Weighbridge Control Building & Warm Garage

Warm Garage

Enclosing Dam

Cleaning Access Road

Control Buffer Zone

Medical Waste Pit

Air Sampling for EIA

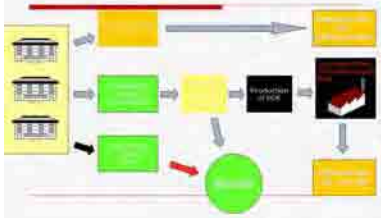
2. RDF Production

Chirigami Kokan

Objectives

- Demonstration of Chirigami Kokan system
- Examination of the applicability
  - Collection of financial data
  - Which day is most effective?
  - Which item can most effectively satisfy people; toilet paper, soap or others.
- To find the proper way to collect recyclables directly from middle income residents.

Master Plan of Waste Stream for Planned Area



Discharge & Collection System Collection of Recyclable Waste By Private People

1. Wide area: Buy back station
2. Large apartment area: Buy back kiosk
3. Small apartment area: Chirigami kokan (Movable collection system by swapping waste for paper)

MUB should promotes these private recycling activities.

Progress

- Decided the project site. Bayangol khoroo 13 and 14.
- Prepared the draft TOR
- Explained the TOR to:
  - Bayangol TUK
  - Buy back kiosk operator in Bayangol Khoroo 13

Proposed Schedule

- Selection of the operator: Beginning of Sep.
- Distribution of leaflet: Middle of Sep.
- Implementation: for 3 months from October 1st

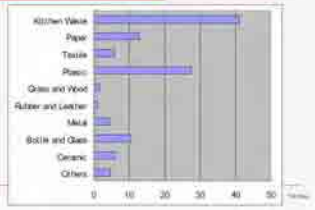
2. Use of WACS Results for SWM -1

Planning for Recycling System

Apartment Waste in 2005

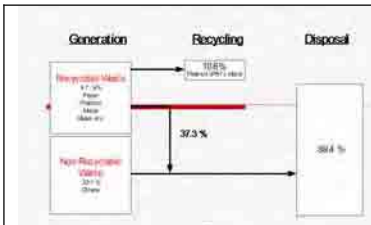
	Generation (Ton/day)	Recyclable
Kitchen Waste	41.0	
Paper	*12.8*	11 %
Textile	5.7	
Plastic	*27.5*	24 %
Grass and Wood	1.6	
Rubber and Leather	1.0	
Metal	*4.5*	4 %
Bottle and Glass	*10.5*	9 %
Ceramic	6.0	
Others	4.8	
Total	115.4	48 %

Composition of Apartment Waste

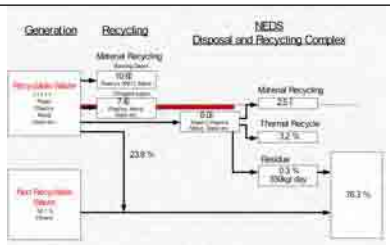


Target Waste in Chirigami Kokan

	Generation (Ton/day)	50 % recycle	Existing Recycle	Chirigami Kokan 1/2 (ton/day)
Kitchen Waste	41.0			
Paper	*12.8*	6.4	0.9	2.8
Textile	5.7			
Plastic	*27.5*	13.7	5.7	4.0
Grass and Wood	1.6			
Rubber and Leather	1.0			
Metal	*4.5*	2.2	1.8	0.2
Bottle and Glass	*10.5*	5.2	2.2	1.5
Ceramic	6.0			
Others	4.8			
Total	115.4	27.5	10.6	8.5 (7.4 %)



Existing Waste Flow
(Apartment waste in 2005)



Proposed Waste Flow

Consideration of Target Area

1. Population of Target Area
   3000 hh x 4.5 person/hh = 13,500persons
2. Generation of Wastes
   13,500 persons x 240g/person/day=3.24ton/day
3. Amount of Target Wastes
   3.24 ton/day x 7.4% = 0.24 ton / day
4. Weekly Collection Amount
   0.24ton/day x 7 days ≒1.7 ton
   ⟹ 2 trip of 2ton truck

Result of Waste Picker Meeting

Outline of the Meeting

- Date: August 30 and September 1
- Place: UCDS
- Attendants:
  - 127 Families in total, 160 Individuals
  - Mr. Jambaldorj and other Nuut Co. Staff
  - JICA study team

Agenda

- Outline of the Pilot Project
  1. Outline of the Construction Work
  2. Outline of the Operation Work
     - Place of the Landfill Operation and the Way of Landfilling
     - Separation of Working Areas
     - Explanation of the waste picking rules

Concerns they have

- ☐Fair business with buyers
- ☐New comers (more new comers, more competition)
- ☐Safety of children

Maintain fair trade

- To make a space for trading inside the disposal site
- To control buyers by agreement or license
- To keep the current recycling system by the private sector

How to manage the Registration System
(how to deal with new comers)

- In order to know the actual number of waste pickers, it is necessary that all the new comers register.
- It is important to prevent someone from cheating.
- It is also important to restrain the number of new comers

Procedure of Registration

- On the first and second day, new comers can apply to the registration every month
- Nuut Co. staff sometimes check if they are actually working at the disposal site full-time
- At the end of the month, applications of those who are recognized as working at the disposal site are accepted for the registration.
- It is clearly mentioned that those who work at the disposal site longer would be given a priority to newly created jobs.
- At the time of the registration, new comers are required to agree with rules

Community Meeting in Khoroo 4

Purpose

- To provide a place for all the stakeholders to exchange opinions on current collection system and to think about possible solutions to improve the collection system and decrease illegal dumping by local residents
- No to seek specific conclusions
- To use the result of discussions for the next phase of the project

Outline

- Date: September 14
  (an additional meeting will be arranged next month)
- Attendants
  - Local residents (especially Heseg 7 & 8)
  - Collection service providers (TUK in Songinokhairkhan and a private contractor)
  - NGOs
  - JICA study team
  - a facilitator

Agenda

- Part 1
  Presentations
  - Result of Interview survey
  - Current conditions in Khoroo 4
  - Current collection system in Khoroo 4
- Part 2
  Discussion

Thank You Very Much for your attention

Technical Working Group Meeting (28)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

September 9, 2005
JICA Study Team

1 . Work Progress

① Production of RDF production
② Waste Educational Tools-1, Leaflet
③ Follow Up Survey for Public Hearing
④ FS for NEDS
⑤ Factory Survey
⑥ Database design and programming for WB
⑦ Water Quality Analysis and Soil Investigation for NEDS
⑧ Implementation of UCDS PP
⑨ Time and Motion Survey
⑩ Preparation for Chirigami Kokan
⑪ Tender for Construction Waste Survey

2. Works for the Following Week

① Production of RDF production
② Public Meeting in Khoroo 4
③ Follow Up Survey for Public Hearing
④ FS for NEDS
⑤ Factory Survey
⑥ Database design and programming for WB
⑦ Water Quality Analysis and Soil Investigation for NEDS
⑧ Implementation of UCDS PP
⑨ Preparation for Chirigami Kokan
⑩ Construction Waste Survey

3. Subjects to be discussed

① **Progress of PP**
② **Use of WACS Results for SWM -2**
③ **Chirigami Kokan**
④ **Outline of Community Meeting in Khoroo 4**

1 . Progress of PP

- Improvement of UCDS
- Leaflet No1

UCDS

Warm Garage

Weigh Bridge

En closing Dam

Onsite Road and Soil Covering

Leaflet No. 1 (P.1)

Notice of the Pilot Project

Leaflet No. 1 (P.2)

Notice of the upcoming schedule (a community meeting and clean-up activity)

Signboard (Draft)

~~(at the intersection~~ of the paved road and access road to the disposal site in Khoroo 4)

Use of WACS Results for SWM - 2

- Waste Amount Forecast
- Waste Composition Forecast

Waste Amount Forecast Results of WACS

Ton/day

Category		Winter season	Summer season	All year
Household Waste		511.0	186.7	402.9
	General	(183.2)	(186.7)	(184.5)
	Ash	(327.8)	(0.0)	(218.4)
Commercial Waste (Restaurant)		10.5	11.3	10.7
Commercial Waste (Other Shop)		3.6	4.9	4.1
Office Waste		13.7	19.0	15.5
Market Waste		3.7	7.5	5.0
School Waste		0.8	0.4	0.7
Hotel Waste		1.5	1.3	1.4
Road Cleaning Waste		8.0	30.1	15.4
Total		552.8	261.2	455.7
Remarks		WACS's data 12/2005	WACS's data 06/2005	Winter season : 8 months Summer season : 4 months

Waste Amount Forecast Present Amount

ton/day

Category		2005	2010	2015	2020
Household Waste		402.9	?	?	?
	General	(184.5)	?	?	?
	Ash	(218.4)	?	?	?
Commercial Waste (Restaurant)		10.7	?	?	?
Commercial Waste (Other Shop)		4.1	?	?	?
Office Waste		15.5	?	?	?
Market Waste		5.0	?	?	?
School Waste		0.7	?	?	?
Hotel Waste		1.4	?	?	?
Road Cleaning Waste		15.4	?	?	?
Total		455.7	?	?	?

Generation amount = (Generation rate) x (Number of Generation source)

Waste Amount Forecast Future Number of Generation Source

Household waste
→ Population Growth
Business waste
→ Economic Growth

Waste Amount Forecast Economic Growth

	GDP 2003 Actual (million US$)	Growth Rate 2004-2010	Growth Rate 2011-2020
Manufacturing	163.1	20.0%	5.5%
Agriculture, Hunting & Forestry	9.0	0.0%	0.0%
Construction	13.6	10.0%	5.5%
Trade	117.5	5.5%	5.5%
Hotels & Restaurants	12.4	5.5%	5.5%
Transport, Storage & Communication	73.8	5.5%	5.5%
Public Administration	6.5	5.5%	5.5%
Education	28.0	5.5%	5.5%
Health & Social Work	9.3	5.5%	5.5%
Other Community, Social & Personnel Service	8.7	5.5%	5.5%
Financial Intermediation	28.3	5.5%	5.5%
Real Estate, Renting & Other Business Activities	10.0	20.0%	5.5%
TOTAL	480.2		

- Economic Growth = 5.5 %

Waste Amount Forecast Future Waste Generation Rate (GRx)

<~~Japanese statistic~~>
- Developing Economy (1963-1970)
  Increase of GRx = 0.55 of GDP growth rate
- Developed Economy (1975-1988)
  Increase of GRx = 0.29 of GDP growth rate

<UBC>
Increase of GRx = 0.55 of GDP growth rate

Waste Amount Forecast Assumption on the Future Waste Generation Rate

- Generation rate of Ash
  No change in future
- Generation rate of other waste
  Increase 3.0% each year (=5.5% x 0.55)

Forecast Generation Amount

ton/day

Category		2005	2010	2015	2020
Apartment area		111.3	175.1	264.3	383.4
	General	73.2	70.6	73.1	59.9
Ger area	Ash	218.4	197.0	162.6	114.8
Commercial Waste (Restaurant)		10.7	16.3	24.6	37.3
Commercial Waste (Other Shop)		4.1	6.1	9.3	14.1
Office Waste		15.5	23.6	35.6	53.9
Market Waste		5.0	7.5	11.4	17.3
School Waste		0.7	1.1	1.6	2.4
Hotel Waste		1.4	2.2	3.3	4.9
Road Cleaning Waste		15.4	23.7	35.5	53.5
Total		455.7	529.2	621.3	741.5

Waste Composition Forecast

Results of WACS

Unit : %

	Winter season	Summer season	All year
Kitchen Waste	12.6	33.8	16.4
Paper	5.2	18.9	8.2
Textile	2.0	4.8	2.5
Grass and Wood	0.5	4.8	1.4
Plastic	7.8	15.2	8.7
Rubber and Leather	0.2	0.6	0.2
Combustibles	**28.3**	**78.1**	**37.4**
Metal	1.5	3.5	1.9
Bottle and Glass	5.4	10.5	6.3
Ceramic & Stone	1.9	6.8	2.8
Others	2.7	1.1	2.0
Non Combustibles excluding Ash	**11.5**	**21.9**	**13.0**
Ash	60.2	0.0	49.6
Total	100.0	100.0	100.0
Remarks	WACS's data	WACS's data	Winter season : 8 months Summer season : 4 months
Recyclable waste (Paper, Plastics, Metal, Glass)	19.9	48.1	25.1

Present Waste Composition

Unit : %

	2005	2010	2015	2020
Kitchen Waste	16.4	?	?	?
Paper	8.2	?	?	?
Textile	2.5	?	?	?
Grass and Wood	1.4	?	?	?
Plastic	8.7	?	?	?
Rubber and Leather	0.2	?	?	?
Combustibles	**37.4**	**?**	**?**	**?**
Metal	1.9	?	?	?
Bottle and Glass	6.3	?	?	?
Ceramic & Stone	2.8	?	?	?
Others	2.0	?	?	?
Non Combustibles excluding Ash	**13.0**	**?**	**?**	**?**
Ash	49.6	?	?	?
Total	100.0	?	?	?

