PSU Comments on Water and Sanitation Policies

"TMA Policy Guidelines for WSS, August 2006"

1. One of the objectives of the TMA policy should be to provide safe drinking-water in adequate quantities, at the "point-of-use" and sanitation, to all. Safe drinking-water should be targeted as the one, which meets the WHO drinking-water guidelines;

2. Under the caption of "objectives," it should be added that, all new water and sanitation projects should be based on environmental considerations. They should be subjected to the environmental impact assessment process;

3. The objectives should also include the aspect of role of information. It should be the policy of TMAs to provide the information to citizens on water and sanitation, under the open policy of "right-to know;"

4. The objectives should also highlight the TMAs' policy of water conservation, rainwater harvesting, water recycling and, pollution prevention;

5. It should also be the objective of TMAs to reduce water leakages to less than 5 per cent of the total water supply;

6. Under the "objectives," it should be stated that the management of all water and sanitation projects should be at the lowest pertinent level;

7. It should be the objective of TMAs to target water provision at the rate of 50 liters/capita per day (lpcd) for urban areas and 40 lpcd for rural areas, for drinking purposes;

8. Under "targeting policy," it should be added that, in all new water and sanitation projects, the TMAs should ensure community participation, right from the start of the project and plan;

9. The TMAs should strive to have a adequate trained staff in the field of water and sanitation, as an institutional policy;

10. In addition to the "rehabilitation of existing schemes," stated under technical policy, it should be stated that, all schemes should be made complete, technically; meaning that, for example, sedimentation unit in water treatment scheme should be extended to include filtration and disinfection units, so as to make the whole process complete technically;

11. The TMAs should make a corner-stone of their technical policy, the finished water quality and effluent discharge quality. All drinking-water supplied to people should be wholesome (meeting WHO drinking-water guidelines) and, wastewater effluents should, at best, correspond to the water quality of the receiving stream, or at least, meet the national environmental quality standards;

12. The issue of public toilets has been discussed at various forums. On the face of it, the option seems attractive. However, if the public toilets are not maintained hygienically, they would then be the source of diseases, insects and flies;

13. The aspects of environmental health and hygiene are missing in the TMA policy guidelines. No water and sanitation program would be sustainable and, the full benefits from them cannot be accrued, unless the water and sanitation components are linked with the environmental health and hygiene promotion. M/S. Halcrow should specifically incorporate these considerations in the policy document; and

14. The water and sanitation policy is meant for TMAs, but there is nothing on record, which says that, the TMAs were taken on board, while developing the policy. It is strongly recommended that, the policy document should be sent to the TMAs for their comments, in the first instance. The comments received from the TMAs should be forwarded to M/S: Halcrow, for incorporation in the document. The policy should, then, be sent to the government departments and to reputed NGOs (IUCN, WWF) for comments, before its finalization.

Comments on the "Domestic Water and Sanitation Policy for Sindh, August 2006"

1. Water and sanitation should be seen in the broader perspective of availability of water, competing uses of water and poverty;

2. There should be a commitment to work for the poorest, since, in rural and peri-urban areas of Sindh, poorest of the poor, constitute a major portion and, further, poorest simply do not have proper water and sanitation facilities;

3. The policy should have an exclusive focus on hygiene and environmental health, which is conspicuously missing. The policy should also focus on water, sanitation, hygiene and environmental health education. Schools play a major role in sanitation and hygiene promotion;

4. Under Sindh's human settlement scenario, a significant portion of the population lives in squatter settlements. The document should focus on policy for utilities in slums and squatter settlements;

5. In rural and peri-urban areas of Sindh, the disadvantaged segments of population are women and children. They should be the focus of policy, even if it means that the criteria for selection, cost sharing or component sharing have to be made flexible;

6. On a scale of 1 – 10, with 1 being poor and 10 being good, the policy should lead to programs which can move number of people from the bottom half to the upper half of the scale, by 2015;

