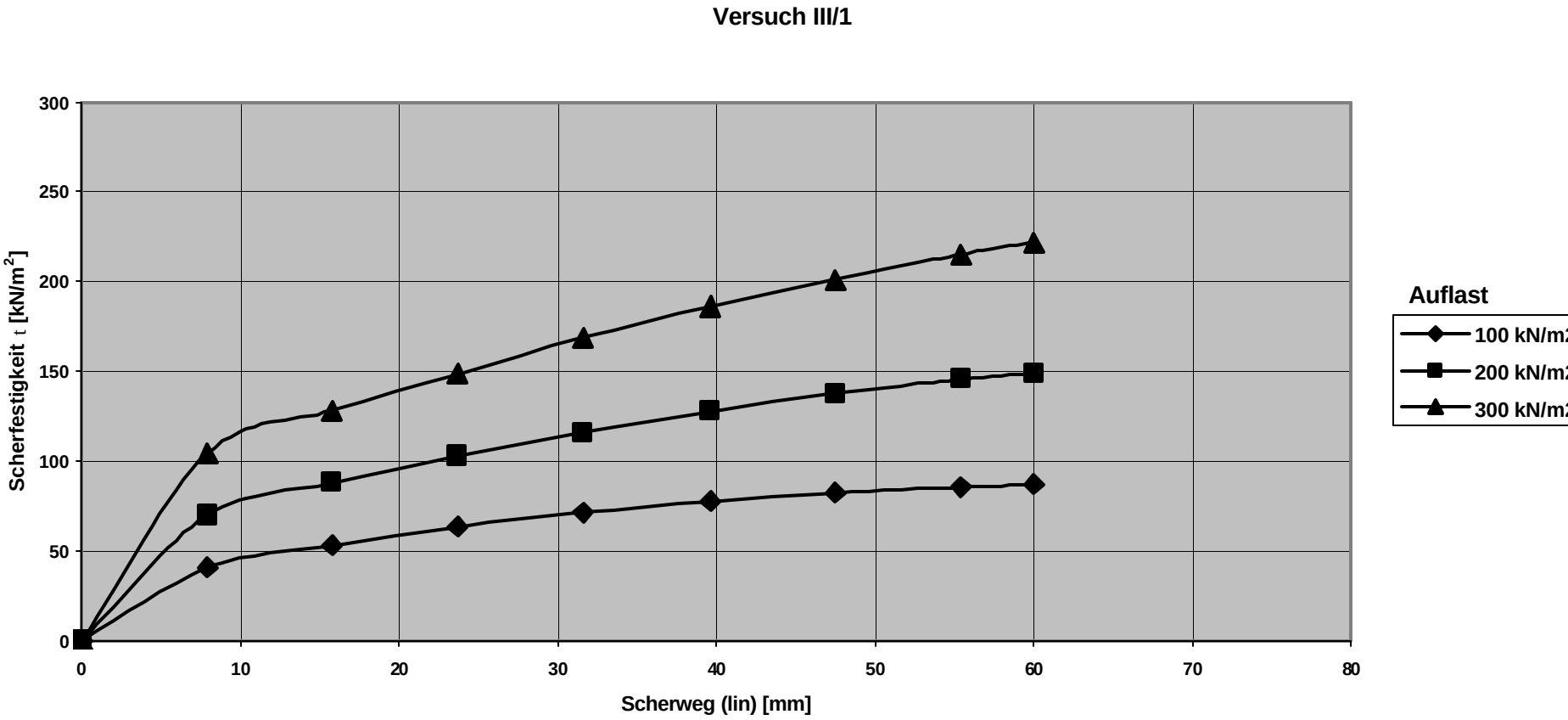
Results of compaction tests Lahe and Bassum

