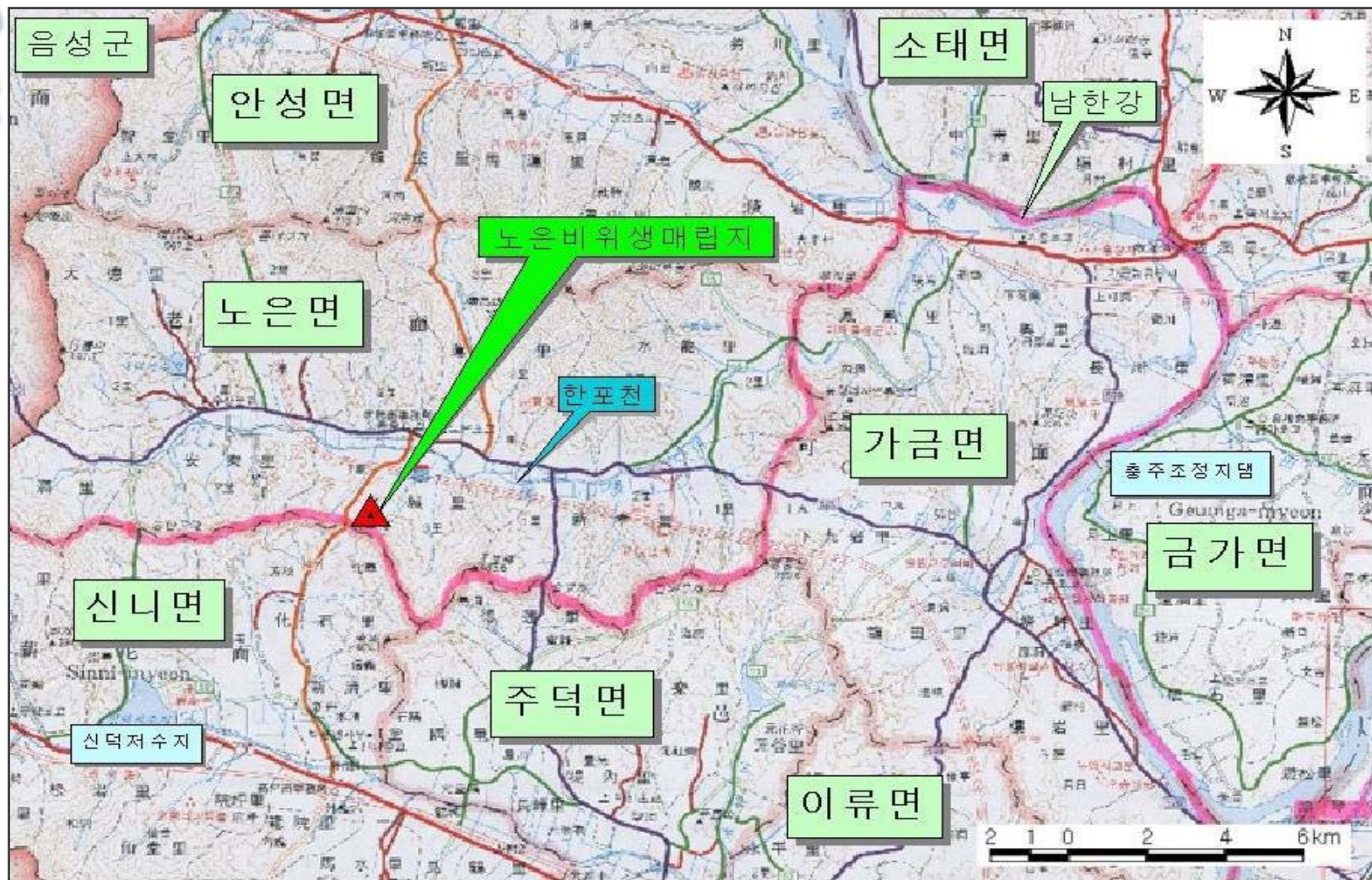


Assessment of Open-dumping Landfill for Post-closure Management

Hong Sang-pyo
Chongju Univ., South Korea

Location Map of the Landfill



Outlines of the Landfill

- 1. Name : Noeun Landfill**
- 2. Location : 90km Southwest of Seoul**
- 3. District for Landfill : Noeun & Shinni, Chungju City**
- 4. Period of Landfill : 92. 6 ~ 99.6**
- 5. Area of Landfill : 9,034m²**
- 6. Capacity of Landfill : 27,102m³**
- 7. Average Daily Landfilled Quantity : 5ton**
- 8. Average Landfill Height : 4m**