7. Because of the gaps in the water and sanitation (difference between targets and achievements), the private sector has stepped in to hasten the progress to meet the MDGs. The policy do not acknowledge the role of public-private partnerships;

8. Increasing number of rural settlements in Sindh is acquiring urban characteristics. The policy should encourage adjustments in rural sanitation to meet the urban characteristics;

9. Since, the bulk water supplies in Sindh have become contaminated, due to polluted water bodies and lack of appropriate treatment, the policy should encourage the use of household water treatment systems;

10. The policy fails to include strategic environmental considerations in the water and sanitation programs. This is a major lapse and, should be

rectified. Strategic environmental assessment, which is different from project-specific EIA (environmental impact assessment) should be applied to all new water and sanitation schemes;

11. While the water stress problems are increasing, the policy does not address the aspect of judicious use of water. In view of the dwindling water resources in Sindh, this aspect has assumed importance;

12. The policy should promote water conservation and water reuse, in view of reduced availability of water per capita. Wastewater reuse is a major field, which the policy should strongly support;

13. The policy should acknowledge the role of school education and school children in promoting sanitation and hygiene;

14. The policy should broaden its scope and should include “management of water resources,” as in Sindh, water supply cannot be de-linked from water availability;

15. Behavioral change in hygiene has assumed importance in developing countries, in view of its significant impact on water and sanitation. The policy should persuade change in behavior towards hygiene promotion;

16. It is important that, the policy stress linkages between water contamination, poor sanitation and occurrence of water-borne diseases;

17. The policy do not advocate nomination of any existing institution, or creation of a new institution, which can act as resource center for water and sanitation information;

18. Policy should acknowledge that, the access to safe water and sanitation is a human right; The policy should show support to the international slogans: “water for all,” “water is life,” and “sanitation is dignity;”

19. M/S. Halcrow has not collected water and sanitation data. In the document, they have quoted from other sources, the authenticity of which is debatable. M/S. Halcrow should collect the data and, append it with the policy. It is essential that M/S: Halcrow should provide authentic data on water and sanitation in Sindh;

20. The policy fails to include environmental considerations for new water and sanitation projects. This is a major deficiency. The policy should stress that, all water and sanitation projects should involve environmental

considerations and, they should be subjected to the environmental impact assessment process;

21. Water and sanitation policies are critical to creating an enabling environment to encourage increased access to water and sanitation services. This should be demonstrated in the policy;

22. The policy document does not demonstrate, how the policy covenants will translate into programs and, how effective would be these programs in improving water and sanitation services;

23. The key elements for assessing the adequacy of the policy are guidance and information. M/S. Halcrow should show how the policy is strong on these two key elements;

24. M/S: Halcrow should indicate, what strategies are in place in the policy document, which can ensure policy implementation by those directly involved in service provision;

25. Policies that are accepted by stakeholders give an indication of relevancy, and those that are accepted will most likely be effective in guiding changes in water and sanitation services. The acceptance of policies also means a general agreement with the purpose of the policies. This acceptance is best secured when stakeholders have a role in formulating the policies and in participating in making informed decisions. It is important to determine the degree to which stakeholders both accept and agree with the policy and how this acceptance was achieved. It needs to be determined whether, the relevant and appropriate stakeholders were involved in the formulation of the policy and, whether the stakeholder involvement translate into clear support or action;

26. A very important aspect of policy adequacy is the acceptance by educational and relevant institutions. There is nothing on record, which says that institutions like environmental engineering departments of NED and Mehran universities, LMC, Jamshoro (Director, M&E Cell, LG department, should send a copy of his letter of 12 December 2006, to the health department, as well), Tando Jam agriculture university, and on-farm water management institute, were involved;

27. A significant portion of the policy has been copied from the national sanitation policy, which is most unfair. M/S Halcrow should be asked to submit revised document and, no portion of the policy should be copied from any other document;

