, there is no wastewater treatment plant here, the technical data on the leachate disturbance on other adjacent water courses is still insignificant. Hence, there is no need for a big or complicate wastewater treatment plant but the primary treatment procedure is still needed.

Although, the observed and analyzed data shown earlier did not indicate any significant contamination on public waterway caused by the solid waste disposal site, the responsibility of the BMA. has , however, not gone away with it. To maintain the activity for public in both disposal sites, the existing problems on the disposal system and its management must be considered. The BMA. or any responsible agencies in the country should take a serious interest in the employing of a new disposal system with less environmental impact, such as sanitary landfill or incineration, of course, this needs a well planning in advance. The effi-

ciency of the wastewater treatment system must be improved with a special emphasis on the removal of hazardous substances. The system thus developed may be stretched to cover the collection system as well, such as to collect and dispose hazard components seperate from general waste. In the rural areas, where the possibility of the construction of a wastewater treatment plant is far beyond their reach, the leachate storage pool technique with an appropriate leachate detention time is recommended for any method of waste disposal.

The above recommendations may not be new, it is believed that almost all of them are in the mind of BMA's executives but the limitation and the complication of a bureaucratic system may hinder them from producing any vigourous actions on it. For the sake of public safety such obstacles have to be overcome.

6.2 Recommendations for future work

1) The number of observations should be carefully considered. If the observations can be performed monthly throughout the year then the monthly changes can be monitored. Because of monthly changes, if detected, can be related to and explained by other involving parameters for each change or occurrence. It may, also, indicate the most probable period that high toxic substances would be leached to the environment.

2) The possible pathways such as sediment and aquatic living organisms must be studied in parallel. Results obtained will explain the transformation of heavy metals in an aquatic environment -if the contamination is taken place- or to confirm that there is no contamination occurred.

3) A study on a shallow well water quality and heavy metals contamination, especially in rural areas is recommended. Because in rural areas, the shallow well water were widely used for various domestic purposes. Results obtained will describe both the level of heavy metals contamination in shallow well water and the transportation pattern of contaminants in soil from the source.

4) Due to the limitation of the study area and the observation location the present study encountered the trouble on a missing data, or data being abnormal etc. Hence a few more observations must be taken to alleviate these problems.

5) The level of the contamination in the waste, both water and solid, by hazardous substances such as pesticides, household chemicals, heavy metals, dioxin, etc. should be studied. The results may indicate the level of environmental contamination by disposed hazardous substances, the environmental condition of in-situ and the surrounding area of the disposal site at that time. Such studies when couple with this work and that of Changpiyarat should give a full picture of environmental problems and more solid and meaningful recommendations to the respective authorities for an appropriate handling and management can be made.

6) The level of heavy metals contamination in human's body should receive a serious and urgent attention especially from the Public Health Department. Studies on the level of and a health impact from the heavy metal contamination of people around these affected areas should reveal some interesting and valuable informations that can lead to more effective measures for both prevention and cure.

6.3 Conclusions

When all the observed and analyzed data were put together, total picture was viewed. It cannot be said that there was no environmental impact from the leachate or from solid waste disposal site. Because during the field observations, the first impression was the unpleasant smell and vision due to the dark colour which exhibit changes each time of observations not only in water at the solid waste disposal site but also in public waterways.

After field observations and samples analyses were completed, results showed that there were some changes occurred which was believed to result from the leachate from the solid waste disposal site. Those changes were BOD loading, COD, salinity, conductivity and pH-value; they were higher in the adjacent stations as compared to the background or remote stations. Fortunately, those mentioned parameters did not impose any severe impact on human's health, because the heavy metals contamination in waterways were not significantly raised up and they were still within

the acceptable range, as ruled by many official environmental control agencies. Those occurrences, as mentioned above, were easily noticed at the On-nuch disposal site. On contrary for the Nong Kham disposal site the level was not detectable and this may be owing to the farther distance from the leachate storage to the receptive waterways.

Although, the heavy metals contamination were found here not to be the major impact on an aquatic environment, other parameters were by causing a decrease in water quality until it cannot be used for any purposes and, consequently, lower the quality of life of people in the downstream area.

Results of this study confirmed that the physical and chemical characteristics of the leachate from both solid waste disposal sites of the BMA. in nearly every parameter were extremely worse as compared to the normal characteristics of natural water during May to August of 1992. The contamination of heavy metals -mercury, cadmium and manganese- was relatively high to the level of contamination that may induce a hazard on human and living organisms. The poor physical and chemical characteristics of surrounding areas were detected which may be caused by the leachate contamination plus other external factors. Fortunately that the heavy metals contamination in downstream areas were consistently not significant. Apart from the level of heavy metals contamination, this research has investigated other factors influencing the quality of water and can conclude that both solid waste disposal sites of BMA. are the sources of severe environmental contamination and the environment

has been affected by the leachate from them (even the heavy metals contamination was not significant). Based on findings in this study, some guidances for responsible agencies for the environmental impact arisen from their public daily work are proposed. The environmental monitoring, performed regularly by related authorities or academic institutions, is necessary for the environmental planning with special emphasis on its effect on human's health. Such a planning, if properly done, should result in an action plan that lead to a better environmental condition which in turn, leads to better quality of lives of our people.