Types of Wastes Landfilled

Types of Waste	District	Quantity(ton/day)
Briquettes Ash	Noeun & Shinni, Chungju City	0.5
Food Garbage		0.5
Waste Papers		1.0
Etc.		3.0

Local Conditions of Landfill

Classification	Distance to Landfill (km)
Residence Area	4 (143 homes, 457 population)
Drinking Water Supply Source	8
Agricultural Area	0.5

Overview of Noeun Landfill



Groundwater Monitoring Well of Noeun Landfill



Groundwater Sampling of Noeun Landfill

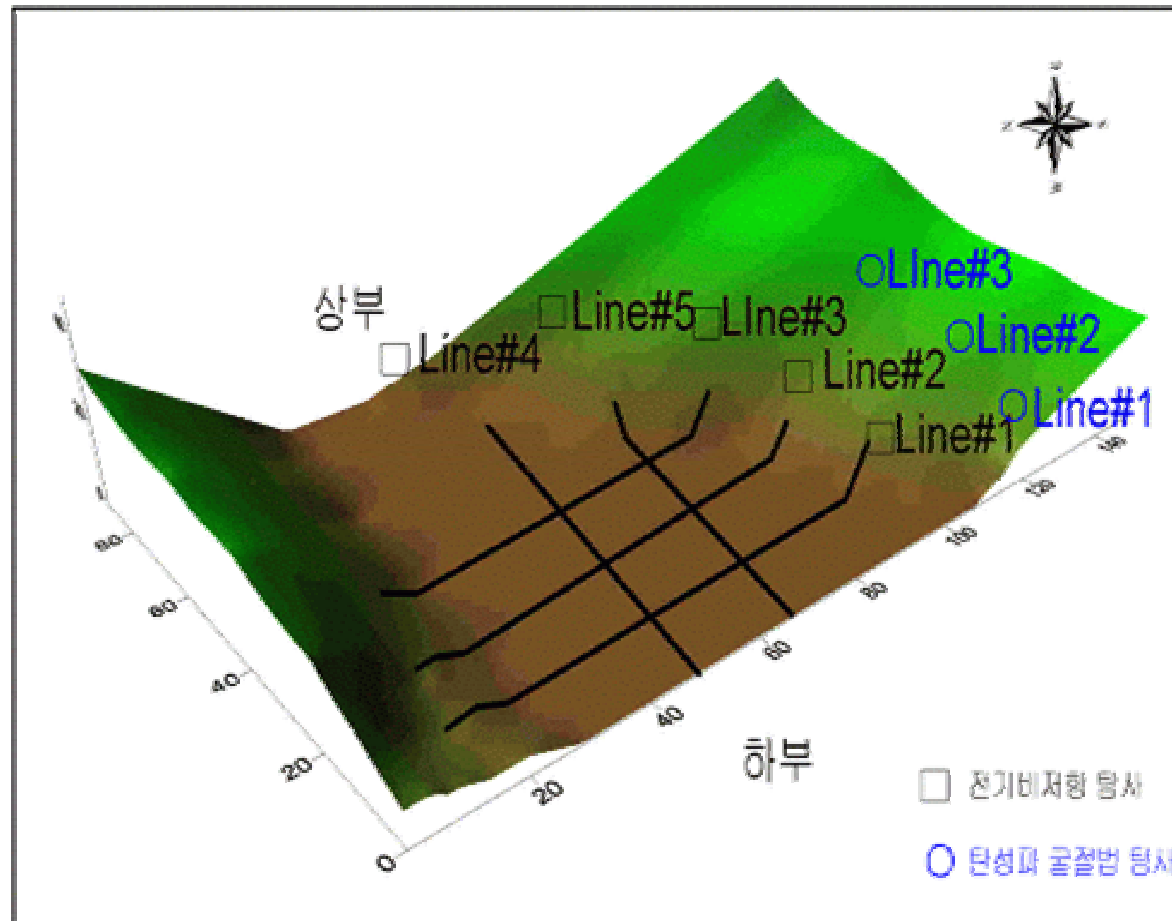


Installation of Landfill Gas Sampling Device

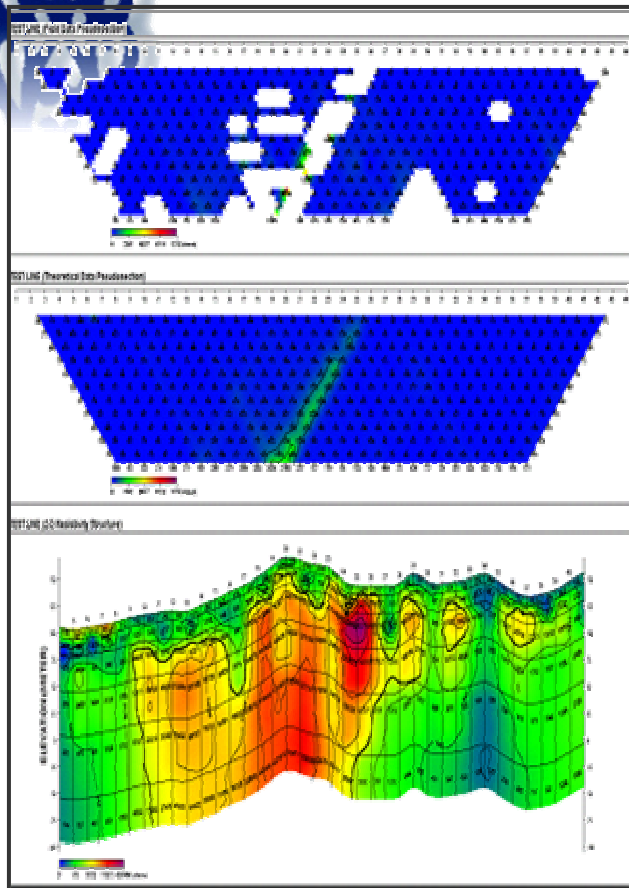
1.