28. M/S. Halcrow should indicate, how the policies specified are comprehensive enough, to allow institutions to develop action plans and strategies and, act upon them;

29. M/S: Halcrow should show how the policies explicitly target the three main population groups: urban poor in large cities, residents of small towns, and inhabitants of rural communities, and whether, these three groups are included in the intent of the policies;

30. The levels of service are important in the context of water and sanitation, as they provide a barrier against the diseases. Different segment of people will have different levels of service, depending upon the affordability and economic status. The document does not show, whether minimum adequate service levels have been defined for the three targeted population groups (urban poor in large cities, residents of small towns, and inhabitants of rural communities), as well as for any other specially targeted groups;

31. The policy does not specify roles and responsibilities of the institutions, which provide service in districts and talukas. The role of each institution should be defined, and there should be a designated office as a focal point for the institution;

32. Under para 3.1, pp. 2, the document says: “urban growth is 3.5 per cent and 48.8 per cent of Sindhis live in urban areas.” Mentioning of “Sindhis” has no relevancy here. This should be deleted;

33. The information of water supply provided, under para 3.2, pp. 2, is mind-boggling and confusing. It says that: “water supply coverage is poor.” It then says: “87 per cent of households have access to water inside their houses.” This is a good percentage. How can they call it poor?

34. It further says: “in rural areas, 81 per cent of the households has access to water inside their houses.” This is totally wrong. Water coverage in rural areas cannot be more than 40 per cent;

35. The document further says: “in urban areas, 94 per cent of the households have access to water inside their houses.” This is again an incorrect figure. M/S: Halcrow should provide realistic and authentic information on water supply;

36. The document further says (para 3.2, pp. 2): “there is virtually no data regarding water quality.” This is again incorrect. The data is available, if only they tap it;

37. Under para 3.3, pp. 3, the document says: “16% of Sindh’s population has no access to toilet facilities, 5% in urban areas and 27% in rural areas and 32% overall and 56% in rural and 7% in urban have non flush toilets.” This

is a hopeless and confusing way of writing. One doesn't understand, what does it mean? They should very clearly spell it out;

38. Para 23 says: "in the urban areas in Sindh, underground drains serve only 69 per cent of households and in the rural areas 85 per cent of households have no system at all." This is confusing. It is not known, what is meant by "underground drains." Do they serve sewage or storm water, or have some other purpose?

39. The objectives, given under para 4, at pp. 4, should be brought to the first page. Objectives are usually given at the start of the report;

40. Under para 6 (minimum acceptable options), it says: "the minimum acceptable option for the provision of domestic water……." The quality of water has not been indicated here. Therefore, the words "domestic water" be replaced by "safe and wholesome water."

41. It further says: "in rural settlements water may be provided through communal points to meet the minimum requirement of 25 liters/person per day." This is not acceptable. The words "communal points" should be changed to "inside the houses, or, point-of-use." In addition, the quantity of water provided should be 40 liters/person per day in rural areas;

42. What has been stated under item # 38, para 6, pp. 6, is not acceptable and should be deleted;

43. The minimum acceptable sewerage option, mentioned under item 39, pp.6, is based on "density considerations." It should be based on urban and rural contexts. Item 39 (iii) is incomplete in sense;

44. The targets for provision of water and sanitation should be 100 per cent by 2015 and, not 93 per cent for water supply (para 7, item # 40 (i), pp. 7) and, 70 per for sanitation [item # 40 (ii)];

45. One hand pump for 250 persons is not sensible [item # 40 (iii)]. One hand pump should be for a maximum of 30 persons;

46. Under item # 40 (v), it says that the water quality standards are approved by 2007. It is not known what "water quality standards" are being talked about. The document should reconcile itself with WHO drinking-water guidelines;

47. Elsewhere, the document mentions 81 per cent sanitation coverage. Under item # 40 (ii), it speaks of 51 per cent sanitation coverage. These are contradictory figures;