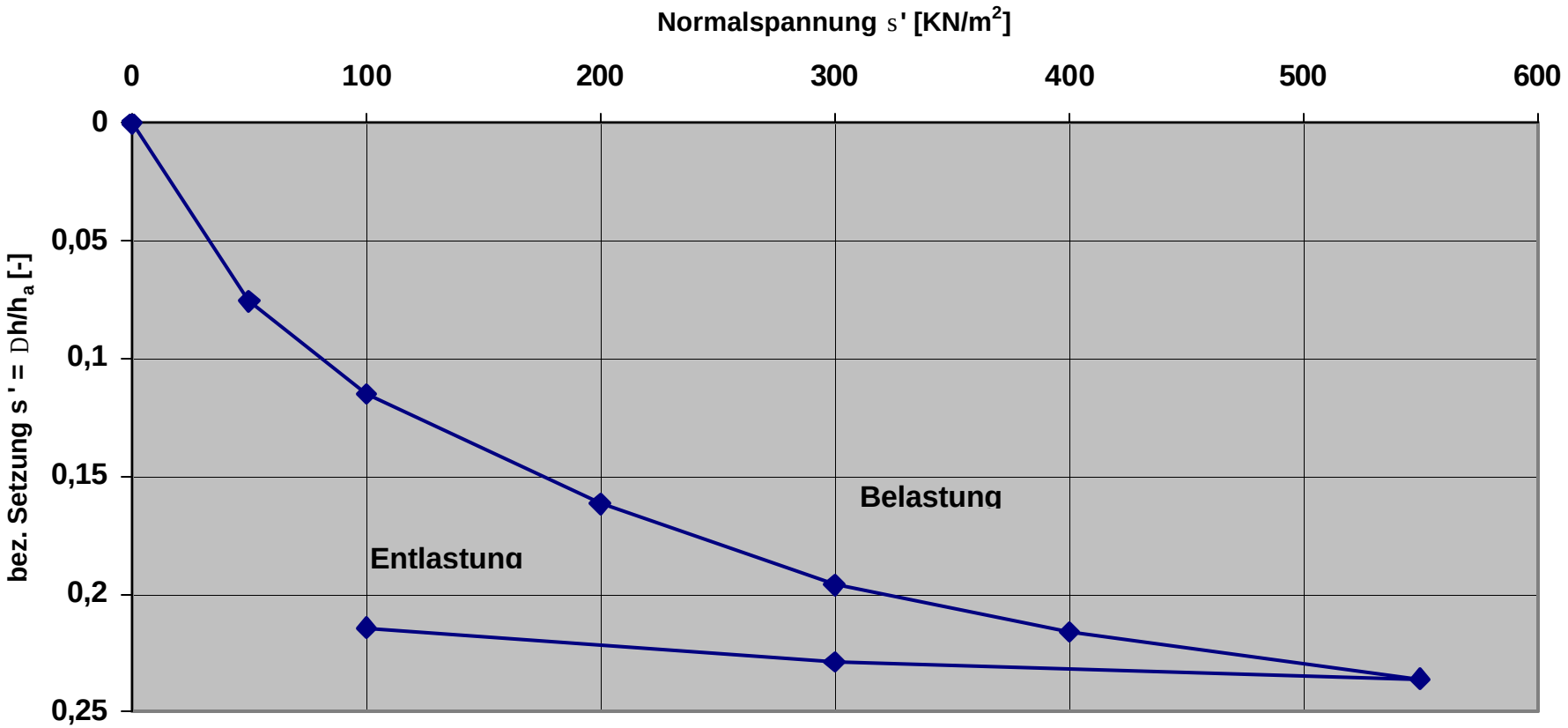
- Placement density at 50 cm layers even higher vs. 30 cm
- A maximun of 3 compaction turns is sufficient, the rest is done by surcharge of the following layers
- Static compaction seems to be slightly better than dynamic (vibration)
- Weight of conpactor has low influence on compaction result (Reiff und Marx (1999) had different results)
- Placement density between 1.0 and 1.4 g/cm³
- Practical experience on MBP landfills revealed, that at wet conditions the materials gets quickly swampy and impassable

Shear diagram MBP-Output 0-30mm (Example)