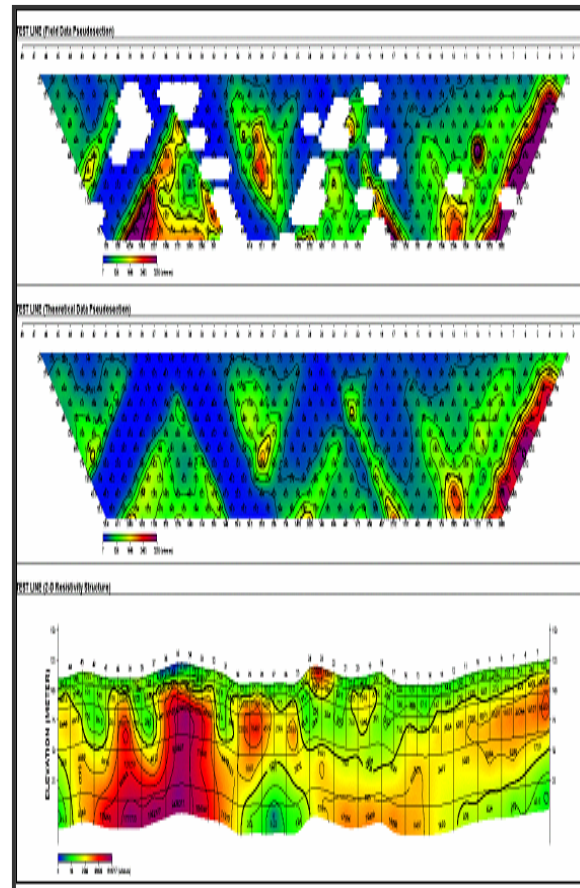
Line Design for Geophysical Prospecting



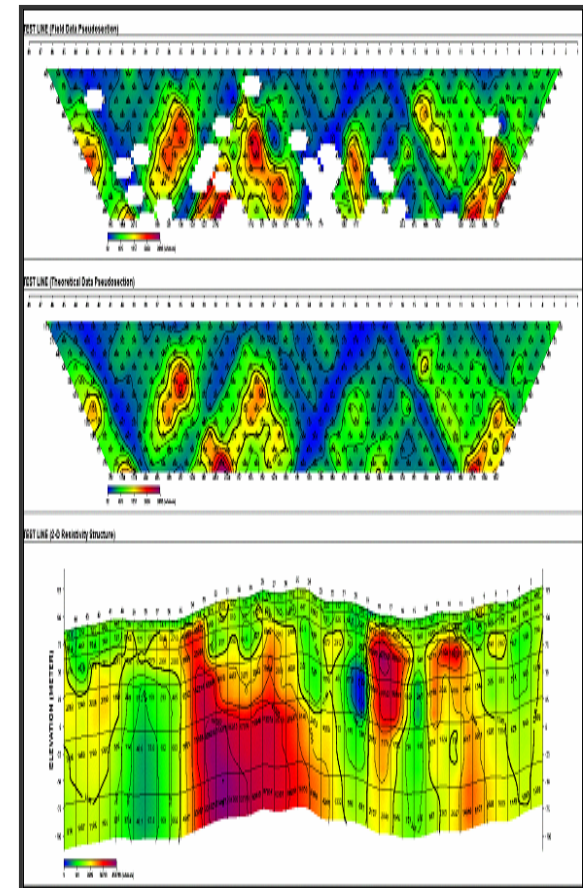
Results of Electrical Resistivity Survey