48. It should be a major policy imperative that, all major water supply schemes must have a component of water treatment. Since, there is no use

providing wholesome water, when it is contaminated at the “point-of-use,” due to unhygienic practices, the service providers should initiate a campaign of hygiene promotion, whenever a major water supply scheme is launched;

49. Since, targets (para 7, pp. 7) are the major component of the policy, they should be re-written, clearly reflecting on water quality, water quantity, provision of piped water inside the houses; water conservation, water metering, sanitation facilities for different economic levels (levels of service) and, sewage treatment, wastewater reuse and standards for wastewater reuse and recycling;

50. A major portion of the water policy has been copied from the draft national drinking water policy. This is not acceptable. M/S; Halcrow should submit their own document;

51. The document, submitted by M/S; Halcrow, is a jumbled-up document, mixing water with sanitation, sometimes making it difficult, as to which policy principle applies to which sector. For example, a partial order of content is:

3.2 Water Supply
3.3 Sanitation
4.0 Objectives
5.0 Policy Principles
6.0 Minimum Acceptable Options
7.0 Targets

52. It is clear from pre-page that, the document layout is confusing. It is unclear whether the “objectives” apply to “water” or “sanitation” or both. Since, there is also a third component of Sindh provincial strategy, making the document more confusing, it is strongly suggested that, M/S: Halcrow should produce separate document for water policy, sanitation policy, and for Sindh provincial strategy.

Comments on Sindh Provincial Strategies

1. A major and significant portion of the Sindh provincial strategy is copied from the national drinking-water policy. This is plagiarism, and is most unfair. It is not proper, on part of M/S: Halcrow to use someone else's ideas, work, or words as if they were own. The strategy is, therefore, not acceptable. M/S: Halcrow should come up with their own original work;

2. Portion of the strategy, which appears to have not been copied, is commented upon;

3. Under para 8.3.9, item # 87, pp. 12, it says that, the component-sharing program "will" be adopted for all TMA schemes. While, component-sharing model is a good practice, which allows the work to be distributed among various organizations, thereby achieving quicker progress, it should be left to the discretion of the TMAs, to choose the mode of work. This is because, if there is no initiative and demand on part of the beneficiaries (e.g., they are more pre-occupied in their income-generating activities, due to poverty), the TMAs can still proceed with the execution of water and sanitation works;

4. Para 8.3.11 deals with urban sanitation. It is not known whether, this deals with the sanitation policy, or with Sindh provincial strategy;

5. Item # 93 of para 8.3.11 is not in order. In case of Karachi, it will not be possible for CDGK to treat the effluents from storm-water drains, as they are located away from wastewater treatment plants. Suggestion of creation of lakes or ponds, using effluents, is not advisable. There are no EPA guidelines. This should be re-phrased as follows:

6. "As far as technically possible, all sewage should drain in sewers, which must be given appropriate treatment, before final disposal;"

7. The sanitation plans in urban areas should be based on the concept of decentralized wastewater treatment, meaning that, wastewater generated in a town (e.g., in case of Karachi, which have 18 towns), should be treated in that town and, the treated effluent may be used for the irrigation of parks and playground. This is a major policy shift, which will be helpful in saving drinking-water, which is otherwise used for irrigating parks, playground and roadside green belts;

8. In case of rural sanitation, it should be made a keystone of rural sanitation policy (this point should receive a high priority), that TMAs should promote rural sanitation at the lowest end (poor people, with no sanitation facility), through public awareness programs and hygiene promotion. Hygiene promotion creates demand for sanitation facilities, which, in rural settings, especially in case of Sindh, receive low priority;

9. Communication and dissemination strategy, under 8.3.15 is copied from the national drinking-water policy document;

10. It should be stated very clearly, as to who is to do what. Who will be the actors, and what will be the responsibility of each actor. The document should give a procedural guideline in the form of “specifying activity, and action by…;”