Düllmann 2002



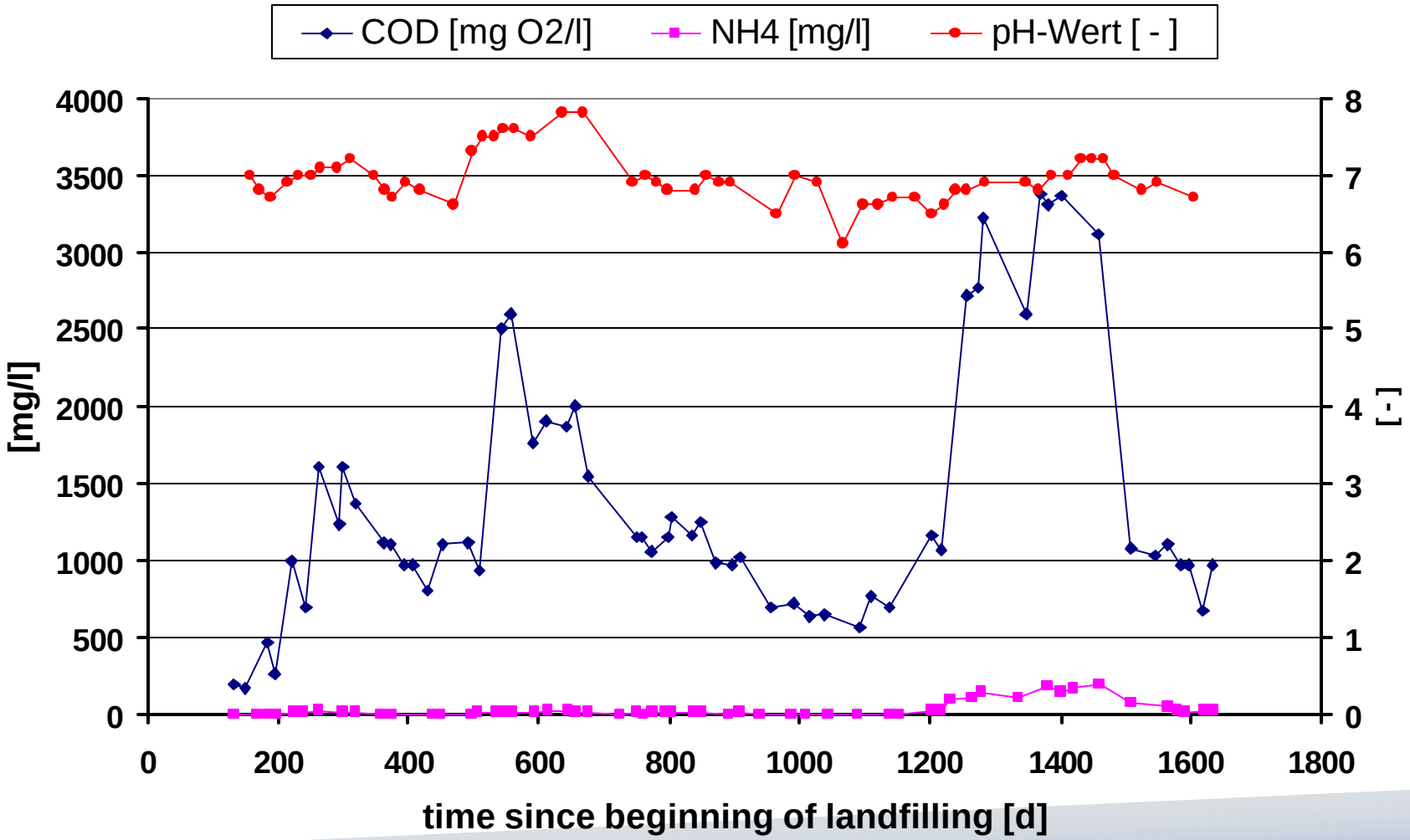
Load-subsidence-graph (linear) Düllmann 2002