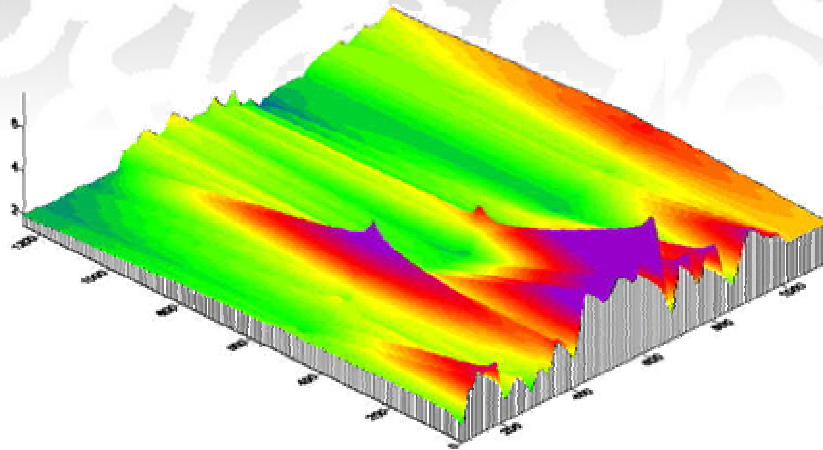
LINE #1 Electrical Resistivity



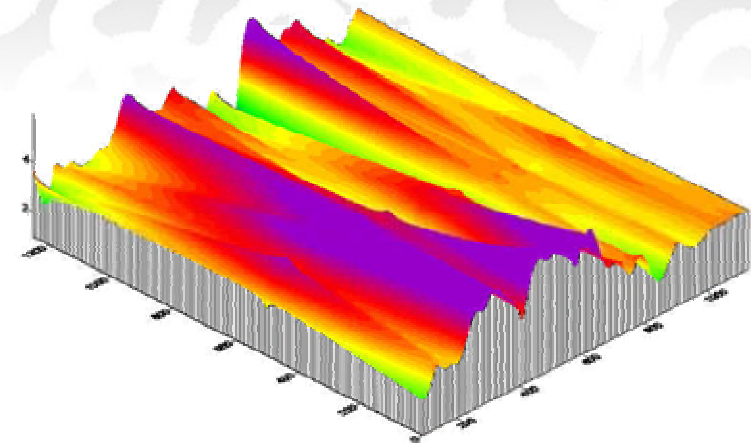
LINE #2 Electrical Resistivity



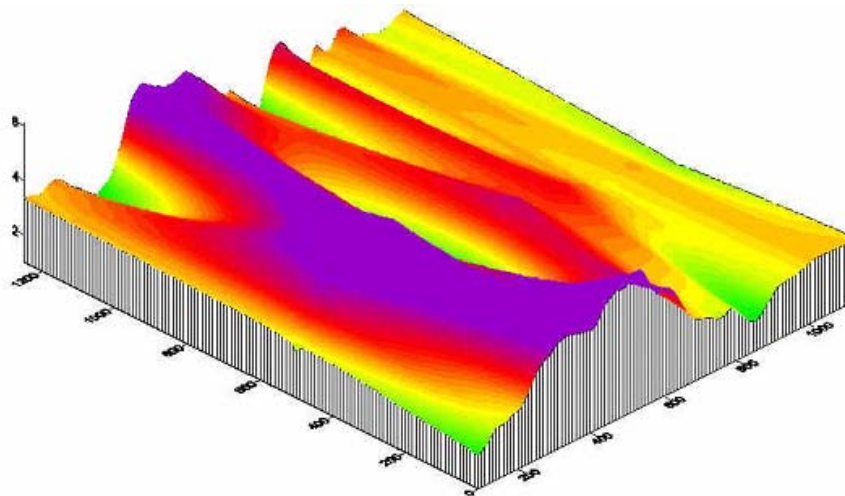
LINE #3 Electrical Resistivity



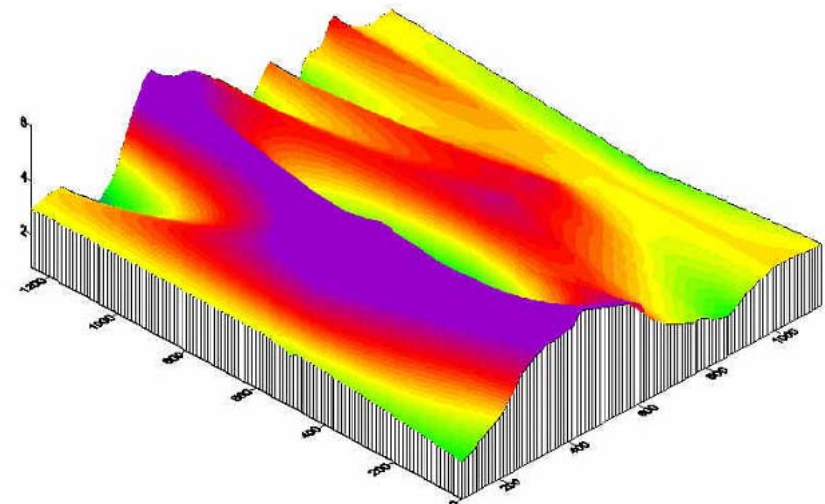
Ground Level 0m Electrical Resistivity