11. Nearly all of financial strategy (8.3.17), monitoring and evaluation strategy (8.3.18) and protection of water sources (8.3.19) has been copied from the national drinking-water policy;

12. Monitoring of effluents of the wastewater treatment plants is primarily the job of EPA, Sindh. However, if a realistic view is to be taken, then, it will be found that, EPA, Sindh, do not have the staff and resources to undertake this exercise, due to the high volume of work involved. TMAs should collect the effluent samples and, have them tested at the EPA laboratories in Karachi, Hyderabad and Sukkur. This will allow effective monitoring and assessment of effluents being discharged into the receiving bodies of water; and

13. Under the mechanisms for implementation and monitoring (para 10), the roles and responsibilities of each player must be clearly defined, for the implementation of the policy. Ambiguity in specifying clear-cut roles and responsibilities will hinder in the smooth implementation of the policy.

Comments on the "National Sanitation Policy, September 2006"

As reported, the national sanitation policy has been approved by the government of Pakistan. In that case, it is not appropriate and proper to offer comments at this stage, as the "comments-stage," is over. Few general comments are, however, made:

1. As expected, the policy has weak linkages with hygiene and environmental health. The sanitation policy would not meet its desired objectives, if the aspects of hygiene are ignored. It is essential that, the policy strongly advocates hygiene promotion;

2. The local government department, government of Sindh, should create a directorate of environmental health, headed by a director (BS-19), with master's degree in environmental engineering (having subjects of environmental health; there is no separate degree on environmental health) to deal with the aspects of environmental health and hygiene promotion. The directorate should be created within the set-up of the local government department;

3. The sanitation technology (wastewater treatment) must be understandable and physically within the capability of the people, responsible for its operation and maintenance;

4. It should be the well-established policy that, the wastewater treatment systems, in future, should always be decentralized. This would mean that each town, community and, in case of a major urban center, each area or segment, should have a wastewater treatment system;

5. Equipment and spare parts need to be easily obtainable and available in Pakistan. No FEC (foreign exchange component) should be allowed in wastewater treatment plants;

6. It should be strictly laid down that, all municipal wastewaters must be treated before their discharge in water bodies. The degree of treatment should be appropriate, such that, it meets the physical, and biological requirements of receiving streams and, should not lower the DO (dissolved oxygen) of the stream by more than 1 mg/l – milligram per liter. At the minimum, the effluent discharge criteria should meet the NEQS (national environmental quality standards);
7. In case of industrial wastewaters, the industries should pre-treat their wastewaters, before discharging them in the municipal sewers, because municipal wastewater treatment plants are not designed to treat toxic

elements, which would require tertiary or advanced wastewater treatment, which follows the secondary treatment;

8. A common problem encountered in the sanitation field is the moving on of the trained engineers and operators to other job avenues, which makes the concerned department handicapped, because of the loss of the trained staff. A incentive system or honorarium system should be in place, through which incentives should be given to trained engineers and operators of sanitation facilities (and, for that matter, of the water treatment facilities);

9. The technology must be affordable to operate and maintain for the people bearing the costs;

10. The sanitation technology, or, the level of service, must be attractive and culturally and socially acceptable to users; and

11. The national sanitation policy should encourage the concept of standardization and replication. The standardization of equipment, parts, designs and, even construction methods, has many advantages. Quite often, the design is simple. Selection is made from a range of available options. The increase in cost will be marginal. It is essential that the choice of design is made judiciously, as one type at a particular location, may not be fully appropriate at another location. However, lower skill levels are required in the design process and, repetitive construction of the same item improves quality. Standardization applies within a range of technological options and alternative management approaches. Replicability applies to processes and to outputs. Latrines should be constructed using designs, materials and methods that local people like and, are willing to copy and adopt. In case of rural Sindh, this will prove beneficial, due to lower technical capacity.