Assumption for Waste Composition Forecast

- Kitchen Waste, Paper, Plastic, Metal and Bottle/Glass
  Increase 3.0 % per year
- Textile and Rubber/Leather
  Increase half of 3.0 % per year
- Grass/Wood, Ceramics/Stone and Miscellaneous
  Increase 0 % per year

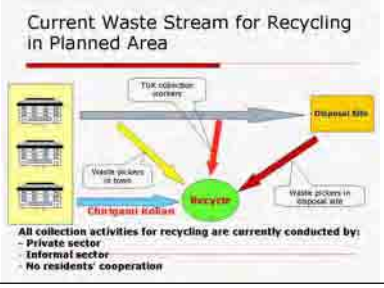
Forecast on Waste Composition

Unit : %

	2005	2010	2015	2020
Kitchen Waste	16.4	20.3	24.5	28.8
Paper	8.2	9.1	12.1	14.2
Textile	2.5	2.9	3.3	3.5
Grass and Wood	1.4	1.5	1.6	1.6
Plastic	8.7	10.8	13.0	15.2
Rubber and Leather	0.2	0.3	0.3	0.3
Combustibles	**37.4**	**45.9**	**54.8**	**63.6**
Metal	1.9	2.3	2.7	3.3
Bottle and Glass	6.3	7.7	9.4	11.0
Ceramic & Stone	2.8	3.0	3.1	3.2
Others	2.0	2.1	2.2	2.2
Non Combustibles excluding Ash	**13.0**	**15.1**	**17.4**	**19.7**
Ash	49.6	39.0	27.8	16.7
Total	100.0	100.0	100.0	100.0
Recyclable Waste	25.1	30.9	37.2	43.7

Chirigami Kokan

Current Waste Stream for Recycling in Planned Area



All collection activities for recycling are currently conducted by:
- Private sector
- Informal sector
- No residents' cooperation

Why we should collect recyclables directly from residents.

1. Less waste scattered by waste pickers
2. Hygiene manner, more systematic
3. Better quality of recyclables
4. Less transportation cost of waste

How to involve Residents

1. Educate them, "Recycle is good for the environment."
2. Respect their pride.
   - If they get little money for recyclables, they are same as waste pickers. Discourage them.
   - If they get goods, they can keep their pride.
3. Satisfy them.
   - Little money (2-300Tg) can't satisfy them.
   - Their contribution to the environment make themselves happier.
4. Comfortable
   - Don't force. Don't disturb.
   - Security. Reliability.

Materials to be used

1. Leaflets explain "Recycle is good for the environment.
2. Goods, toilet paper and soap.
   - All households need these.
   - These can be used for several days.
3. Note to thank for their contribution to the environment.

Experiment:
Which do you want?

Planning Chirigami Kokan

- Khoroo No. 13 and 14, Bayangol
- Population: 12,000 people (2700 HH)
- Waste generation amount
  - 1 person: 256 g/day
  - 12000 p: 3.07 ton/day
- Recyclable (plastic and bottle)
  - Percentage: 29% x ½ = 15%
  - Amount: 3.07ton x 15% = 0.46 ton/day
- Expected cooperation rate: 30%-50%
- Estimated amount to be colleted.
  - 0.46ton/day x 30% = 0.13 ton/day(0.91 ton/w)
  - 0.46ton/day x 50% = 0.23 ton/day (1.61 ton/w)

Why we strengthen Private Sector

1. Private sector will take a main role of recycling in M/P.
2. Without strengthening private sector:
   - Difficult to achieve M/P.
   - Chinese people will occupy profitable business. Mongolian will do only little profitable business.

How to support Private Sector Proposal: "Recycle Fund"

1. Recycle fund
   Examples:
   - Give low interest finance to Mongolian private companies' investment to recycle business.
   - Give subsidy to community activities initiated by residents' group
   - Give subsidy to the operation of RDF.
   - Finance to the environmental education
2. Potential financial source
   - Rental fee of new garbage collection trucks
   - Counterpart money

Outline of Community Meeting in Khoroo 4

How to clean Khoroo 4

Outline

- Date & Time
  - September 14 starting 6:00pm
- Place
  - A meeting place in Khoroo 4
- Participants
  - Local residents (40-45: around 20 from Heseg 7&8 and the rest from other Hesegs)
  - Nuuts Co
  - TUK of Songinokhairkhan
  - MUB
  - NGO
  - JICA study team

Agenda

- Chaired by Facilitator (Ms. Tuul)
- Opening Address : Khoroo 4 Governor
- Opening topic: Progress of PP at UCDS :Nuuts
- Part 1: Current Conditions : Ms. Selenge
  - Result of baseline survey (by the study team)
  - Current conditions in Khoroo 4 (by the study team)
  - Current collection system in Khoroo 4 (by TUK)
- Part 2: Discussion : Ms. Tuul
  - to select a core problem
  - to analyze problems
  - to think about possible solutions
- Closing : MUB Mr. Delgerbayar

Thank You Very Much for your attention

Technical Working Group Meeting (29)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

September 23, 2005
JICA Study Team

1 . Work Progress

① Collection of waste paper and plastic for RDF production
② Community Meeting in Khoroo 4
③ Follow Up Survey for Public Hearing
④ FS for NEDS
⑤ Factory Survey
⑥ Database design and programming for WB
⑦ Water Quality Analysis and Soil Investigation for NEDS
⑧ Implementation of UCDS PP
⑨ Preparation for Chirigami Kokan
⑩ Construction Waste Survey

2. Works for the Following Week

① Collection of waste paper and plastic for RDF production
② Preparation of Educational Tools
③ FS for NEDS
④ Factory Survey
⑤ EIA Study
⑥ Implementation of UCDS PP
⑦ Preparation for Chirigami Kokan
⑧ Preparation of Loading Device
⑨ Construction Waste Survey
⑩ Fee Collection System and Tariff setting
⑪ FS for Central Workshop

3. Subjects to be discussed

① **Commencement of Sanitary Landfilling in UCDS**
② **RDF Combustion Test**
③ **T & M Survey Results**
④ **Result of Community Meeting in Khoroo 4**
⑤ **Before Visiting Japan**

Commencement of Sanitary Landfill in UCDS

- Facility is ready for sanitary Landfill in October 2005
- What is required for sanitary landfill?
  - Bulldozer in good condition (no1:81hrs, No2:133 hrs)
  - Soil to cover waste (Excavator + Dump Truck)
  - Cooperation from Waste Pickers
- Where is the budget and when do you start?

RDF Combustion Test

RDF Combustion Test

- Test on Heating Plant
  - Impact on Air (Exhaust Gas)
  - Impact on Furnace
- Test on Laboratory
  - Calorific Value (economical value of RDF alternative to the coal)
  - Physical Composition of RDF
  - Physical Composition of Ash

Spreader

Condition of Combustion

Impact on Air (Exhaust Gas)

Measure three times
1. Without RDF
2. 5 % mixture of RDF to coal
3. 10% mixture to coal

Exhaust Gas Measurement

- Volume
- Temperature
- Moisture content
- Dust
- Oxygen
- Carbon Dioxide
- Carbon Monoxide
- Sulfur Dioxide
- Nitrogen Oxide
- Hydrogen Chloride
- Dioxin

Impact on Furnace

- Visual Check before and after RDF combustion – internal furnace (brick, water pipe, etc.)
- Investigation of relevant equipment such as feeder, spreader, so on.

Time & Motion Survey in Summer

Outline of Survey

1. Survey Period
   24 Aug. – 5 Sep.
2. Survey Sites

Ger:	Chingeltei
Apartment:	Sukhbaatar
Summer houses:	Chingeltei and Sukhbaatar

Findings for Ger Area

1. Compositions of wastes in winter and summer are very different.
   - No ash
   - Some light waste. Paper and plastic.
   - Construction waste.
   - Even furniture waste.
2. Waste in summer is still heavy. Too difficult for loading.
3. Waste collection fee in summer is cheaper than that in winter.

Findings for Apartment Area

1. Collection method in Sukhbaatar is unsystematic. Low efficiency.
2. Most collection trucks are bad condition.
3. Compactor truck: Only one small compactor can work.

Summer House Area

1. There are several collection points. People carry their waste there by their cars. It is station collection. Not door-to-door.
2. TUK's truck collect waste disposed at collection points.
3. Waste composition looks similar to waste in Apartment. Many packaging waste.
4. There are waste pickers because waste is rich.
5. There are waste fee collectors for summer houses. 5,000 Tug. per season.
6. Quite many people stay there through out a year.
7. Near future, the regular waste collection service throughout a year will be necessary.

General Findings on TUK

1. No proper control of employees.
   - Disorder of works.
2. Ignoring customers.
   - They collect garbage when they want to collect. Their own convenience first.
3. Very hard work for collection workers.
4. Drivers often don't go along road.
5. Most trucks are in bad condition.
6. No future plan. Lack of mind for marketing.
7. To change TUK's mind and attitude is essential to improve SWM.

General Findings

1. Dust chute cause many problems.
   - Irregular waste collection, fire, flies, lack of consciousness on waste by public, unsanitary condition.
2. The system to discharge waste outside cause many problems.
   - Waste scattered by waste pickers.
   - Waste pickers burn waste in winter.
   - Waste frozen in winter.
3. Public cooperation is sometimes good.
   - Loading of waste in ger area.
   - Some apartment areas.

General Findings

4. The collection of waste from Gers and organizations is inefficient. This is due to the poor fee collection system.
5. To improve the waste collection efficiency for Ger and organizations, the fee collection system should be separated.

Result of Community Meeting in Khoroo 4

Program

	Topic
1	Special Topic Progress of the pilot project at Ulaan Chuluut Disposal Site
2	Introduction of the meeting Ice Breaking Game
3	Introduction of participants Opening Remark
	Part I: Sharing information on current conditions
4	Result of Baseline Survey (People's awareness of solid waste management and the manner how to store and discharge waste in Khoroo 4)
5	Current collection service in Khoroo 4
6	Result of Time & Motion survey
	Part II: Discussion
7	Explanation how to proceed discussion
8	Group discussion and presentation of the result of discussion (including a tea break)
9	Summary of discussion
10	Closing Remark

Participant

- Local residents (71 people)
- TUK (Director and 3 staffers)
- Facilitator (Ms. Tuul of Tolgoit)
- JICA
- JICA study team member

Conclusions (1)

- Current collection systems
  - Collection day should be fixed
  - Number of collection vehicles and collection workers should be increased
  - Collection frequency should be at lease twice a month
  - Collection vehicles should have a cover and not load waste too much

Conclusions (2)

- Local residents should
  - keep waste in a container
  - have a drainage hope and not mix waste with waste water generated from cooking and laundry
  - pay a collection fee

Conclusions (3)

- Others
  - A monitoring system should be established.
  - Those who dump waste illegally should be fined and those who catch someone in dumping waste should receive a bonus.
  - Small valleys (resulted from soil erosion) should be filled with soil.
  - Do air an advertisement at radio or TV in order to prevents from illegally dumping and encourage to use collection service etc.

Before Visiting Japan

23rd 2005

JICA Study Team

SWM was Easy and Simple.

SWM was just
- collecting waste
- carrying waste
- disposing of waste.

This was enough
- when the waste amount was little.
- when the waste was mainly biodegradable.
- when the objective was only sanitation.

The Situation has Changed!

1. Population greatly increased.
2. The waste amount increased.
3. Supermarket increased. → Packaging waste have increased.
4. Road have been improved. It has highlighted the ugly view of waste scattering.
5. People's concerns on the environmental has been raised.
6. People are getting more selfish and demanding more.

It has caused:

- Many waste scattering.
- Huge SWM expenditure.
- Too many waste collection vehicles required.
- Serious environmental impacts by landfill.

SWM is Beyond City Gov.' Capacity

- City Gov. can't do SWM works by itself.
- Waste reduction, recycle, separate discharge, require public cooperation.
- Recycle greatly rely on private sector.
- City Gov. has to fully utilize external resources.
  - Citizens
  - Private sector
  - Donors

SWM in Japan

- SWM is the most important issue for local governments.
- Local governments are working very hard to get public cooperation.
  - Very punctual waste collection
  - Leaflets and signboards for public education
  - Education in elementary schools.

In Tokyo Waste Collection System

Garbage Discharge Rule in Tokyo

The notice board showing the waste discharge rule is placed at every collection station.