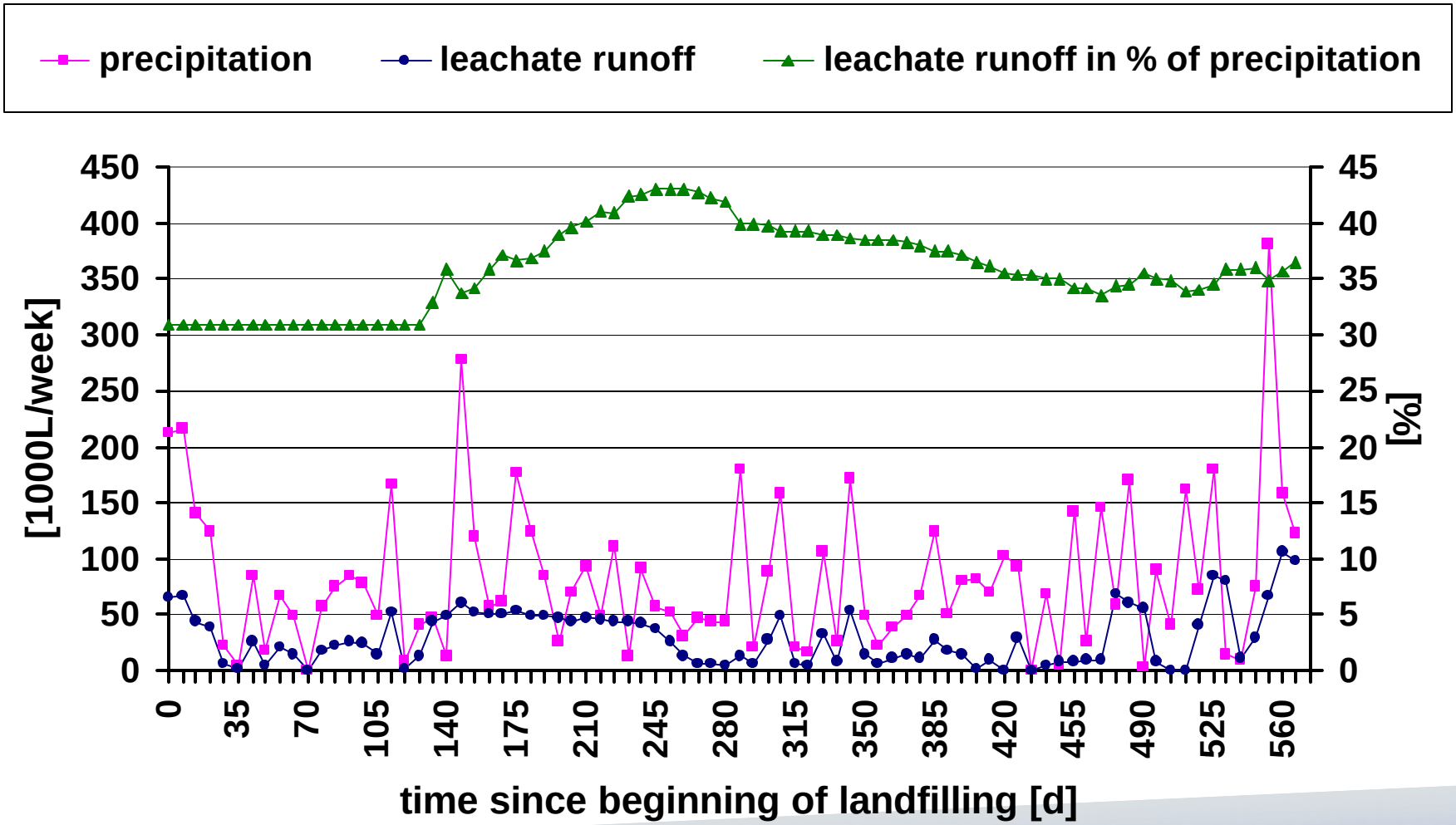
Geomechanical properties

grain size		mm	0-20			0-40			0-60		
origin			V4	V5		V4	V5		V4	V5	
placement moisture		%mo	36	41		37	46		36	41	
		%DM	56	70		58	84		57	70	
placement density	moist	g/cm³	1,40	1,50		1,40	1,50		1,40	1,40	
	dry	g/cm³	0,90	0,90		0,90	0,90		0,90	0,80	
angle of shear	fail / slide	°	33 / 33		34	34 / 34	36 / 36		35 / 35	35	27
cohesion c´	fail / slide	kN/m²	38 / 21		16	43 / 21	23 / 11		35 / 20	49	62
oedometric modulus E_S at a surcharge of	25-50	MN/m²		0,80			0,50			0,60	
	50-100	MN/m²		1,00			1,10			1,30	
	100-200	MN/m²		1,80			1,60			2,00	
	200-400	MN/m²					2,80			2,80	
permeability		Lab	a	a	b	a	a	b	a	a	b
		m/s	7,8*E-8	3,7*E-9	2,3*E-10	6,5*E-6	3,6*E-6	7,0*E-10	6,2*E-6	5,2*E-5	1,8*E-8
placement moisture		%DM	56	70	72	58	64	67	57	70	54
placement density	moist	g/cm³	1,2	1,4	1,4	1,1	1,2	1,4	1,2	1,0	1,3
	dry	g/cm³	0,8	0,8	0,8	0,7	0,7	0,9	0,8	0,6	0,9