Comments on the solid waste management Policy for Sindh, August 2006

Introduction

Sindh Devolved Social Service Program (SDSSP) through surveys to some Towns/Taluka, s and by reviewing the annual sector plans 2005/2006 submitted by Towns/Talukas to Program Support Unit (PSU) SDSSP, come to know that basic Solid Waste Management facilities in most of the TMAs of Sindh are missing and the situation of Towns/Taluka, s are not similar.

The Policy developed by Halcrow doesn't contain real data and existing situation of Sindh, though M/S Halcrow has conducted consultation meetings with stakeholders in 41 TMAs and issues assessments in 6 TMAs to analyze the existing situation of Sindh.

The detail review of the policy is given in this report but in general the efforts made by Halcrow for the development of Policy is questionable as most of the component like Policy Principles, Objectives, Legislative Strategy, Targets and Institutional Strategy etc are as same as given in the draft policy of National Sanitation Policy. The context and Preamble given in the policy by M/S Halcrow contains the statistics which were obtained from desk studies, hence no exclusive survey for Solid Waste Management in Sindh has been conducted.

Suggestions and Recommendations

1. Actually at TMA level, it's not possible to develop an effective institutional and financial framework to implement and ensure a clean, healthy and pollution free environment in all settlements by their own, therefore clear guidelines and roadmap shall be developed in the policy for ensuring a clean, healthy and pollution free environment which is missing in the document.

2. There are no guidelines developed since for reduce, reuse and recycling of waste (3 Rs), no law established against open burning which is common in Sindh, Pakistan. No one can stop open burning as no law exists; therefore it is a suggested to guide and develop the necessary guidelines and actions for laws for the improvement of SWM. Generation rates shall be reduced by 20% by the year 2012, may the target set in the policy.

3. Landfill shall be designed at least for 10-30 years therefore adequate land area and volume shall be provided for sanitary landfill capacity to meet projected needs for at least 10 years, so that the cost in access roads,

drainage, fencing, building work if constructed at the landfill site and weighing bridge stations are justifiable

4. A landfill site must be with in distance of 25 Kilometer from the center of a town, if the average round-trip haul (travel) distance is more than 50 Km then garbage transfer stations will be constructed[1].

5. Garbage transfer station (GTS) (Garbage transfer station GTS means where the garbage is primarily stored and then transported to landfill/dumping site). Transfer stations are centralized facilities where the waste is unloaded and collected, from scattered collection vehicles and reloaded in to longer vehicles for transport to a final disposal point or processing sites. Waste Transfer Stations are frequently accompanied with sorting units for separation of recyclable material. Compacting units for Solid Waste compaction further transported to final Disposal Point are also installed at transfer stations.

6. The site is not within 1 Km of socio-politically sensitive sites where public acceptance might be unlikely (e.g., Mosques, Churches, graveyards, schools, hospitals, historical places, play grounds etc)[2]

7. Population shall be more than 200 meter away from the boundary of a landfill site.

8. Landfill site shall not be sited near any existing or planned drinking water protection and catchments-areas.

9. Landfill site shall not be located at an unfavorable local hydro-geological situation, e.g. springs or drinking water wells within very close distance to the chosen area

10. Landfill site shall not be advised where the access roads are of very poor quality and the garbage collection vehicles has to pass through densely populated areas

11. There should be no private or public drinking, irrigation or livestock water supply wells down-gradient of the landfill boundaries if at risk from contamination, unless alternative water supply sources are readily and economically available

12. No significant protected forests are within 0.5 Km of the landfill cell (in landfills, a portion of refuse that has been compacted and then surrounded with cover material. Daily cover is placed over the landfilled materials at

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the end of each day to complete the cell) development area. No major lines of electrical transmission or other infrastructure (e.g., gas, sewer, water lines) are crossing the landfill cell development area, unless the landfill operation would clearly cause no concern or rerouting is economically feasible

13. There is no underlying limestone, carbonate, or other porous rock formations that would be ineffective as barriers to Leachate and gas migration, where the formations are more than 1.5 meter (m) in thickness and present as the uppermost geological unit.