Garbage Discharge Rule in Katsushika-ward, Tokyo

Paper, glass, tins	on Mon.	before 8am
Combustible waste	on Wed.& Sat	before 9:30am
Incombustible waste	on Fri	before 8am

- Bulky waste — apply to the office by phone (disposal fee depending on items)
- Pet bottles — carry to recycle bins at shops (producers are responsible for collection)
- Nonresidential waste — pay as you throw

Collection Day for Recyclables

Waste Bins at Stations

Have a nice Journey to Japan

Technical Working Group Meeting (30)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

September 30, 2005
JICA Study Team

1

1 . Work Progress

① Collection of waste paper and plastic for RDF production
② Preparation of Educational Tools
③ FS for NEDS
④ Factory Survey
⑤ EIA Study
⑥ Implementation of UCDS PP
⑦ Preparation for Chirigami Kokan
⑧ Preparation of Loading Device
⑨ Construction Waste Survey
⑩ Fee Collection System and Tariff setting
⑪ FS for Central Workshop

2

2. Works for the Following Week

① RDF production
② Preparation of Educational Tools
③ FS for NEDS
④ Factory Survey
⑤ EIA Study
⑥ Implementation of UCDS PP
⑦ Preparation for Chirigami Kokan
⑧ Preparation of Loading Device
⑨ Construction Waste Survey
⑩ Fee Collection System and Tariff setting
⑪ FS for Central Workshop

3

3. Subjects to be discussed

① Fee by sources
② Proposed type of contract for collection work
③ Schedule of 3rd Workshop
④ Schedule of 2nd Public Hearing
⑤ Pilot project for the improvement of UCDS

4

① Fee by sources by Mr. Mori

- See the table provided

5

② Proposed type of contract for collection work by Mr. Doi

6

Potential Types of Contracts for Residential Waste Collection Work

1. Fixed rate per weight of waste
2. Fixed rate per trip by type of truck
3. Lump sum for the contract area

7

Fixed rate per weight of waste

1. The bidders offer the rate per weight for the specified collection area.
2. The client pay to the contractor the fixed rate per weight of waste carried.
3. To be exactly, the rate per km x ton.
4. This is a reasonable concept in terms of the cost.
5. But the contractor often cheat the weight.
   - To pour water on waste.
   - To load construction debris.
6. Budget control is difficult for MUB.

We don't recommend this to MUB.

8

Fixed rate per trip by type of truck

1. The bidders offer the rate per trip to the specified collection area.
2. The client pay to the contractor the fixed rate per trip.
3. This is a reasonable concept in terms of the cost.
4. For the contractor, this is less risk than the per weight system.
5. The client can control the contractor easily.
6. But they don't load waste fully to increase the number of trips. The client has to check the weight of every truck.
7. Budget control is difficult for MUB.
8. This is common system in Japan.

We don't recommend this to MUB.

9

Lump sum for the contract area

1. The bidders offer the amount for the specified collection area.
2. The client pay the amount to the contractor monthly.
3. But the contractors try to dump waste nearby. Checking the truck by weighbridge data is essential.
4. Budget control is easy and no risk for MUB.

We recommend this to MUB.

10

Necessary Preparation Work for Tendering

1. Cost estimation for budgeting
   - Collection and haulage cost for each khoroo should be calculated by using:
   - Haulage distance data
   - waste generation amount data
2. Inventory list of generation sources to be covered by the contract
   - Number of population or households
   - List of small business entities
3. Preparation of tender documents

11

In order to encourage the competition to improve the contractors' performance

1. Creation of many bidding chances.
   - A small contract area.
   - To scatter the tender years of collection areas.
2. To rent collection equipment to the winner. Many companies can participate in it.
3. Rating their performance. It is taken into account for the tender evaluation.
   - Number of complains received.
   - Number of accidents
   - Nuuts' evaluation at disposal site.

12

Work to be included in the Contract

Present	Alternative
TUK does: 1. Collection and haulage 2. Street sweeping work 3. Snow cleaning work	Contractor does: 1. Collection and haulage Other or same contractor does: 1. Street sweeping work 2. Snow cleaning work

13

③ Schedule of 3rd Workshop (1)

- **Purpose**

The main purpose of the 3rd workshop is to evaluate the progress of 2 pilot projects in Khoroo 4 of the Songinokhairkhan District, Urgent Improvement of the Ulaan Chuluut Disposal Site and Raising Public Consciousness on Waste Issues, by local residents and waste pickers.

14

③ Schedule of 3rd Workshop (2)

- **Date: October 18 (Tue)**
- **Part 1 (10:00 – 13:00):**

Targeting local residents who do not work at the disposal site

- **Part 2 (18:00 – 20:00):**

Targeting waste pickers (some of them are residents of Khoroo 4)

15

④ Schedule of 2nd Public Hearing (1)

Purpose:

- to show the result of the EIA survey on the development plan including mitigation measures; and
- to discuss about the result with stakeholders such as local residents and NGOs

④ Schedule of 2nd Public Hearing (2)

Outline:

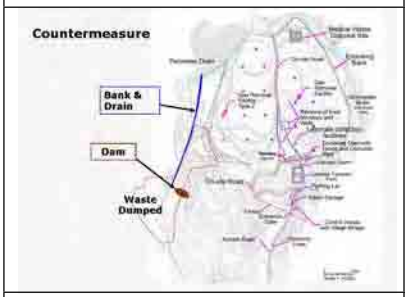
- Date: October 19
- Time: 18:00 – 20:00
- Place: School (?) in Khoroo 3

⑤ Pilot project for the improvement of UCDS

- Westside of UCDS became a dumpsite and expanding everyday.
- To stop dumping and clean up to avoid further expansion. => MUB/Nuuts should do the following measures:

1. Dumped waste shall be cleaned.
2. Boundary of west side shall be established by construction of boundary bank with drain.
3. Waste should not be dumped at outside the boundary. => Strict control

- Strict control of waste dumping at a disposal site is the first step of the sanitary landfill operation.



Construction Waste Survey

Background of Survey

- One of the biggest problem of SWM in UB
  - ⇨ Illegal Dumping
- Construction Wastes : Main Cause

Purpose of Survey

- To Investigate Generation of Construction Wastes
- To investigate waste flow of Construction Waste

Number of Construction Companies

- Construction Companies with Special Permission in UBC
  - 717 companies (active one is 400)
- Construction Companies without Permission
  - ???
  - Check news paper Advertisement

2 out of 15 companies have permission.

50 companies (sites) will be surveyed

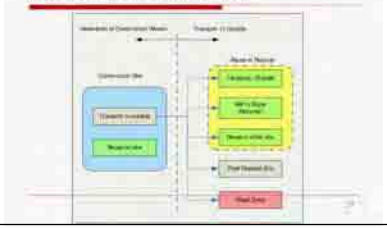
- Apartment construction : 13
- General construction : 20
- Road construction : 5
- Engineering infrastructure : 8
- Electricity : 2
- Roof : 2

Which are actively operated, recommended by CPUDC of MOCUD

Questionnaire

- General information of the project
- Who transport the CW
- What kind of CW generated
- What is the amount (to outside)
- Where to transport

Estimated Waste Flow



Technical Working Group Meeting (31)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

October 17, 2005
JICA Study Team

1 . Work Progress

① RDF production
② Preparation of Educational Tools
③ FS for NEDS
④ EIA Study
⑤ Implementation of UCDS PP
⑥ Implementation of Chirigami Kokan
⑦ Fabrication of Loading Device
⑧ Construction Waste Survey
⑨ Fee Collection System and Tariff setting
⑩ FS for Central Workshop

2. Works for the Following Week

① RDF production
② Preparation of Educational Tools
③ FS for NEDS
④ Third Workshop
⑤ Second Public Hearing
⑥ EIA Study
⑦ Implementation of UCDS PP
⑧ Implementation of Chirigami Kokan
⑨ Fabrication of Loading Device
⑩ Fee Collection System and Tariff setting
11 Preparation of Progress Report

3. Subjects to be discussed

① Schedule of the Study
② Third Workshop
③ Second Public Hearing

① Schedule of the Study

- Oct 18: Third Workshop
- Oct 19: Second Public Hearing
- Oct 21: Technical Working Group Meeting (31) for Discussion of Fee Collection System and Tariff setting
- Oct 24: Discussion of P/R
- Oct 25: Discussion of M/M on P/R
- Oct 26: Inauguration Ceremony
- Oct 27: Signing of M/M on P/R

② Third Workshop

Item 11

The Result of the Environmental Impact Assessment (EIA) Survey

Second Public Hearing Meeting for the Development of a New NEDS and a Recycling Complex

October 19, 2005
Municipality of Ulaanbaatar

7

Pilot Project

Raising Public Consciousness on Waste Issues

8

Үндэслэл

- 4 дүгээр хорооны иргэд тарааж хаясан хог хаягдлаас болж зовдог.
- Асуудал болж байгаа гол шалтгаануудын нэг бол Улаан чулуутын хогийн цэг юм.Гэхдээ,баярлуушатай явдал бол энэ байдал туршилтын төслөөр сайжрана.
- Өөр нэг гол шалтгаан бол одоо хүртэл шийдвэрлэгдээгүй байгаа хууль бусаар хог хаях явдал юм.

9

Objectives

- To make sure of proper operation of the disposal site by introducing the participatory monitoring system
- To decrease illegal dumping though public participation

10

Contents (1)

- To establish a participatory monitoring system
  - To organize the monitoring committee
  - To conduct a participatory evaluation of the pilot project at the Ulaan Chuluut disposal site (the first of two evaluations)
  - To prepare a manual of the future regular monitoring, including the data management

■ finished, ■ partly finished, and ■ not started yet

11

Contents (2)

- To decrease illegal dumping though public participation
  - To conduct a baseline survey (an interview survey)
  - To organize a community meeting
  - To conduct a clean-up activity
  - To prepare educational materials (4 series of leaflets, banners, a poster, a signboard)

■ finished, ■ partly finished, and ■ not started yet

12

Progress of the Project

13

Establishment of Participatory Monitoring System (1)

Monitoring Committee Members

	Name	Organization
1	Mr. Delgerbayar	MUB
2	Mr. Ganbold	Khoroo 4 Governor
3	Mr. Ch.Batsaihan	MUB
4	Mr. Gonchigsumlaa	MOE
5	Ms. Ouyntsetseg	Specialized Monitoring Body of UB
6	Ms. Baatarjav	NGO-Baigal Erdene Fund
7	Ms. Enhee	NGO-World Vision
8	Mr. Darisuren	Resident representative
9	G.Enhjargal	Health center staffer
10	Hishigmaa	School teacher

14

Establishment of Participatory Monitoring System (2)

- Participatory Evaluation of Pilot Project at the Ulaan Chuluut Disposal Site
  - First Evaluation (before the pilot project started)
  - Date: July 28, 2005
  - Participants:
    Monitoring Committee Members
    20 local residents

15

Establishment of Participatory Monitoring System (3)

Program of the First Participatory Evaluation

1	Нээлтийн үг	Mr. Ganbold
2	"Улаан Чулуутын хогийн төвлөрсөн цэгийн нөхцлийг ахиралтай сайжруулах", "Хог хаягдлын асуудлаар иргэдийн мэдлэг, ухамсрыг дээшлүүлэх" туршилтын төслүүдийг хэрэгжүүлэх болсон үндэслэл ба тэдгээрийн тухай танилцуулга	Mr. Delgerbayar MUB
3	Байгаль хамгаалын тогтолцоо бий болгох, хамгаалын хороонд гишүүдийг танилцуулах	Mr. Delgerbayar MUB
4	Эрүүл ахуйн шаардлага хангасан ландфилын үйл ажиллагаа хэрхэн явуулах болон ухаалганий хүүдэг хэрэн бөглөх тухай	Mr. Delgerbayar MUB
5	УЧОЦ-ийн нөхцлийг сайжруулах талаарлаг	Mr. Jambaldorj Nuut. Co
6	Site tour To fill in the check-sheet	Mr. Jambaldorj Nuut. Co
7	Questions & Answers/ To fill in the questionnaire	
8	Closing remark	

16

Establishment of Participatory Monitoring System (4)

First Participatory Evaluation

18

Establishment of Participatory Monitoring System (5)

Result of First Participatory Evaluation

Байгаль орчны асуудлууд			Үйл ажиллагааны нөхцөл		
№	Асуумт	Дүн	№	Асуумт	Дүн
A1	Гал ба утаа	1.1	A8	Нийт үйл ажиллагаа	1.0
A2	Эвгүй үнэр	1.1	A9	Хог түүч нарын ажлын нөхцөл	1.1
A3	Хамгдал ус	1.4	A10	Хогны машин	1.0
A4	Хог хаягдлын тархалт	1.0	A11	Бульдозер болон бусад ландфилын ажиллагаат хангах хүнд даварн машин механизм	1.1
A5	Амьтан (нохой, шувуу, хорг)	1.2	A12	Хог хаягдал бууллаг байршил	1.0
A6	Шавьж (хлаа, ет, хорг)	1.1	A13	Халдварүүйжүүлэх ажил хийдэг эсэх	1.0
A7	Гаднах байдал	1.0			

The highest and lowest scores are 3.0 and 1.0 respectively.