Leachate quality



Precipitation and leachate runoff



Gasproduction

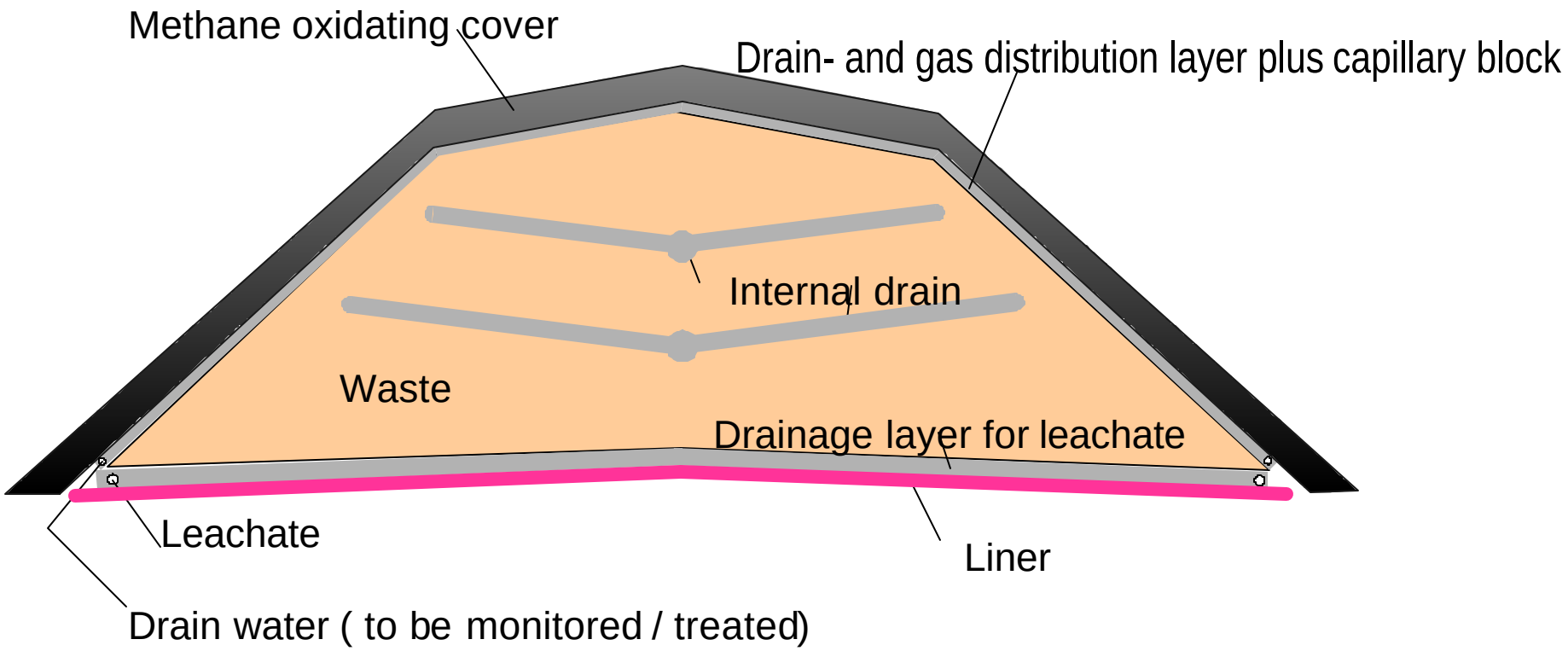
- > 90% less compared with untreated waste
- Gas usage unatractive
- Gas treatment:
  - uncollected by methane oxidation in the landfill cover
  - collected by regenerative thermal oxidation

landfill	CH_4 Vol.%	O_2 Vol.%	CO_2 Vol.%	equals to landfill phase
a	45	0	52	phase III, instable methaneous
i	70	0	22	end phase V, long time
u	60	0	37	ende phase IV, stable methaneous

Further recommendations

- Stability analysis has to consider the individual properties of the local MBP output
- Implacement preferably at dry weather conditions
- Small implacement area;(Dach et al., 1999)
  - < 25.000 Mg/a < 0,5 ha
    < 50.000 Mg/a< 1,0 ha
    < 100.000 Mg/a < 2,0 ha
- Placement moisture should be low to prevent excess porewater pressure
- Possibly an internal drainage is necessary at higher landfills
- Water circulation in untreated waste below MBP waste should be kept going on

Landfill construction



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