14. There are no guidelines available for the establishment of a landfill site; landfill site shall be established at TMA level or at District level with clear responsibility of its development and maintenance.

15. In section 7.3.10, the private sector will be encouraged to participate in the collection and disposal of solid waste, actually transportation (hauling) of waste is the main issue. According to the Annual Sector Plans submitted by TMA to SDSSP, it is learnt that most of the TMAs do not have a single garbage lifting vehicle. Therefore it is suggested to improve transportation of garbage also to the final disposal point through public private partnership.

16. Develop policy considering the local conditions of Sindh Taluka, s & Towns; Halcrow has not given the situation analysis and specific recommendations.

17. Once the SWM Policy for Sindh is developed by the Halcrow, it should be reviewed by Engineering Universities in Sindh and other research centers in order to incorporate the recommendations so that effective policy may be framed and implemented.

18. In Sindh scenario, a significant portion of the population lives in squatter settlements. The document should focus on policy for collection and disposal mechanism of solid waste in slums and squatter settlements.

19. Policy should include necessary environmental assessments, therefore Initial Environmental Examination and Environmental Impact Assessments must be considered to all new facilities established under solid waste management.

20. Halcrow has not collected any rate of generation of solid waste per capita per person in rural, slum and urban areas. In general 50% of waste is lifted, but in rural areas no system exists. Therefore Halcrow should acquire some data on SWM in Sindh.

21. Where possible yard waste and grass clippings shall be collected separately from gardens, parks and residential areas for composting.

22. Hazardous waste and medical waste shall be collected separately from industries and hospitals respectively and from other sources.

23. Municipal solid waste shall be collected door to door from residential areas.

24. Waste which is collected during sweeping shall be dropped in communal bins by sweepers. No waste shall be burnt after sweeping.

25. Special collection schemes shall be designed for festivals and Eid-ul-Azha

26. Sweepers shall collect waste from door to door at union council level and drop the waste in communal bins.

27. If the number of sweepers falls short then private contractor shall be hired for door to door collection.

28. Scavengers (Junkmen) who buys the recyclable, middle men and other involved in the business of solid waste management shall be registered by each Town/Taluka.

29. The registration of informal sector would help to plan recycling of waste for future

30. The bins shall not be placed near mosques, schools, hospitals and public community centers etc

31. The bins shall be placed away from public places to reduce the possibility of interaction of vectors (flies, mosquitoes, rats, cockroaches and others) to human beings.

32. Closed moveable bins shall be placed at market areas and at picnic points.

33. The bins shall be lifted at least once in two days

34. Medical waste collection and hazardous waste collection stations shall be established at TMA level

35. Community based organization shall be involved to take care of the communal bins

36. Garbage vehicles shall be covered during hauling of waste

37. Where possible manual lifting shall be replaced with mechanical lifting

38. M/S Halcrow shall prepare benchmarking for Water Supply & Sanitation and Solid Waste Management to achieve the desired targets.

FUTURE STRATEGY

A Health Protection Agency (HPA) should be established in the Local Government Department, at provincial level which will include the Environmental Health Officers (Public Health Specialist) and Environmental Engineers. The Health protection agency will be responsible for

- Preparation of future policies of water supply and sanitation, solid waste management
- Coordination with concerned department and agencies
- Provide guidelines to the TMA and Districts
- Arranging trainings and workshops at TMA and Districts level
- Suggest measures for the prevention and control of epidemics in Sindh due to vector borne, water borne and water related diseases
- Conducting environmental epidemiological surveys in Sindh to diagnose the vector borne, water borne and water related diseases at community level.

(HPAs are effectively working in developing countries)

The policy prepared by Halcrow needs further consideration