Ground Level- 4m Electrical Resistivity

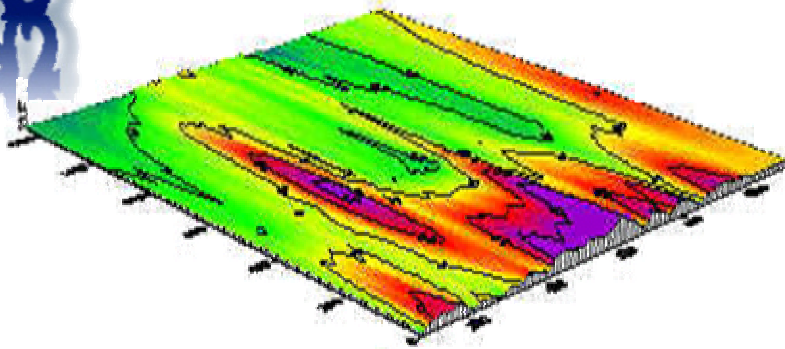


Ground Level- 8m Electrical Resistivity

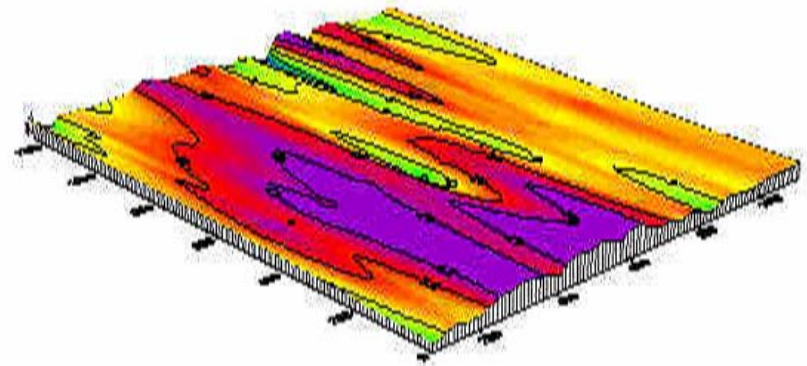


Ground Level- 12m Electrical Resistivity

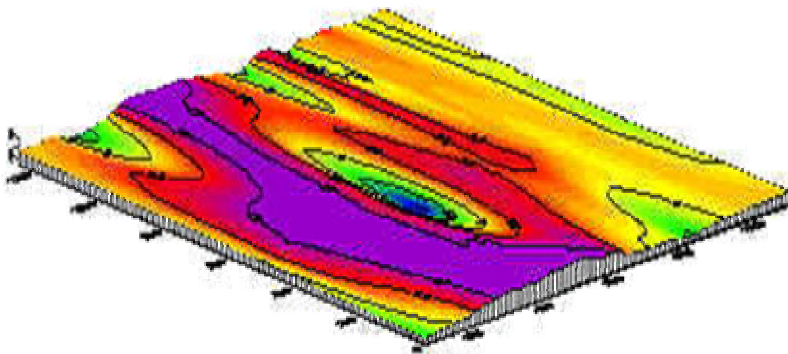
Cross-sectional Features of Horizontal Electrical Resistivity