19

Decrease in illegal dumping (1)

Community Meeting

- Date: September 14, 2005
- Location: Meeting room of Khoroo 4
- Participants
  - Local residents (71 people)
  - TUK (Director and 3 staffers)
  - Facilitator (Ms. Tuul of Tolgoit)

20

Decrease in illegal dumping (2)

Program of Community Meeting (September 14, 2005)

	Topic
1	Special Topic Progress of the pilot project at Ulaan Chuluut Disposal Site
2	Introduction of the meeting (Ice Breaking Game)
3	Introduction of participants and Opening Remark
	Part I: Sharing information on current conditions
4	Result of Baseline Survey (People's awareness of solid waste management and the manner how to store and discharge waste in Khoroo 4)
5	Current collection service in Khoroo 4
6	Result of Time & Motion survey
	Part II: Discussion
7	Explanation how to proceed discussion
8	Group discussion and presentation of the result of discussion (including a tea break)
9	Summary of discussion
10	Closing Remark

21

Community Meeting

22

Decrease in illegal dumping (3)

Conclusions of Community Meeting (1)

- Current collection systems
  - Collection day should be fixed
  - Number of collection vehicles and collection workers should be increased
  - Collection frequency should be at lease twice a month
  - Collection vehicles should have a cover and not load waste too much

23

Decrease in illegal dumping (4)

Conclusions of Community Meeting (2)

- Local residents should
  - keep waste in a container
  - have a drainage hope and not mix waste with waste water generated from cooking and laundry
  - pay a collection fee
- Others
  - A monitoring system should be established.
  - Those who dump waste illegally should be fined and those who catch someone in dumping waste should receive a bonus.
  - Small valleys (resulted from soil erosion) should be filled with soil.
  - Do air an advertisement at radio or TV in order to prevents from illegally dumping and encourage to use collection service etc.

24

Decrease in illegal dumping (5)

Educational Materials

- Leaflet (4 series)
- Banner (5 sheets)
- Poster
- Badge (key holder)
- Signboard

25

Decrease in illegal dumping (6)
Educational Materials

Decrease in illegal dumping (6)
Clean-up Activity

- Date: October 20 (the day after tomorrow!)
- Starting at 3:00 pm

Let's join in Clean-up Activity
to clean our Khoroo!

Thank you very much

Technical Working Group Meeting (32)
for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

October 21, 2005
JICA Study Team

1 . Work Progress

① RDF production
② Preparation of Educational Tools
③ FS for NEDS
④ Third Workshop
⑤ Second Public Hearing
⑥ EIA Study
⑦ Implementation of UCDS PP
⑧ Implementation of Chirigami Kokan
⑨ Fabrication of Loading Device
⑩ Fee Collection System and Tariff setting
11 Preparation of Progress Report

2. Works for the Following Week

① RDF production
② Preparation of Educational Tools
③ FS for NEDS
④ Inauguration Ceremony
⑤ EIA Study
⑥ Implementation of UCDS PP
⑦ Implementation of Chirigami Kokan
⑧ Fabrication of Loading Device
⑨ Fee Collection System and Tariff setting
⑩ Preparation of Progress Report

3. Subjects to be discussed

① Schedule of the Study
② Fee Collection System and Tariff setting

① Schedule of the Study

- Oct 24: Discussion of P/R
- Oct 25: Discussion of M/M on P/R
- Oct 26: Inauguration Ceremony
- Oct 27: Signing of M/M on P/R
- Nov 1: New operation hour of UCDS will start

Inform all users of UCDS before Nov. 1.

New operation hour of UCDS

Notice from Nuut Co.

We will introduce the operation hour system from MM/DD.
Since we will close the disposal site during the midnight and early morning, please remind the following new operation hour when you make your operation plan.

Our New Operation Hour
Winter Time (October - March)
8:00 - 22:00
Summer Time (April - September)
6:00 - 24:00

We will also introduce a sanitary landfill operation.
Our supervisor will give you an instruction where you should unload waste. Please follow the instruction.
We will highly appreciate your cooperation.

② Fee Collection System and Tariff setting by Mr. Mori

Thank you very much

Technical Working Group Meeting (33)
for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

December 9, 2005
JICA Study Team

1 . Work Progress

① RDF production and Preparation of combustion test
② Preparation of Educational Tools
③ FS for NEDS and Recycling Complex
④ EIA Study
⑤ Implementation of UCDS PP
⑥ Implementation of Chirigami Kokan
⑦ Fee collection and Tariff Settings

2. Works for the Following Week

① RDF production and preparation of combustion test
② Preparation of Educational Tools
③ FS for NEDS and Recycling Complex
④ EIA Study
⑤ Implementation of UCDS PP
⑥ Implementation of Chirigami Kokan
⑦ Trial of Loading Device
⑧ Fee Collection System and Tariff setting

3. Subjects to be discussed

① Delivery of loading device
② EIA procedure
③ Schedule of RDF production and combustion test
④ Terminology of SWM words
⑤ Monitoring committee
⑥ Results of 3rd Workshop

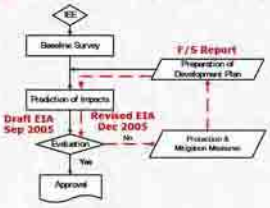
① Delivery of loading device

Eight loading devices are completed.

- To whom we deliver them
- How to deliver and when

② EIA procedure

- Study team will complete F/S including financial analysis by mid-December
- MUB/Agrar shall modify the draft EIA report



③ Schedule of RDF production and combustion test

Production of RDF : History

- First Company : Mongol Khevlel
  - Spend 3 months and Give up
- Second Company : TUV MORIT HANGAI
  - Start preparation at early Nov 2005

Trial run is over and final adjustment of the machinery is under way.

RDF Production Machinery 1

RDF Production Machinery 1

Schedule for Production and Combustion Test

- Production : Dec 2005 and Jan 2006
  - Required Quantity : 6 to 12 ton depend on the mix proportion and combustion test procedure
- Combustion Test : Feb 2006
  - Location : Nalaikh Heating Plant
  - Feeding Method : manual
  - Sampling of emission gas

Nalaikh Heating Plant

Manual Feeding

④ Glossary of Solid Waste Management

Terms need to be discussed

- 3Rs
  - Reuse
  - Recycle
- Others
  - discharge

⑤ How to make Monitoring Committee work?

Monitoring Committee Members

proposed in the Interim Report

Chairperson	Khoroo 4 Governor
Member 1	a staffer of MUB in charge of environmental issues
Member 2	an environment/pollution inspector
Member 3	a staffer of the health center
Member 4	a school teacher
Member 5	a representative of local residents
Member 6	a staffer of local NGO

Monitoring Committee Members

Name	Organization
Ganbold	Khoroo 4
Ch.Batsaihan	MUB
Delgerbayar	MUB
Gonchigsumlaa	MOE
Ouyntsetseg	Specialized Monitoring Body of UB
Darisuren	Resident representative
G.Enhjargal	Health center staffer
Ms. Chagtsal	School teacher
Enhee	NGO-World Vision
Baatarjav	NGO-Baigal Erdene Fund

Matters in Question

- It seems difficult for Khoroo to take a leading role.
  - City Specialized Inspection Department takes a leading role; to organize a regular monitoring, convene members, and compile the data
- Neither of two NGOs are local NGOs.
  - Local NGO (Tolgoit) is included
- The number of local people is too small.
  - A few more local representatives are included.

Matters to be confirmed

- Frequency
  - Once every three months
- Data Management
  - City Specialized Inspection Department is in charge.
- Information disclosure
  - Annual report
  - At the office of Khoroo 4 and Tolgoit
- Meeting with Nuut
  - At the control office after the monitoring

Result of 3rd Workshop

Objectives

- To evaluate the progress of the pilot project

Outline 1

- Targeted Pilot Projects
  - Urgent Improvement of the UCDS
  - Raising Public Consciousness on Waste Issues
- Evaluators
  - Local people in Khoroo 4
  - Those who worked at the UCDS

25

Outline 2

- Divided into two parts
  - Part 1: Local resident meeting
    - Evaluating both projects
  - Part 2: Disposal site meeting
    - Evaluating only one project at the UCDS
- Evaluation methods: all the participants were required to write answers to several questions by the team.

26

Outline 3

Questions at the evaluation session

Part 1: Local resident meeting

- ✓ Changes in environmental conditions (Are there any changes by the pilot project? If so, what is improved and what is not improve or worsen?)
- ✓ Changes in people's awareness (Are there any changes in your awareness by the pilot project? If so, what is improved and what kinds of changes occurred?)
- ✓ Effect of educational materials (Opinions and comments on educational materials such as leaflet and banners)
- ✓ Changes in people's behaviors (Are there any changed in your behaviors?)
- ✓ Other comments

27

Outline 3

Questions at the evaluation session

Part 2: Disposal site meeting

- ✓ Changes in environmental conditions (Are there any changes by the pilot project? If so, what is improved and what is not improve or worsen?)
- ✓ Changes in working conditions (Are there any changes by the pilot project? If so, what is improved and what is not improve or worsen?)
- ✓ Other comments on the project

28

Thank you very much

29

Technical Working Group Meeting (34)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

December 16, 2005
JICA Study Team

1

1 . Work Progress

1. **RDF production and preparation of combustion test**
2. **Preparation of Educational Tools**
3. **FS for NEDS and recycling complex**
4. **EIA Study**
5. **Implementation of UCDS PP**
6. **Implementation of Chirigami Kokan**
7. **Trial of Loading Device**
8. **Fee Collection System and Tariff Setting**

2

2. Works for the Following Week

1. **RDF production and preparation of combustion test**
2. **Completion of Weigh Bridge**
3. **FS for NEDS and recycling complex**
4. **EIA Study**
5. **Implementation of UCDS PP**
6. **Implementation of Chirigami Kokan**
7. **Trial of Loading Device**
8. **Fee Collection System and Tariff Setting**

3

3. Subjects to be discussed

1. **Ulaan Chuluut Disposal Site**
2. **RDF Production and Combustion Test**
3. **Loading Device**
4. **Fee Collection and Tariff Setting**

4

1st Step of Sanitary Landfilling

- Dispose Wastes at designated place

⇩

- Need to prepare area for disposal
- Control Truck
- Control Waste Pickers

⇩

- Workable Bulldozer
- Capable Supervisor

11

Completion of Weighbridge

- Outstanding work
- Verification of Weigh Bridge
- Strengthening of approach slab

⇩

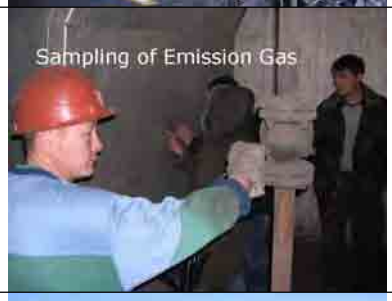
- Let's start weighing truck

12

Schedule for Production and Combustion Test

- Production : Dec 2005 and Jan 2006
  - Required Quantity : 6 to 12 ton depend on the mix proportion and combustion test procedure
- Combustion Test : Feb 2006
  - Location : Nalaikh Heating Plant
  - Feeding Method : manual
  - Sampling of emission gas

16



Tariff Setting
and
the Resulting Revenues and Costs

22

Assumptions

Fee collection rates:

		2010	2015	2020
Apartment		86%	86%	86%
Ger	Effective fee collection rate (excluding poor households)	18%	100%	100%
	Overall fee collection rate	12%	63%	63%

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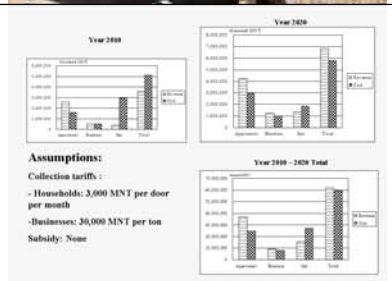
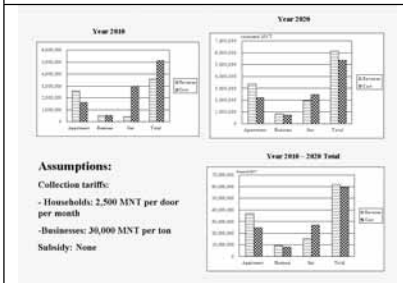
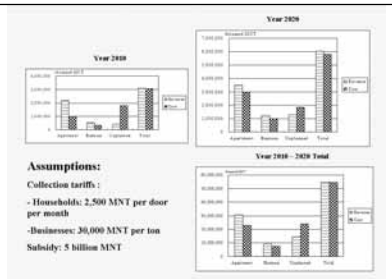
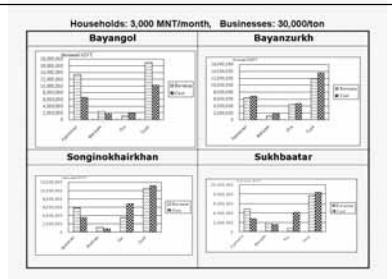
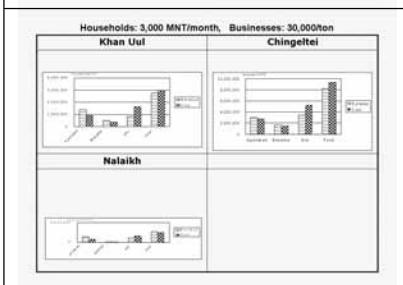










Thank You Very Much for your attention

29

Technical Working Group Meeting (35)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

January 6, 2006
JICA Study Team

1 . Work Progress

① RDF production and preparation of combustion test
② Preparation of Educational Tools
③ FS for NEDS and recycling complex
④ EIA Study
⑤ WB Outstanding Work
⑥ Data Collection at WB
⑦ Implementation of Chirigami Kokan
⑧ Trial of Loading Device
⑨ Implementation of UCDS Project

2. Works for the Following Week

① RDF production and preparation of combustion test
② Data Collection at WB
③ FS for NEDS and recycling complex
④ EIA Study
⑤ Implementation of UCDS PP
⑥ Implementation of Chirigami Kokan
⑦ Trial of Loading Device
⑧ Fee Collection System and Tariff Setting

