

## Activities of UN-HABITAT in the People's Republic of China

### Technology Transfer

“The Fukuoka Method (Semi-aerobic) Type Landfill Project, Weifang City”

Weifang City (620,000 people) of Shandong Province, China, has successfully completed the construction of the Fukuoka Method landfill in October 2003, as a part of their plan to integrate and improve existing landfills scattered over the city. The new landfill has started receiving municipal waste. The Fukuoka Method is a semi-aerobic landfill developed by Fukuoka University in collaboration with Fukuoka City nearly 30 years ago. The Method has many distinct advantages over traditional sanitary landfills. Among other things, the Method allows countries to start with basic design and gradually upgrade it to a more sophisticated level as they achieve similar improvements in other aspects of municipal waste management.



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### Background

An environmentally responsible management of landfills is of critical importance to China because of its vast number of cities, the size of urban population and a rapid urban growth. In cognisance of this fact UN-HABITAT



Newly constructed landfill in Weifang



Leachate Control Pond



Leachate Treatment Plant



Environmental Monitoring Equipments

and the Ministry of Construction (MOC), Government of the People's Republic of China, entered into an understanding in August 2001 to cooperate with each other to help improve existing landfilling practices in China. As per the understanding UN-HABITAT will facilitate introducing the Fukuoka Method type of landfill method in three pilot cities at a demonstration scale so that once the project is finished China could replicate the Fukuoka Method in other cities. The overall objective was to enable the target cities to manage their municipal solid waste in an environmentally responsible and cost-effective manner. The support from UN-HABITAT included a series of advisory assistance such as in (i) site selection, (ii) engineering design, (iii) periodic supervision of limited number of civil works, and (iv) training of national designers, engineers and operators. The respective cities were to bear the cost of the construction of the pilot landfill. The initiative was to be completed within three year from August 2001.

Three pilot cities were identified by MOC but only Weifang City accepted the offer. Accordingly, the technical assistance of UN-HABITAT was focused on Weifang City only. To date, eight technical missions have been fielded to Weifang covering the investigation, design, construction and operation phases.

#### **Outline of the Fukuoka Method Project in Weifang (the Weifang project)**

First phase of the Fukuoka Method type landfill in Weifang was completed in October 2003 and the landfilling works began soon thereafter. The physical characteristics of the Fukuoka Method landfill site in Weifang are as follows:

Area: 6.4 ha

Capacity: 1.16 million metric tons of solid waste

Facilities: Liner system, leachate collection pipes, leachate pond, leachate treatment plant, gas ventilation pipes, run-off drainage, site office, and laboratory facility



#### **Activities**

Soon after signing of the understanding with MOC the UN-HABITAT entered into an agreement with Fukuoka City and, by its association, with Fukuoka University enabling the three partners to collaborate with one another in providing the technical support to the Weifang project. A consortium (Advisory Team) comprising of experts from Fukuoka City, Fukuoka University and a number of volunteer-experts from the local organisations based in Fukuoka was formed wide-ranging technical support to the project.