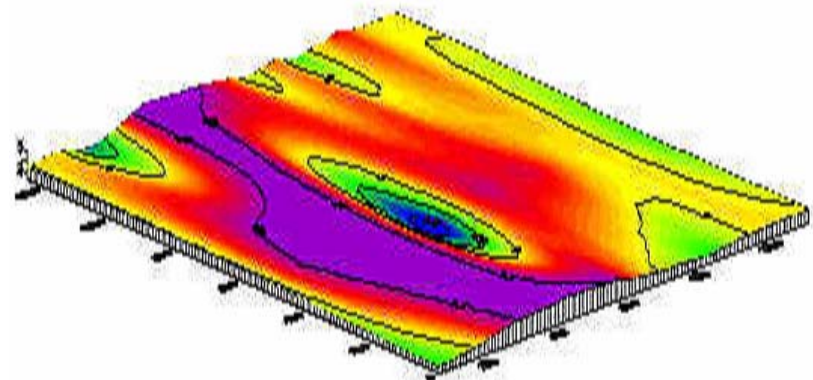
Elevation 100m



Elevation 50m

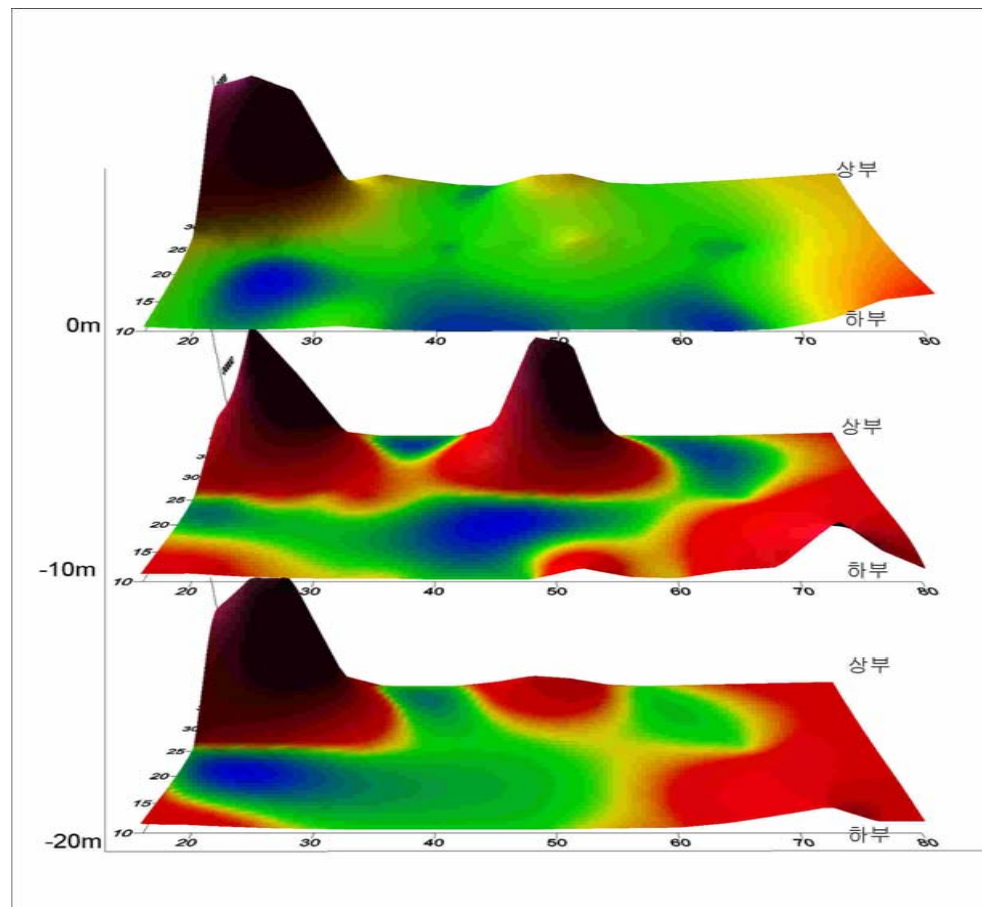


Elevation 0m



Elevation- 50m

3-D Features of Electrical Resistivity



Criteria for Stabilization of Landfilled Wastes

Classification	Criteria
Leachate and Groundwater	1. BOD/COD_{Cr} in Leachate should be less than 0.1 2. Contaminants concentrations in leachate should not be more than leachate effluents criteria. 3. Contaminants concentrations in groundwater should not be more than groundwater quality criteria.
Landfill Gas	1. Concentration of CH₄ should be less than 5%
Wastes Landfilled	1. Contents of combustibles should be less than 5% or C/N should be less than
Etc.	1. Adverse effects to surrounding due to bad odor, geophysical stability of landfill, surfacewater qualities, soil analysis are not recognized.

<Source> : Ministry of Environment , South Korea, 2001,

Guidelines for Post-closure Management of Landfill

Physical Characteristics of Landfilled Wastes

% by weight		Site1	Site2	Site3	Average	Range
Components						
Combustibles	Food garbage	-	-	-	-	-
	Waste papers	1.18	1.59	0.98	1.25	0.98~1.59
	Textiles	2.84	3.24	2.92	3.00	2.84~3.24
	Plastics	18.59	14.42	19.26	17.42	14.42~19.26
	Timbers	0.25	0.12	0.06	0.14	0.06~0.25
	Rubbers, leathers	4.26	0.09	1.12	1.82	0.09~4.26
	Sub-total	27.12	19.46	24.34	23.64	19.46~27.12
Incombustibles	Glass, ceramics	4.22	1.53	2.31	2.69	1.53~4.22
	Metals	3.24	0.42	0.12	1.26	0.12~3.24
	Soil and etc.	65.42	78.59	73.23	72.41	65.42~78.59
	Sub-total	72.88	80.54	75.66	76.36	72.88~80.54
Total		100	100	100	100	