3. Subjects to be discussed

① Ulaan Chuluut Disposal Site including WB Operation
② RDF Production and Combustion Test
③ Distribution of Poster
④ Costing for Collection

UCDS Operation Hour

- Why open for mid night
  - Out of control
  - Operator's cost

Distribution of Poster

Method and Result of Costing

for the improvement of collection system

Feasibility Study (Costing)

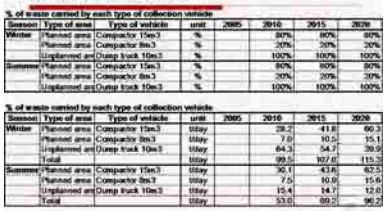
1. Improvement of collection system
2. Development of New NEDS
3. Development of Recycling Complex

1.Caluculation of Necessary Equipment-1 (ex. Sukhbaatar District)

Waste Collection Amount per day by type of the collection vehicle

Waste Collection Amount per day by type of Vehicle

% of Waste carried by each type of collection vehicle



Average trip per day by type of vehicle

Number of Vehicle required

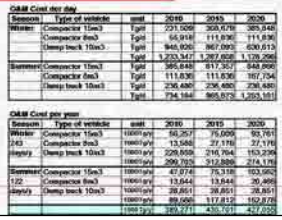
Price of Each Equipment

	Basic price USD	Basic price Tg	Life year years	Salvaged value Tg
Compactor truck 15m3, 10ton	95,000	114,000,000	8	11,400,000
Compactor truck 8m3, 6ton	80,000	96,000,000	8	9,600,000
Dump truck 10m3, 6ton	65,000	78,000,000	8	7,800,000
Skipper truck 5m3		0	8	0
Wheel loader	130,000	156,000,000	12	15,600,000
Wheel backhoe	100,000	120,000,000	12	12,000,000

Number of Vehicles and Amount to be Invested

O&M cost per each truck

O & M Cost



Summary of Cost

	Investment	O&M
2009	4,296,054	0
2010	0	3,045,706
2011	228,000	3,087,680
2012	96,000	3,098,026
2013	666,000	3,065,632
2014	288,000	3,182,776
2015	342,000	3,146,114
2016	342,000	3,231,304
2017	4,125,595	3,276,581
2018	324,000	3,298,203
2019	433,200	3,337,283
2020	-3,611,625	3,364,134

Thank You Very Much for your attention

Technical Working Group Meeting (36)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

January 13, 2006
JICA Study Team

1 . Work Progress

① RDF production and preparation of combustion test
② Data Collection at WB
③ FS for NEDS and recycling complex
④ EIA Study
⑤ Implementation of UCDS Pilot Project
⑥ Implementation of Chirigami Kokan
⑦ Trial of Loading Device
⑧ Fee Collection System and Tariff Setting

2. Works for the Following Week

① RDF production and preparation of combustion test
② Data Collection at WB
③ FS for NEDS and recycling complex
④ EIA Study
⑤ Implementation of UCDS PP
⑥ Implementation of Chirigami Kokan
⑦ Trial of Loading Device
⑧ Fee Collection System and Tariff Setting

3. Subjects to be discussed

① How to make the monitoring committee work?
② Policy of collection system improvement
③ Interim evaluation of the recycling pilot project
④ Interim evaluation of the loading device for heavy waste

① How to make Monitoring Committee work?

Monitoring Committee Members
proposed in the Interim Report

Chairperson	Khoroo 4 Governor
Member 1	a staffer of MUB in charge of environmental issues
Member 2	an environment/pollution inspector
Member 3	a staffer of the health center
Member 4	a school teacher
Member 5	a representative of local residents
Member 6	a staffer of local NGO

Matters in Question

- It seems difficult for Khoroo to take a leading role.
  - City Specialized Inspection Department takes a leading role; to organize a regular monitoring, convene members, and compile the data
- Neither of two NGOs are local NGOs.
  - Local NGO (Tolgoit) is included
- The number of local people is too small.
  - A few more local representatives are included.

Proposed Monitoring Committee Members (revised)

Chairperson	Specialized Monitoring Body of UB
Local members	
Member 1	Khoroo 4
Member 2	School teacher
Member 3	Health center staffer
Member 4,5,6	Representatives of local residents
Member 7	Representative of local NGO
City-wide	
Member 1,2	MUB
Member 3	MOE
Member 4,5	Representatives of NGOs

Matters to be confirmed

- Frequency
  - Once every three months
- Data Management
  - City Specialized Inspection Department is in charge.
- Information disclosure (how to open the result)
  - Annual report
  - At the office of Khoroo 4 and Tolgoit
- Meeting with Nuut
  - At the control office after monitoring (every time)

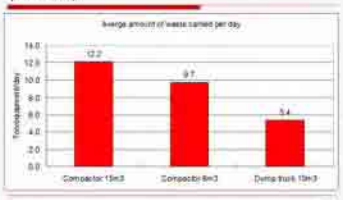
Strategy for the Collection Improvement

Assumed Bulk density of waste

	Area	Original condition	After compaction
Compactor 15m³ & 8m³	Planned	0.20 t/m³	0.45 t/m³
Dump truck 10m³	Un-planned	0.30 t/m³	-

Collection & Haulage Cost per Equipment per Day

Average Amount of Waste Carried per Day



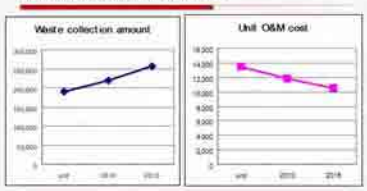
Collection & Haulage Cost per Ton of Waste

Compactor is cheaper by 5000Tg per ton of waste.

How much can Collection Cost is reduced?

- Waste amount in planned are in 2015: 133,000 ton
- The difference of unit cost between a dump truck and a compactor: 5,000Tg/ton
- Different amount in 2015:
  133,000ton x 5,000Tg/ton=
  665million Tg. can be saved in 2015.

Waste Collection Amount vs Unit Collection Cost



Strategy to achieve 100% collection rate at the minimum cost.

1. To minimize the total collection cost, all waste in Planned Area is collected by compactor trucks.
2. Extra budget squeezed in Planned area is spent for un-planned area.
3. Common 6 ton dump truck is used for un-planned area because compactor is unsuitable for waste there.

Separate Collection

1. Separate collection is necessary for the sorting yard and RDF
2. Separate collection is introduced into the planned area.
3. Collection schedule
   - General waste: 2 times/week
   - Recyclable waste: 1 time/week
4. Sorting yard and RDF require the very stringent collection plan and schedule.

Collection Schedule
Essential for Sorting yard and RDF

Type	Mon	Tue	Wed	Thu	Fri	Sat	Sun
1(33t)	R		G			G	
2(33t)	G	R		G			
3(33t)		G	R		G		
4(33t)			G	R		G	
5(33t)	G			G	R		
6(33t)		G			G	R	
Total 200t	R-1 G-2	R-1 G-2	R-1 G-2	R-1 G-2	R-1 G-2	R-1 G-2	

G: Collection day of General Waste
R: Collection day of Recyclable Waste

Institutional Requirements

1. MUB has to prepare and strictly control the collection schedule of each khoroo in the planned area.
2. MUB force
   - The contractor collect waste from un-planned area.
   - The contractor use the compactor only for the planned area.
3. If the contractor doesn't follow the collection schedule, MUB fire the contractor immediately.
4. MUB does the public education on the separate discharge.
5. MUB has to receive complains from residents to understand the contractor's performance.
6. In order to control the contractor, MUB must hold the right of payment.

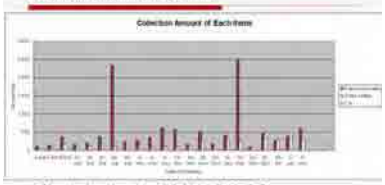
Interim Evaluation of Recycle Project (Chirigami Kokan)

Outline of the Project

- Site: Bayangol, Khoroo 12, 13, 14.
- Population: about 23,000
- Household: about 4,200
- It started on 2 Oct.
- It carried out every Wednesday and Sunday.
- It did already 23 days.
- It will do the last operation this Sunday.

Total customer is 552.
Total household is 4,200.

Collection Amount



Plastic bottle: 11,475 (114,750 Tg)
Glass bottle: 3,811 (38,110 Tg)

Ranking of Swapped Goods

Present Condition of the project

1. Number of customers and items collected are increasing.
2. Residents are getting familiar with sorting material.
3. Most people appreciate this project because they can get useful things.
4. People expect to continue the project.
5. People expect to expand the area.

Problems with the system

1. Residents often miss the truck due to:
   - People don't know when Truck come.
   - It takes time for people to come down.
2. Weekday is inconvenient for residents.
3. Target area is too small for a truck.

Housing Association Survey 1/2

- 88% Ass. Staff know the project.
- 75% Ass. Staff think the private sector recycle necessary.
- 94% Ass. express their cooperation.
- Ass say many residents appreciate the project.
- 100% request the project continuation.
- 50% support the swapping method. 38% support money.

Housing Association Survey 2/2

- There is a conflict with entrance keepers and waste pickers.
- Most association request to do the education of residents for sorting. Association cooperate for it.
- Problem is that the collection truck schedule is irregular.

Impacts

1. Little conflict with entrance keepers.
2. Less recyclable waste in the dust chute chambers.
3. Waste pickers suffer from the decrease of recyclables.

Lessons

1. It takes a few months for residents to get familiar with the new system.
2. The education should be done together with the project.
3. It should be done on Saturday and Sunday.
4. The schedule should be fixed and informed to residents in advance.
5. People want to swap with OK soap, soap, toilet papers.

Recommendation

1. We should continue and even expand the project because:
   - Many people expect and getting familiar with sorting at home.
   - The project is heading to the success.
2. The assistance to the operator should be gradually decreased to make them independent.

Thank You Very Much for your attention

Technical Working Group Meeting (37)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

January 20, 2006
JICA Study Team

1 . Work Progress

① **RDF production and preparation of combustion test**
② **Data Collection at WB**
③ **F/S for NEDS and NERC**
④ **EIA Study**
⑤ **Implementation of UCDS Pilot Project**
⑥ **Implementation of Chirigami Kokan**
⑦ **Trial of Loading Device**
⑧ **Fee Collection System and Tariff Setting**

2. Works for the Following Week

① **RDF production and preparation of combustion test**
② **Data Collection at WB**
③ **F/S for NEDS and recycling complex**
④ **EIA Study**
⑤ **Implementation of UCDS PP**
⑥ **Preparation of Chirigami Kokan Continuation**
⑦ **Fee Collection System and Tariff Setting**

3. Subjects to be discussed

① **Data management method of City Specialized Inspection Department**
② **Improvement Issues for UCDS/PP**
③ **RDF Production and Combustion Test**
④ **Feasibility Study Results (1)**

① Data management method of City Specialized Inspection Department (SID)

It was discussed and agreed that the SID takes responsibility for data management of the monitoring committee. To find out better data management, the following information is required.

Question

- **What kinds of data management system SID has?**
- **In case it has a digital (computerized) data base:**
  - **What kinds of soft ware it applies?**
  - **How long is it used and how many months' data it has?**
  - **Are there any manual for the operation of it?**
  - **Degree of the data utilization: some examples?**
  - **Does the data open to the public?**
  - **If yes, how does SID publicize the data?**

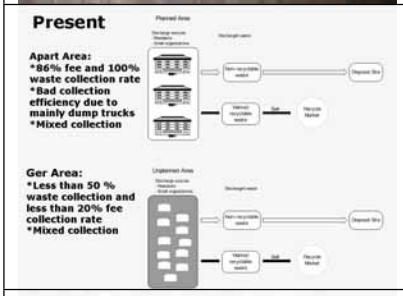
② Improvement Issues for UCDS/PP

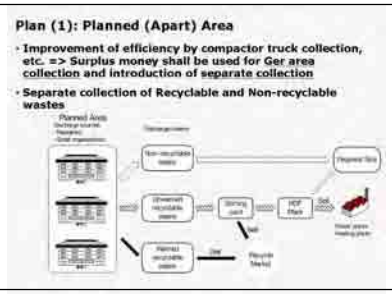
③RDF Production and Combustion Test

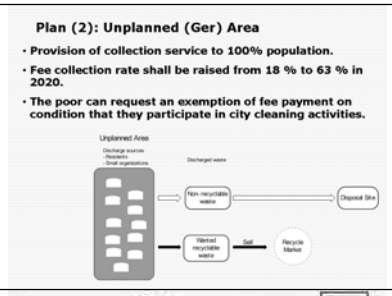
④ Feasibility Study Results (1)

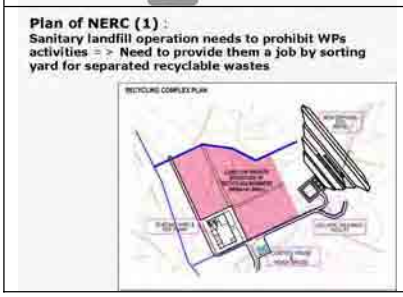
Feasibility Study (F/S) Projects

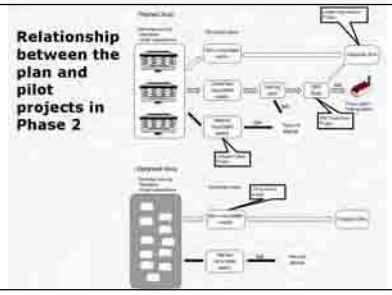
1. Improvement of collection system including development of a central workshop
2. Development of Narangiin Enger Disposal Site (NEDS)
3. Development of Narangiin Enger Recycling Complex (NERC)



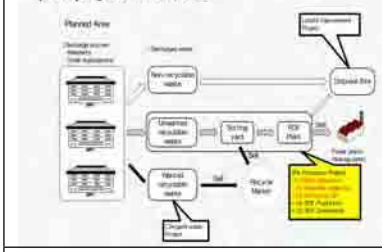








Relationship between the plan and proposed pilot projects in Phase 3



Issues to be discussed for proposed separate collection in Phase 3 (1)

- Intentions of MUB/Duuregs/Khoroos on separate collection and RDF. Yes or No
- Separate collection does not give any profits to the residents who separate their waste. => Are there any housing corporations to conduct separate collection?
- If yes, let have a competition for separate collection performance.
- For successful separate collection it requires intensive and long-term public education to the residents by the administrations.