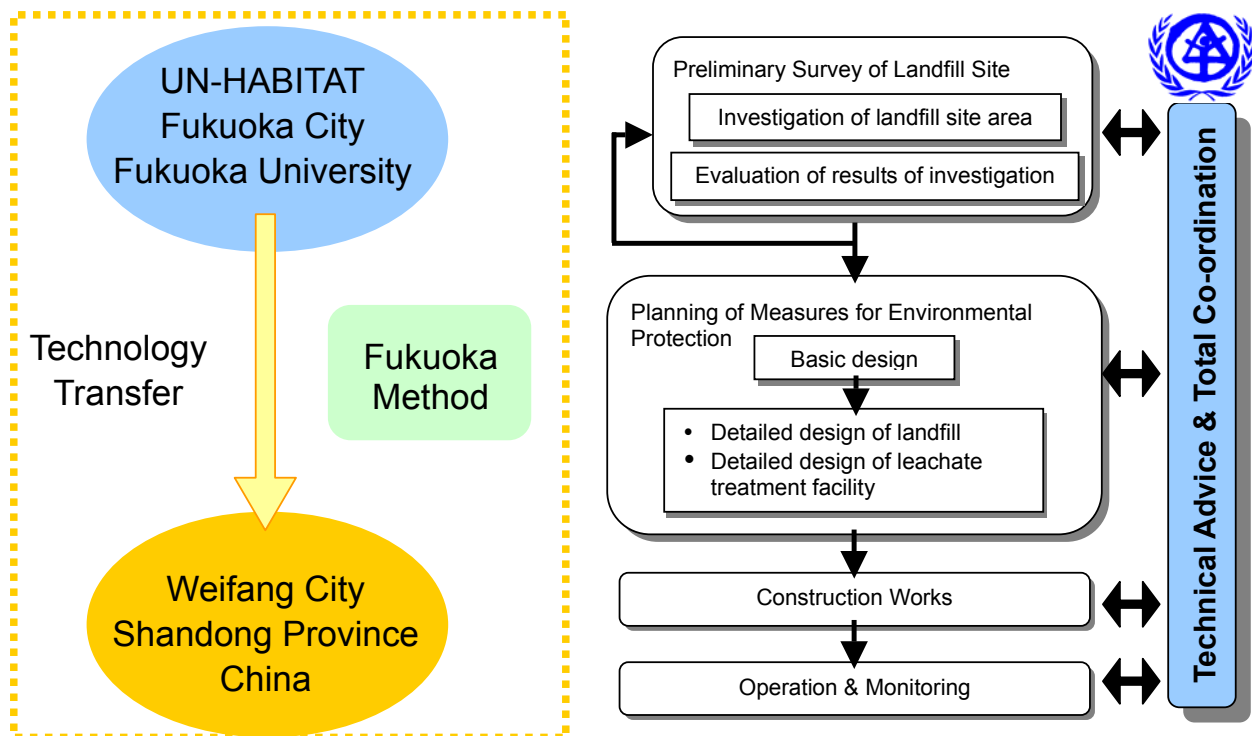


Figure 1: Procedure of the project and the roll of UN-HABITAT

Weifang has borne the full cost of design and construction whereas UN-HABITAT provided technical assistance at its own cost. The cooperation between UN-HABITAT and Fukuoka City also enabled the latter to raise additional funds from various funding sources in Japan. The milestones of this initiative are presented below accompanied by a brief description of each:

*1. Discussion on Work Plan: (September 2001)*

UN-HABITAT Fukuoka Office fielded an expert from the Office for the first mission to Weifang in September 2001. The work plan of the initiative was discussed and an understanding reached.

*2. Site investigation (September 2001)*

UN-HABITAT Fukuoka Office fielded two experts from the Fukuoka City for the second mission to Weifang for site investigation.

*3. Formation of Working Group in Fukuoka: (December 2001-)*

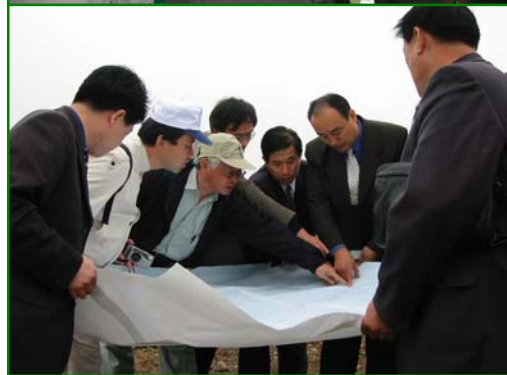
A Technical Working Group was formed comprising experts from UN-HABITAT Fukuoka Office, Fukuoka City, Fukuoka University, and three Volunteer-experts from the local organisations based in Fukuoka (The number of Volunteer-experts increased to five in 2003). Each member was prominent in one specific aspect of solid waste



management. The Group provided a pool of experts from which UN-HABITAT could choose specific individuals according to the need of the advisory missions. In addition, the Group met periodically to discuss the problems received from the field and plausible solutions. The willingness of the Group to meet regularly, often at odd hours, and share experience with one another and the Chinese counterparts contributed much to the success of this initiative.

#### *4. Seminar on Fukuoka Method Techniques (April 2002)*

One of the regular features of all UN-HABITAT missions to Weifang was working with local experts as a way of providing hands-on training. In a few occasions formal training were held. The April 2002 mission comprising four experts held a technical seminar on the Fukuoka Method design. The main objective of the seminar was to present substantive and operational aspects of the Fukuoka Method against the concept design so that the Chinese counterparts are able to develop a full design of the pilot site by themselves. As a part of the training, prominent new landfill areas were visited and basic field survey was conducted.



#### *5. Technical Advice on Fukuoka Method Landfill Design (July 2002)*

The fourth UN-HABITAT mission to Weifang provided more detailed advice and recommendations on the detailed design the Chinese counterparts were developing. (Photo right: discussion on the landfill design.)



#### *6. Training Programme (August-November 2002)*

Wherever possible every occasion was used to build technical capacity in the Weifang City to design and develop Fukuoka Method based landfills. Accordingly, Fukuoka City sponsored a professional officer from Weifang City to be trained in Fukuoka City over a period of four months. Such opportunities strengthened the relationship between China, Fukuoka City, and UN-HABITAT and contributed to the successful technology transfer of the Fukuoka Method to Weifang.



#### *7. Technical Advice on detailed design (August-September, 2003)*

Considerable time and efforts went in advising the Chinese counterpart in the detailed designing of the Fukuoka Method landfill in Weifang. It was only in early August 2003 that the Advisory Team was able to provide detailed critiques on the design prepared by the Weifang engineers. UN-HABITAT fielded the sixth mission in the end of

August 2003 so that the Advisory Team and the Chinese counterpart could have face-to-face discussion on design issues. The mission provided technical advice on the on-going construction.

*8. Fukuoka Method Workshop (6-7 November 2003 in Weifang)*

UN-HABITAT and Shandong Provincial Construction Bureau co-organised a workshop with the support of Fukuoka City, Fukuoka University, Weifang City and JICA. Eighty-eight participants from 48 cities in Shandong Province participated in the Workshop. Mr. Madhab Mathema of UN-HABITAT gave a keynote speech followed by a series of well-prepared presentations by experts from Fukuoka City and Fukuoka University. The workshop clearly marked the successful progress of the Weifang Fukuoka Method Landfill Project.



UN-HABITAT was effortful in implementing this technology transfer project as a comprehensive package (design, construction, operation and management, monitoring). Both hands-on and formal training was an important feature in this assistance. There are reasons to believe that the project has contributed to the improvement in the way municipal solid waste is disposed of by Weifang City. The City professionals have now started acquiring skills in landfill operation and management, periodic monitoring, and preserving the environment. This technology as well as the modality of the transfer should be replicated in other cities in China for which both support of the Ministry of Construction is required. A successful replication will address one of the major environmental concerns in urbanisation in China.



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