Proximate Analysis of Landfilled Wastes

% by weight Component	Physical Ratio	Moisture	TS	TS	
				VS	FS
Food Garbage	-	-	-	-	-
Waste papers	1.25	27.05	72.95	78.57	21.43
Textiles	3.00	28.19	71.81	65.78	34.22
Plastics	17.42	14.05	85.95	75.08	24.92
Timbers	0.14	26.39	73.61	66.44	33.56
Rubbers, Leathers	1.82	10.41	89.59	73.48	26.52
Total	23.64	-	-	-	-

Results of Analysis of Landfill Gas

Date	Types	Site1			Site 2		
		1st	2nd	Average	1st	2nd	Average
21 Sep., 2003	CH ₄ (%)	4.1	4.3	4.2	5.7	5.8	5.75
	CO ₂ (%)	13	14	13.5	16	15	15.5
	O ₂ (%)	5.7	5.6	5.65	4.9	5.3	5.10
	H ₂ S(ppm)	1.6	1.5	1.55	1.7	1.8	1.75
	NH ₃ (ppm)	0.8	0.9	0.85	1.0	0.9	0.95
15 Oct., 2003	CH ₄ (%)	4.0	4.1	4.05	5.6	5.3	5.45
	CO ₂ (%)	15	14	14.5	16	17	16.5
	O ₂ (%)	5.2	5.1	5.15	4.9	4.7	4.80
	H ₂ S(ppm)	1.7	1.7	1.7	1.8	1.9	1.85
	NH ₃ (ppm)	0.9	1.0	0.95	1.2	1.3	1.25
16 Nov., 2003	CH ₄ (%)	3.9	3.8	3.85	5.1	5	5.05
	CO ₂ (%)	16	14	15	15	13	14
	O ₂ (%)	4.8	5.0	4.9	4.9	4.9	4.90
	H ₂ S(ppm)	1.7	1.8	1.75	1.9	2.0	1.95
	NH ₃ (ppm)	1.4	1.3	1.35	1.5	1.5	1.50
9 Dec., 2003	CH ₄ (%)	3.5	3.4	3.45	4.3	4.2	4.25
	CO ₂ (%)	16	15	15.5	17	16	16.5
	O ₂ (%)	5.1	4.8	4.95	4.9	4.6	4.75
	H ₂ S(ppm)	1.6	1.6	1.6	1.9	1.9	1.90
	NH ₃ (ppm)	1.5	1.4	1.45	1.6	1.7	1.65

Analysis of Leachate and Groundwater (unit : mg/L)

Types	Leachate	Groundwater 1	Groundwater 2
BOD ₅	2.7		
BOD ₁₀	2.9		
BOD ₁₅	3.5		
BOD ₂₀	3.8		
COD _{Mn}	11.3	1.2	0.2
PH	6.9	5.7	6.6
SS	4.2	-	-
T-N	2.26	-	-
T-P	0.130	-	-
NO ₃ -N	2.2	3.5	2.3
Cl-	3.8	14.1	11.4
NH ₃ -N	ND	ND	ND
Cd	-	0.0005	0.0004
Cr	-	0.001	0.001
As	-	ND	ND
Hg	-	ND	ND
Pb	-	0.357	0.032
Cr ⁺⁶	-	ND	ND
TCE	-	ND	ND
PCE	-	ND	ND
Organic-P	-	ND	ND
Phenol	-	ND	ND
CN ⁻	-	ND	ND
E-Coli	-	Detected	Detected
TPH	-	ND	ND



Thank You
Chongju University,
South Korea