Issues to be discussed for proposed separate collection in Phase 3 (2)

- Which governments will take such works?
- City Maintenance Div (CMPUD) of MUB needs to strengthen in human resources.
- A JOCV volunteer will assist it.
- Separated recyclable waste is subject to WPs sorting at UCDS. => provision of area or facility and organization of WPs
- Residue after sorting will be raw materials for RDF production. => Mass production of RDF (to 50 tons) and continuous combustion test (more than one week)

Thank You Very Much for your attention

Technical Working Group Meeting (38)
for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

February 3, 2006
JICA Study Team

1 . Work Progress

① RDF production and preparation of combustion test
② Data Collection at WB
③ F/S for NEDS and NERC
④ EIA Study
⑤ Implementation of UCDS Pilot Project (PP)
⑥ Preparation of Chirigami Kokan Continuation
⑦ Fee Collection System and Tariff Setting

2. Works for the Following Week

① RDF production and preparation of combustion test
② Data Collection at WB
③ F/S for NEDS and recycling complex
④ EIA Study
⑤ Implementation of UCDS PP
⑥ Implementation of Chirigami Kokan
⑦ Fee Collection System and Tariff Setting

3. Subjects to be discussed

① Confirmation of the improvement issues on UCDS
② PP for Separate Collection
③ RDF Combustion Test
④ Feasibility Study Results (2)

① Confirmation of the improvement issues on UCDS

- Kid climbing collection trucks
- Completion of enclosing bank
- Move of movable fence
- Procurement of a second hand bulldozer

How to prevent vehicles from climbing up children

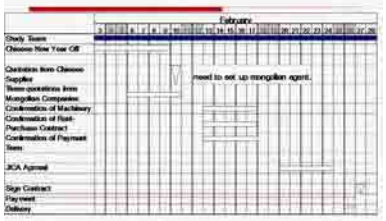
Incompletion of Second Embankment Dam

Relocation of Movable Fence

Purchasing Chinese made second hand Bulldozer

- Rent Purchase Contract
  - Draft Contract prepared by?
  - How much is the first payment as a rent.
  - Sign Contract in where, by who,
- Payment Term
  - Pay in cash, transfer money, check?
  - Pay in US$, Chinese Yuen? Tg?
  - Pay to who, is it possible to pay to Chinese Company? Or only Mongolia company?
- Schedule (to match JICA rule)
  - Before when, needs to sign Contract
  - Before when, money has to be paid.
  - Before when, machinery has to be delivered

Schedule



② PP for Separate Collection

PP for Separate Collection

1. **Separate Collection Item** :
   - **Paper, Textile, Plastic, Metal**
2. **Type of Vehicle to be used**
   - **8 m³ Compactor**
   - **2 trips per day,**
   - **8 m³ x 80 % x 0.2 t/ m³ =1.28 t / trip**
   - **1.28 t / trip x 2 trips / day = 2.56 t / day / truck**
3. **Frequency of Collection**
   - **Once a Week**

Population to be covered under PP

- Generation Rate from Apartment in 2005
  - 256 g/day/person in winter
  - 228 g/day/person in summer
- % of Recyclable Waste (paper, textile, plastic, metal)
  - 43.7 % in winter
  - 42.1 % in summer
- Recyclable waste generated by a person (take a big figure for planning)
  - 256 g x 43.7% = 112 g/person/day

13

- Recyclable wastes generation in a week
  - 112 g x 7 days = 784 g/person/week
- Collection truck will work 6 days a week
  - 2.56 t/day x 6 days = 15.36 t /week

14

- Population covered by one 8 m³ compactor for separate collection
  15.36 t/week/truck ÷ 784 g / person/week
  = 19,592 persons

!! Nearly cover 4 % of the UB city apartment population.

15

O & M cost for 8 m³ compactor

Items	Unit	Compactor 15m3	Compactor 8m3	Dump truck 10m3
Distance	km	17.2	17.2	23.3
Diesel consumption per km for traveling	km/l	2	5	3
Collection and discharge time	minutes	125	69	125
Efficiency for working hours		0.9	0.9	0.9
Diesel consumption per minutes for collection	min/l	15	30	30
Diesel quantity for traveling	liter/trip	17.2	6.88	15.533333
Diesel quantity for collection	liter/trip	7.5	2.07	3.75
Total consumption quantity of diesel	liter/trip	24.7	8.95	19.283333
Unit rate of diesel	Tg/liter	940	940	720
Fuel cost per trip	Tg/trip	20,748	7,518	13,884
Trip nos per day	Trip/day	2	2	2
Fuel cost per day	Tg/day	41,496	15,036	27,768
Depreciation cost	Tg/day	0	0	24,041
Maintenance cost	Tg/day	21,863	18,411	14,959
Salary	Tg/day	16,667	16,667	16,667
O&M cost per day	Tg/day	80,026	50,114	83,435
Unit cost per ton of waste	Tg/ton	6,581	7,734	15,451

O & M Cost for 8m³ Compactor

Unit: Tg

	Fuel	Salary	Repair	Total
1 day	15,036	16,667	18,411	50,114
1 month	360,864	400,008	441,864	1,202,736
6 month	2,165,184	2,400,048	2,651,184	7,216,416
1 year	4,330,368	4,800,096	5,302,368	14,432,832

17

Example of housing association

Chingeltei Duureg

	Number of Apartment Associations	Number of House hold	Population*
Khoroo 1	8	1,101	3,902
Khoroo 2	8	780	2,431
Khoroo 3	8	1,105	4,928
Khoroo 4	9	841	3,467
Khoroo 5	4	963	3,790
Khoroo 6	6	959	2,833
total		5,749	21,351

*in case data is not available, 4.5 person per house hold is used to calculate

18

③ Mixed Combustion Test RDF with Coal

19

Objectives

- To mainly investigate degree of negative impacts which may be caused by mixed combustion of RDF with coal at the existing heating plant;
- To demonstrate citizens in MUB both negative and positive impacts of the mixed combustion of RDF with coal at the existing heating plant in order to obtain the consensus to implement the proposed M/P regarding thermal recycle "RDF"; and
- To examine economic viability of the use of RDF at the existing heating and/or power generation plant. => It needs long term use.

20

Negative Impacts

- Generation of black smoke;
- Generation of dioxins;
- Damage to the internal furnace due to higher combustion temperature than pure coal combustion; and
- Generation of hydrochloric (HCl) gas.

21

Outline of the Test (1)

- The M/P proposes to use RDF at the existing power plants in which continuous and higher combustion of it is done in order to reduce adverse impacts.
- Even if RDF is produced at maximum amount in the target year of F/S, i.e. 2010, the portion of RDF mixture to coal is less than 4% in weight[1]. Calorific value of RDF is estimated as two times of that of coal. So mixing 4 % of RDF means 8% in terms of calorific value.

[1] No. 3 power plant has 13 furnaces and two of them are fluid type furnaces which will be able to burn particle type fuel like RDF. However, the other furnaces of the existing power plants uses powder coal which can not burn RDF without providing grades.

22

Outline of the Test (2)

- Compare with the mixed combustion of RDF at the power plants, it at the Nalaikh heating plant may cause more serious negative impacts. It is, therefore, more convenient to conduct the combustion test at the Nalaikh heating plant.
- Furthermore, since available RDF amount for the test is very limited, i.e. about 12 tons, mix proportion of RDF to coal is decided at 4 % and 8 % in weight (8% and 16 % in terms of calorific value) in this test in order to observe more serious condition than it of F/S.
- In the test RDF and coal will be mixed and burned in the furnace and to obtain combustion data, check equipment running condition and inspect combustion conditions visually.

23

Outline of the Test (3)

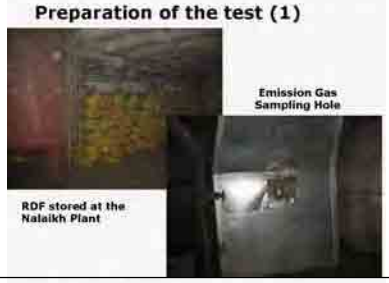
- There will be four kinds of combustion tests, 1. Preliminary test, 2. Baseline test for only coal combustion, 3. Mixed combustion of RDF (of 4% in weight) with coal and 4. Mixed combustion of RDF (of 8% in weight) with coal. In the preliminary combustion test, lower mixing rate will be applied first to carefully check the combustion conditions such as relevant equipment and exhaust gasses then, to increase mixing proportion gradually.
- Mixed combustion tests of RDF (of 4% and 8% in weight) with coal will be carried out more than 12 hours continuously. Necessary data will be collected to investigate the negative impacts. In addition suitability of the equipment and economical aspects will also be examined.
- It requires more than 12 hours operation during obtaining data for dioxin analysis.

24

Schedule of Combustion Test

	12 Sun	13 Mon	14 Tue	15 Wed	16 Thu	17 Fri	18 Sat	19 Sun
1. Preliminary Test								
2. Baseline Test (Coal only burning)								
3. Mixed Combustion Test (RDF 4% Mixture)								
4. Mixed Combustion Test (RDF 8% Mixture)								
5. Occasional Date								

Preparation of the test (1)



Preparation of the test (2)

Preparation of the test (3)

Preparation of the test (4)

④ Feasibility Study Results (2)

- Needs of cross-subsidy
- Management of leachate at NEDS

30

Needs of Cross Subsidy among Duuregs (1): Collection Cost

Summary of collection cost

	Unit cost per ton		cost per house hold per month *1	
	planned	unplanned	planned	unplanned
	Tg/ton	Tg/ton	Tg/month	Tg/month
Sukhbaatar	17,219	22,935	573	2,169
Chingeltei	17,252	22,810	574	2,158
Bayanzurkh	16,522	25,290	550	2,392
Songinokhairkhn	14,321	20,295	477	1,920
Bayangol	14,974	23,695	499	2,241
Khan-Uul	17,442	23,275	581	2,201
Nalaikh	10,788	10,266	359	971
Total	15,899	22,229	529	2,103

Waste Generation rate in 2005 is used for calculation and 4.5 person per house hold is applied.

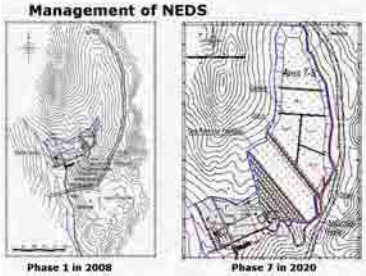
Needs of Cross Subsidy among Duuregs (2): Recycle & Disposal Cost

Final Disposal Cost	Unit cost per ton	Cost per house hold per month	
	Tg/ton	planned	unplanned
		Tg/month	Tg/month
	5,674	189	537
Recycle Cost	Unit cost per ton of separate collection	Cost per house hold per month	
	Tg/ton	planned	unplanned
		Tg/month	Tg/month
	17,966	162	0

Needs of Cross Subsidy among Duuregs (3): Unit Cost

- Unit waste management costs for waste generated in each household (4.5 persons) per month are **880 MNT for Apartment area** and **2,639 MNT for Ger area.**
- Therefore, if we apply a unified waste collection fee, Duuregs which have more Ger Area will not able to provide 100 % collection service due to financial problems.
- Provision of waste collection service to whole population is the most important target of the M/P.

Management of NEDS

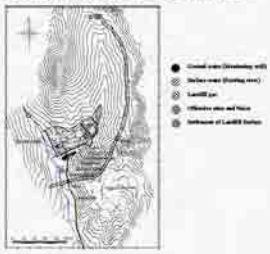


Phase 1 in 2008 Phase 7 in 2020

Management of NERC (1)

Management of NERC (2)

Monitoring Plan for NEDS & NERC



Management of leachate at NEDS (1)

- Leachate is generated by ① consolidation of wastes itself and ②precipitation.

Management of leachate at NEDS (2)

- Leachate by consolidation of wastes disposed of at NEDS is not generated due to:

1. Water content of the incoming wastes is as low as 40.5 % even in summer and 21.5 % in winter comparing with the other countries such as Adana-Mersin in Turkey is 63.3% and Phnom Penh in Cambodia is 69.5 %.
2. Therefore, the characteristic of the wastes in the study area is that, in order to accelerate decomposition of the organic substances, it requires a water to be supplied in stead of generating excess water as a leachate.
3. In the leachate treatment facilities, which were constructed in the existing UCDS as a pilot project, there is no leachate observed even in August 2005 when precipitation is the largest in the year.

Management of leachate at NEDS (3)

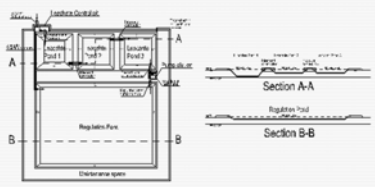
- All percolation rates become negative in case using average precipitation on 10 years and average evaporation in 6 years.
- Therefore, percolation rates are calculated in all the months in 6 years which evaporation record are available and it was found that all the percolation rate except in August 1998 and 2000 is negative.
- As a conclusion, there is no leachate outflow under normal weather conditions and, only in August of some years, there is a possibility of leachate outflow by precipitation.

Management of leachate at NEDS (4)

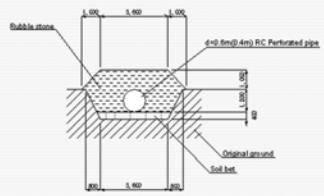
- In order to prevent leachate from penetration into underground, the following measures are made.

1. No specific lining is laid.
2. Leachate collection pipe will be installed at the lowest point of the valley from enclosing dam to the top of the landfill.
3. Leachate collection pit will be constructed in between leachate treatment facility and the leachate collection pipe.
4. Leachate collection pit will be installed on the impermeable layer of bed rock.
5. Submersible pump will be installed in the leachate collection pit and, in case level of leachate reach to the 60 cm above bed rock , pump up leachate to the treatment ponds to minimize leachate pressure in order to prevent it from penetration to the underground.

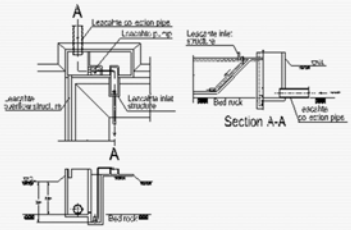
Management of Leachate at NEDS (5): Leachate Treatment and Regulation Ponds



Management of leachate at NEDS (6): Leachate Collection Pipe



Management of leachate at NEDS (7): Leachate Collection Pit



Management of leachate at NEDS (8): Reasons of Decision

- Water content of the wastes is very low compared with other countries. Furthermore, evaporation is three times much than precipitation. As a result, leachate generation is very limited. Based on the examination above, possibility of outflow of the leachate from disposal site is limited only in August and once in three years according to the available data.
- Construction of liner to prevent leachate penetration might be very expensive under such a cold weather (mean temperature in January is less than -20℃) and it is still questionable that the liner will maintain those function permanently or not.
- There is a firm bed rock under 2 to 3 meters below the ground in the proposed disposal site. The layer above this bed rock is made of weathered stone and sand and its permeability is relatively high. But the permeability of the said bed rock is anticipated very low. Based on the consideration of the topographic and geological features, very limited leachate will gather in the lowest point naturally and this can be collected at collection pit safely without penetrating into underground.
- The majority of source of drinking water for UB city locates in the eastside of the city and usage of underground water at downstream of NEDS is very limited. Furthermore, the result of the underground water survey conducted for the downstream of UCDS which locates next to the NEDS shows there is no underground pollution caused by the leachate of disposal site.
- For the safety of very limited people who use underground water at downstream of NEDS, piped water, which will be laid under development of NEDS, will be recommended to use.

Thank You Very Much for your attention

Technical Working Group Meeting (39)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

February 10, 2006
JICA Study Team

1 . Work Progress

① RDF production and preparation of combustion test
② Data Collection at WB
③ F/S for NEDS and NEDS
④ EIA Study
⑤ Implementation of UCDS PP
⑥ Implementation of Chirigami Kokan
⑦ Fee Collection System and Tariff Setting

2. Works for the Following Week

① Implementation of mixed combustion test of RDF with Coal
② Data Collection at WB
③ Analysis of data obtained at WB
④ Implementation of UCDS PP
⑤ Implementation of Chirigami Kokan
⑥ Preparation of Phase 3 study work

3. Subjects to be discussed

① Schedule of discussion on P/R (2)
② Additional pilot project at the UCDS
③ Proposed work responsibility of each party concerned in PP for separate collection
④ Preparation of mixed combustion test of RDF with coal
⑤ Degree of capacity development made by the study
⑥ Feasibility Study Results (3)

① Schedule of discussion on P/R (2)

Schedule
- Feb 21: Submission of P/R (2)
- Feb 22: Explanation of it
- Feb 23: Signing of M/M on it
- Feb 24: Report to JICA

Important issues
- Based on the M/M on P/R (2), the budget for Phase 3 Study will be allocated.
- Arrangement of Steering committee meeting
- Who will sign M/M?

② Additional Pilot Project in UCDS

1. Sorting Yard
2. Fair Trading Building
3. RDF Production Facility
4. Tree Planting
5. Realignment of Onsite Road together with Third Embankment Bank

Plan of Additional Pilot Project in UCDS

Sorting Yard in UCDS -1

1. Preparation of Sorting Yard
2. Organization of Waste Pickers (WPs)
   Form Association, Election of Leader, Establishment of Rule
3. Establishment of fair rotation for about 200 – 300 WPs => For instance 25 persons/group x 12 days = 300 persons => Each group can work one day per two weeks
4. Who will work at When – Fair rule

Sorting Yard in UCDS-2

5. Valuables collected by Waste Pickers are sold to Recycle Dealers at Fair Trading Building (simple roof and wall structure)
6. Paper and Plastics are used for RDF production facility at next to the warm garage
7. Residue will be disposed to next to the sorting yard

③ Proposed work responsibility of each party concerned in PP for separate collection (1)

Important issues:
- Separate collection shall be continued until NERC will be developed. => Confirmation of TUKs cooperation and conditions for it (free renting of coming compactors)
- JICA, therefore, can not support daily operation cost, such as fuel, wage of collection workers, etc. => Explanation meetings, provision of educational tools like pamphlets, etc.
- Consensus of residents and TUK on frequency of service and cooperation on the pilot project.

③ Proposed work responsibility of each party concerned in PP for separate collection (2)

Frequency of service in case of Chingeltei:
- At present: Everyday twice a day and some areas once a day
- Plan:
  Recyclable waste: once a week
  General waste: three time a week

Collection vehicle:
- 8m3 compactor 3 units under the condition of free rent and separate collection?

③ Proposed work responsibility of each party concerned in PP for separate collection (3)

Work responsibility:
- MUB: Selection of PP site and overall coordination
- JICA ST: Planning and education to the residents, officers of Duureg government and collection workers
- TUK: Implementation of separate collection
- Duureg Government: Monitoring and instruction of discharge rule

④ Preparation of Mixed Combustion Test RDF with Coal

- Kono, Timuujin and Kay will be Nalaikha plant from 9:00 to 17:00 on Feb 15 and 16
- They will take care of visitors for the test and deliver a pamphlets to them.
- In form the visitors to contact with Phone Nos of Timuujin (9986-7123) and Kay (9985-9852)

⑤ Degree of capacity development made by the study

- JICA is very interested in the capacity development (CD) of the C/P regarding SWM by the Study
- Team likes to conduct a questionnaire survey to the C/P on performance of CD by the Study:
  Delivery of the questionnaire : Feb 10
  Collection of the answer: Feb 14
  To whom: TWGM members

⑥ Feasibility Study Results (3)

- Financial evaluation of the projects
- Economic evaluation of the projects

Financial Evaluation (1):

Basic assumption

- Financial evaluation is carried out to determine whether both the SWM service and the financial plan can be realised within the financial capacity of the agency in charge.
- Although several agencies are involved with SWM services, the evaluation of the financial state of each agency would be difficult.
- Although in practice waste collection fee, the main source of income for the SWM services, is collected by each Duureg government and only some of the collected fees go to MUB, it is supposed in the financial evaluation that all collected fees come to MUB and are spent by MUB for the SWM services.
- In addition, road and public area cleaning service is not included for the evaluation.

Financial Evaluation (2):

Project Implementation Body

Improvement of Collection System
- Maintenance of collection vehicles for rent: Nuuts/MUB
- Fee collection & contract management: Seven Duureg Governments
- Provision of collection service: Private companies

Development of NERC
- Development and management of site and facilities: Nuuts/MUB
- Fee collection and contract management: Nuuts/MUB
- Operation of facilities: Private companies

Development of NEDS
- Development and management of site and facilities: Nuuts/MUB
- Fee collection and contract management: Nuuts/MUB
- Operation of facilities: Private companies

Financial Evaluation (3):
Waste collection fee (1)

- A uniform tariff is applied to all the households on a door basis, while businesses will be charged on a volume basis.
- Since fee collection rate of each Duureg differs from each other significantly, rate of each Duuregs is set respectively.
- As for the fee collection rates for Planned area (Apartment area), the fee collection rates as of 2005 are assumed to remain in the same in 2010. From then in accordance with collection service improvement, it is supposed that the fee collection rates will increase and become 80% in 2015 and 90% in 2020

19

Financial Evaluation (4):
Waste collection fee (2)

- As for the fee collection rates for Unplanned area (Ger area), waste fees will not be collected from poor households in Ger area. The "effective fee collection rate" (poor households are excluded from calculation) for Ger area are assumed to remain in the same until 2010 and increase from 2010 in accordance with the introduction of new fee collection regime and reach 100% in 2015.
- The portion of households that can pay the waste collection fee is set based on the number of poor households in each Duureg in the Statistical Handbook "Ulaanbaatar-XX century".
- As the results, the overall collection rates in Ulaanbaatar in 2020 will be 90 % for apartment and 67% in Ger.

20

Financial Evaluation (5):
NERC

- As for the income from the operation of sorting yard, a 10 % of commission on the sale price of recyclables is charged as the use of the yard and baling & compaction facilities. 90 % of sale price of recyclables is the income of the Waste Pickers who work the yard.
- The sale price of RDF to the users, power and heating plants, is assumed to be the same as it of coal in weight base. It means half price in calorific base since the calorific value of RDF is double of it of coal.

21

Financial Evaluation (6):
NEDS

- Disposal fee is not charged on the wastes hauled by the private company that gets collection service contract with each Duureg since it is included in waste collection fee.
- Income of disposal fee charged on the waste hauled by generators and their contractors is not counted. It will be counted when the analysis of data obtained by the weigh bridge concluded.

22

Financial Evaluation (7): Results (1)

F/S-1 Full-fledged project: initial investment 17.8 billion MNT		Tariffs	FIRR
Case 1	No grant	Household 2,200MNT/month Business 30,000MNT/ton	0.5%
Case 2	A half of initial investment is financed through a grant.	Household 1,800MNT/month Business 30,000MNT/ton	0.4%
Case 3	All initial investment is financed through a grant.	Household 1,400MNT/month Business 30,000MNT/ton	0.1%

23

Financial Evaluation (8): Results (2)

	F/S-2 Project without NERC: initial investment 11.3 billion MNT	Tariffs	FIRR
Case 1	No grant	Household 2,000MNT/month Business 28,000MNT/ton	0.7%
Case 2	A half of initial investment is financed through a grant.	Household 1,800MNT/month Business 26,000MNT/ton	1.4%
Case 3	All initial investment is financed through a grant.	Household 1,600MNT/month Business 26,000MNT/ton	4.4%

24

Financial Evaluation (9): Results (3)

	F/S-3 Project without NERC and NEDS: initial investment 5 billion MNT	Tariffs	FIRR
Case 1	No grant	Household 1,600MNT/month Business 26,000MNT/ton	1.8%
Case 2	A half of initial investment is financed through a grant.	Household 1,500MNT/month Business 26,000MNT/ton	2.6%
Case 3	All initial investment is financed through a grant.	Household 1,400MNT/month Business 25,000MNT/ton	3.4%

25

Economic Evaluation (1):
Basic assumption

- Economic evaluation is carried out to determine the necessity of the project in view of the present national economic conditions. Because environmental benefits are difficult to quantify, economic evaluation is mostly limited to cost minimisation methods and qualitative evaluation. The following are the economic benefits to be gained from the Project:
  - Improvement of living environment and amenity of entire Ulaanbaatar City
  - Reduction of expenses to remove illegally dumped waste
  - Reduction of smokes generated at disposal sites that could trigger respiratory diseases to surrounding residents
  - Reduction of coal consumption by providing RDF to power generation and heating companies
  - Reduction of consumption of reusable goods by recycling
  - Reduction of final disposal cost

26

Economic Evaluation (2): Quantitative analysis

- With resource-recovery and disposal site cost reduction as the benefits that can be expected from the introduction of recycling facilities such as sorting yard and RDF plant in NERC, a quantitative economic analysis is conducted; a comparison is made between costs and benefits of a project that has (*with-project*) and that does not have (*without-project*) the introduction of such facility.

	Collection & Transportation	NERC (Intermediate Treatment)	NEDS (Final Disposal)
Evaluation Method	Qualitative Evaluation	Quantitative Evaluation (Cost-benefit Analysis) Qualitative Evaluation	Qualitative Evaluation
Evaluation Period		13 years (2008 - 2020)	

27

Economic Evaluation (3):
Project benefit

- Final sale price of recyclables (papers, textile, plastics and metals) in Mongolia is counted as project benefit. Those are recovered by Waste Pickers, sold to brokers and finally sold to users in Mongolia and exporters to China.
- Price of RDF in weight is counted as project benefit and set as double of it of coal (12,000 MNT/ton) since the calorific value of RDF is twice of it of coal that is used in the existing power and heating plants.
- Reduction of final disposal cost is counted as project benefit. The benefit is deduced by multiplying the average unit final disposal cost (MNT/ton) from 2010 to 2020 with disposal amount that is reduced by the operation of the sorting yard and RDF plant.

28

Thank You Very Much for your attention

29

Technical Working Group Meeting (40)
for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

April 28, 2006
JICA Study Team

1

1 . Work Progress

① Data Collection at WB
② Update of WB Database System
③ Examination of EIA Study
④ Preparation of a Buffer Zone Construction at UCDS
⑤ Examination of Financial System

2

2. Works for the Following Week

① Data Collection at WB
② Update of WB Database System
③ Examination of EIA Study
④ Preparation of 3rd Public Hearing Meeting
⑤ Analysis of Data obtained by the Mixed Combustion Test of RDF with Coal
⑥ Preparation of a Buffer Zone Construction at UCDS
⑦ Preparation of Additional Pilot Project at UCDS
⑧ Examination of Financial System

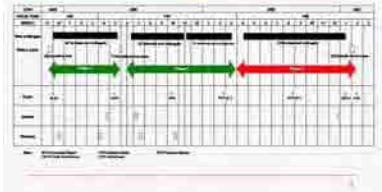
3

3. Subjects to be discussed

① Schedule and Contents of Phase 3 Study
② Others

4

① Schedule and Contents of Phase 3 Study



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Expert Assignment Schedule

Contents of Phase 3 Study

I. **Continuation and monitoring of the pilot projects;**
II. **Expansion of the pilot projects to confirm further feasibilities of the priority projects proposed in the M/P; and**
III. **Assistance for the C/P to conduct some of the important issues for the implementation of the M/P.**

7

I. Continuation and monitoring of the pilot projects:

Pilot Projects	Work of C/P and Relevant Mongolian Organizations	JICA ST
1. Urgent improvement of UCDS	Nuuts/MUB • To conduct sanitary landfill operation as much as possible • To establish a control and management system of collected waste in order to avoid illegal dumping • To establish a database that utilizes data obtained by the weighbridge	• To advise on how to conduct sanitary landfill operation as much as possible • To advise on how to establish a control and management system of collected waste • To support the establishment of a database that utilizes data obtained by the weighbridge • To examine the effectiveness of a buffer zone by tree planting
2. Thermal recycling "RDF"	MUB and relevant organizations • To publicize the results of the first mixed combustion test of RDF with coal • To disseminate the knowledge on RDF	• To examine economic viability of the use of RDF at the Nalaikh heating plant by conducting about one week continuous combustion test
3. "Chinggis Koiker"	MUB and relevant organizations • To publicize and disseminate the "Chinggis Koiker" system • To promote and support the private company to conduct the system	• To advise on how to publicize and disseminate the "Chinggis Koiker" system • To advise on how to promote and support the private company to conduct the system
4. Examination of loading device for heavy waste	TUK's • To upgrade the loading device in order to improve their collection service	• To advise on how to upgrade the loading device in order to improve their collection service
5. Raising public consciousness on waste issues	MUB (Khoroo in the future) • To organize regular participatory monitoring • To manage obtained data and disclose monitoring result • To discuss with Nuuts, if any problems are found	• To advise on how to manage data and disclose monitoring result • To advise on how to modify the monitoring system, based on its progress • To advise on how to keep communication with local residents and authorities and promote further public participation

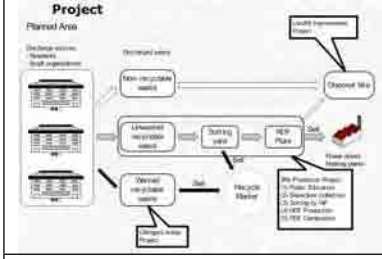
Refer to the Table 1-1 of P/R (2)

Green Belt

- **Location : south of buffer zone, east of existing access road.**
- **Size : 50 m long x 3 m wide**
- **Tree : 2 row, 1m interval**
- **Type of Tree : Populus**
- **Schedule : Planting Tree before Mid of May**
- **Maintenance : Nuuts Co under MUB**

9

II. Expansion of the Pilot Projects: 3Rs Promotion Project

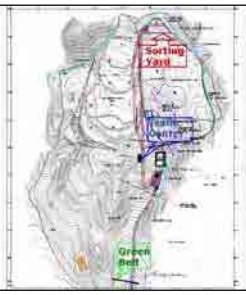


Collection System Improvement and Separate Collection

- **Location : Chingeltei District, Khoroo 1~6**
- **Population : 28,000 (HH8700, AA44)**
- **Establishment of Discharge Rules: Day, time, manner. Etc.**
- **Expected Separated Wastes : 5 tons a day**
- **Frequency of Collection:**
  - **General Wastes : 3 times a day**
  - **Valuables, plastic, paper : 1 time a day**
- **Collection Trucks : 8 m3 Compactor from Kawasaki City**

11

3Rs Promotion Project at UCDS

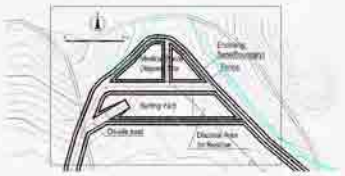


Sorting Yard

- **Objective**
  - **Salvage valuables from the recyclable waste which is subject to the separate collection**
  - **Organize waste pickers**
  - **Collect raw materials for RDF production**

13

Sorting Yard



Fair Trading Building

- **Objective**
  - **Give a fair trading place and a scale for waste pickers**
  - **Control and manage recyclable's traders inside UCDS**
  - **Give incentives to waste pickers in order to organize them**
  - **Formulate mutual understandings for future Sanitary Landfilling at NEDS**

15

Fair Trading Building

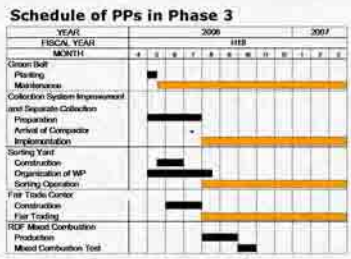
Note: Scale of the above center is reduced due to budget limitation of JICA

RDF Production and Mixed Combustion Test of RDF with Coal

- **Raw Materials : Residues from Sorting Yard**
- **Production : 24 ton**
- **Place of Production : Contractor's Choice**
- **Schedule**
  - **Production : August to September**
  - **Mixed Combustion Test: October**

17

Schedule of PPs in Phase 3



Important issue: Compactor trucks arrive in early July.

② Others: Weighbridge Problem

Flow Chart of Grant Aid

1. Preparatory Study for Basic Design (BD)
2. Basic Design (BD) Study
3. Cabinet Approval
4. Exchange of Note (E/N)
5. Detailed Design
6. Tender of Suppliers and Contractor
7. Audit of Grant Aid project.

20

Question related to Grant Aid

1. According to questionnaire survey to the waste pickers, 517 kg of valuables per week is collected by one waste picker. After NEDS and NERC is constructed, waste pickers can collect same valuables at NERC sorting yard?

21

Question 2 : Feasibility of Separate Collection

- How is the feasibility of followings in terms of equipment, labour force, resident cooperation.
  - Separate collection will be carried out at all the planned area in year 2008 onwards?
  - At least 50 percent of the residents will cooperate for the separate collection?
  - Will separated wastes with valuables be collected and transported to the sorting yard for WP to pick.

22

Question 3 : Countermeasures

1. In case that the separate collection is not carried out according to the plan, not much valuables will come to sorting yard. How about the countermeasures to take care 300 waste pickers now working at UCDS in new NEDS.

23

Request for Confirmation

1. EIA and Public Hearing is conducted based on the condition that WPs will be employed at NERC.
2. MUB agrees that NERC will be constructed for taking care of WPs.
3. New Final Disposal Site will not be constructed without taking care of WPs

24

Thank You Very Much for your attention

Technical Working Group Meeting (41)

for THE STUDY ON SOLID WASTE MANAGEMENT PLAN FOR ULAANBAATAR CITY

May 5, 2006
JICA Study Team

1 . Work Progress

① Data Collection at WB
② Update of WB Database System
③ Examination of EIA Study
④ Preparation of 3rd Public Hearing Meeting
⑤ Analysis of Data obtained by the Mixed Combustion Test of RDF with Coal
⑥ Preparation of a Buffer Zone Construction at UCDS
⑦ Preparation of Additional Pilot Project at UCDS
⑧ Examination of Financial System

2. Works for the Following Week

① Data Collection at WB
② Update of WB Database System
③ Examination of EIA Study
④ Holding of 3rd Public Hearing Meeting
⑤ Analysis of Data obtained by the Mixed Combustion Test of RDF with Coal
⑥ Preparation of Pilot Project for Collection System Improvement
⑦ Construction of a Buffer Zone at UCDS
⑧ Preparation of Additional Pilot Project at UCDS
⑨ Examination of Financial System

3. Subjects to be discussed

① Establishment of a Waste Picking Rule at UCDS
② Review of Financial Evaluation and Sensitivity Analysis
③ Preparation work for the Pilot Project for Collection System Improvement

① Establishment of a Waste Picking Rule at UCDS

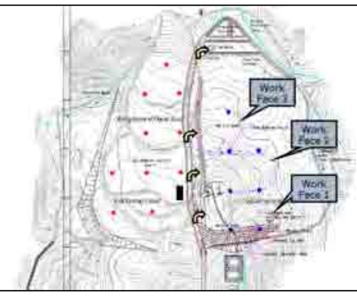
Waste Picking Rules at UCDS

- to separate working areas for waste pickers and heavy vehicles and rotate these areas periodically
  - Waste unloading area
  - Waste picking area
  - Waste leveling area

Waste Pickers are not allowed to enter in the Waste unloading area and Waste leveling area.

Why rules are necessary

- Grant Aid will be approved under the condition of Sanitary Landfilling at NEDS
- Sanitary landfilling can be implemented only without WP in landfilling working face
- At NEDS, WP will work at sorting yard and not in working face
- But in case separate collection fails, WP will come to working face and pick valuables.
- ➢ This rules are the supplement solution to conduct sanitary landfilling without separate collection



Working Pattern

Time \ Location	WF 1	WF 2	WF 3
Morning till 14 : 00	Unloading	Picking	Leveling
14:00 till 18:00	Picking	Leveling	Unloading
18:00 onwards	Leveling	Unloading	Picking

Advantage and Difficulty

- Advantage
  - Lower risk of accidents with machine
  - Incase soil cover is applied after leveling, sanitary condition will improve more.
- Difficulty
  - Working space for WP become 1/3
  - Traffic Control by controller
  - Need to prepare plan for emergency

◆ Detailed rules will be decided through trial and error.

Rotation time depends on the number of collection vehicles per hour and how much waste pickers can wait patiently.

Waste Picker Meeting No1 on 3 May 2006

② Review of Financial Evaluation and Sensitivity Analysis

Modifications of Assumptions for Financial Evaluation

- The beginning of the Project is moved two years ahead. Thus, costs are generated from 2006 and revenues from 2008.
- 4% and 10% of the revenues is deducted as a fee collection charge from apartment and from Ger, respectively.
- Fee collection rates start increasing from 2008 in accordance with the introduction of a new tariff/enforcement regime, reaching 97% - current utility fee collection rate by OSNAAG - in apartment and 65% in Ger (97% when poor households are excluded) in 2012.

Fee Collection Rates in Ger Area (modified)

	2005 (Actual)	2008	2012 - 2020
Bayangol Duureg			
Effective Collection Rate	13%	30%	97%
Overall Collection Rate	8%	19%	61%
Bayanzurkh Duureg			
Effective Collection Rate	12%	29%	97%
Overall Collection Rate	9%	23%	77%
Songinokhairkhan Duureg			
Effective Collection Rate	24%	39%	97%
Overall Collection Rate	13%	21%	53%
Sukhbaatar Duureg			
Effective Collection Rate	0%	19%	97%
Overall Collection Rate	0%	13%	65%
Khan Uul Duureg			
Effective Collection Rate	57%	65%	97%
Overall Collection Rate	33%	38%	56%
Chingeltei Duureg			
Effective Collection Rate	9%	27%	97%
Overall Collection Rate	7%	21%	78%
Nalaikh Duureg			
Effective Collection Rate	54%	62%	97%
Overall Collection Rate	20%	23%	36%
Total			
Effective Collection Rate	17%	33%	97%
Overall Collection Rate	12%	22%	65%