

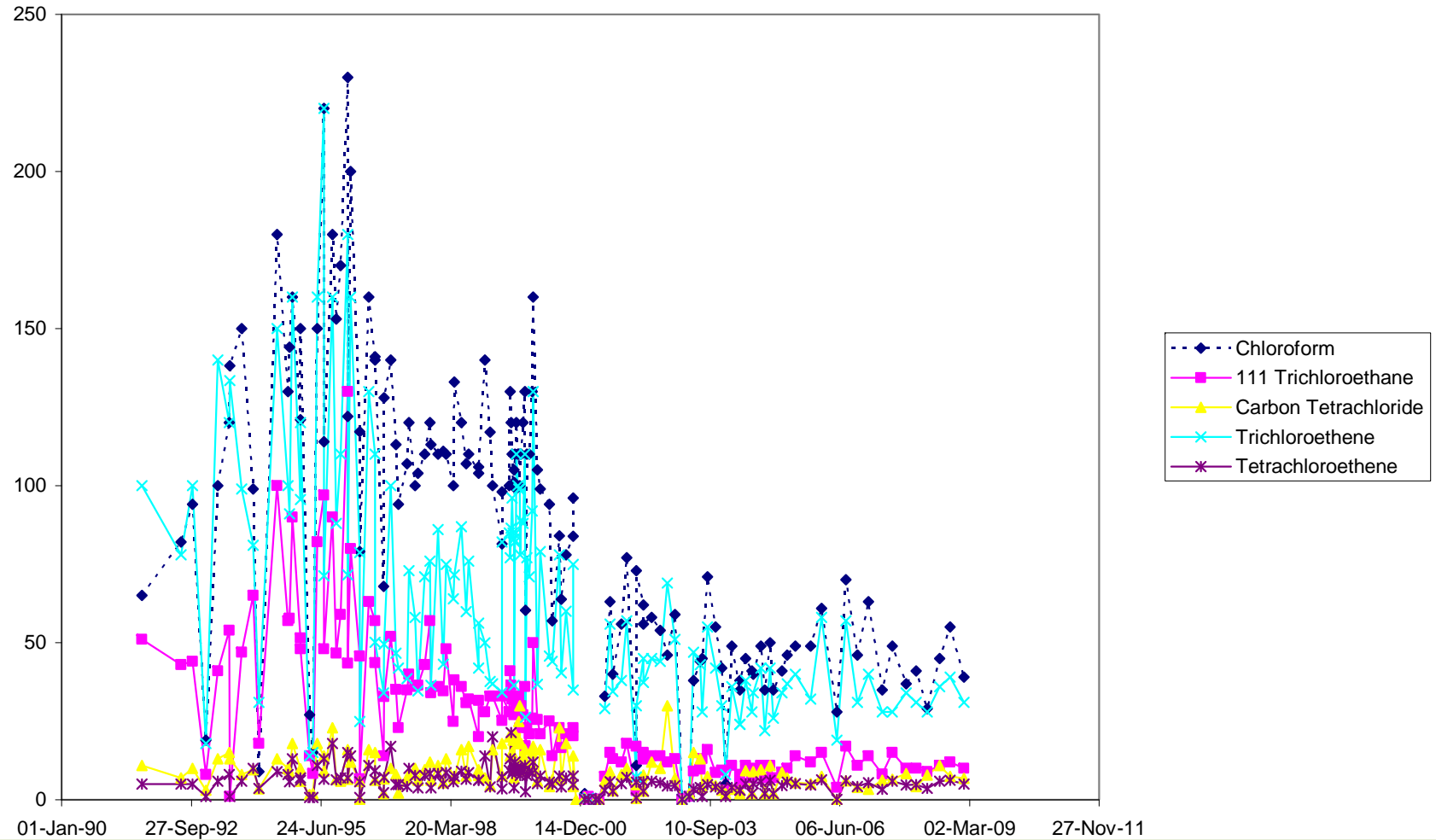


Environment
Agency

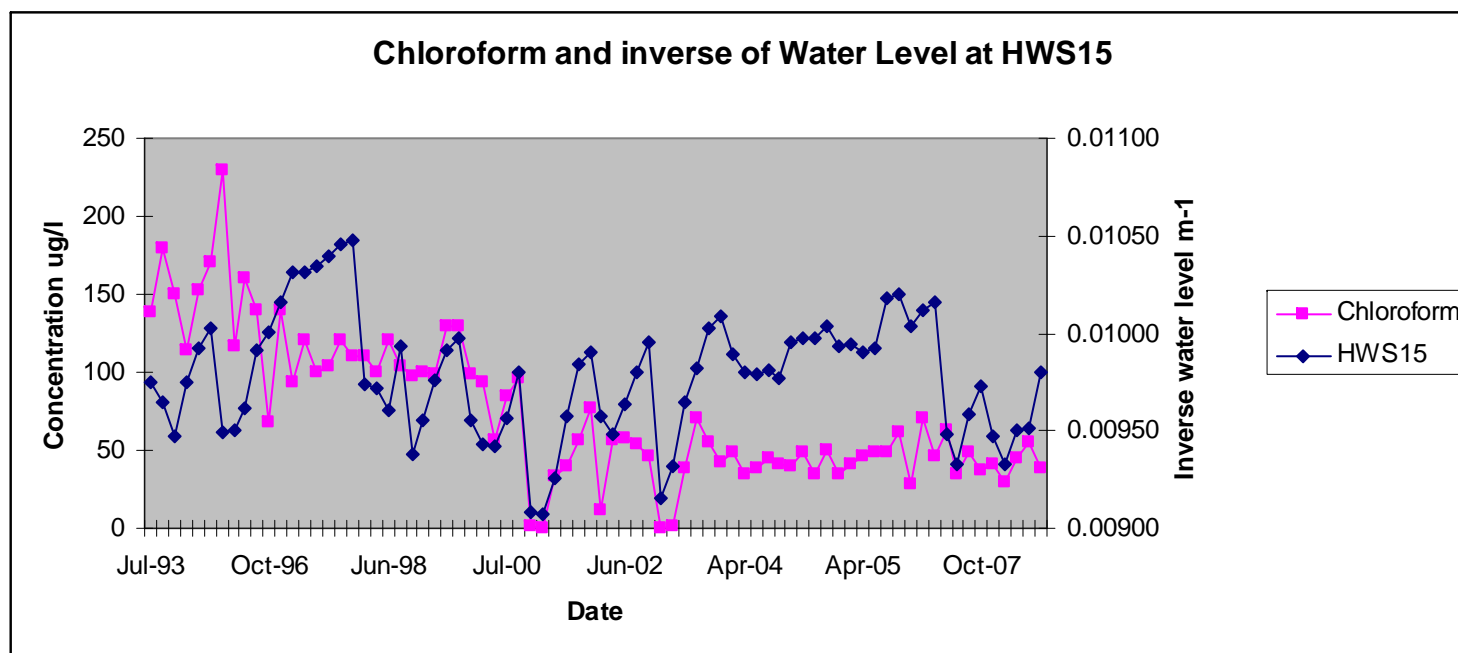
Workshop 2

Transportation of contaminants

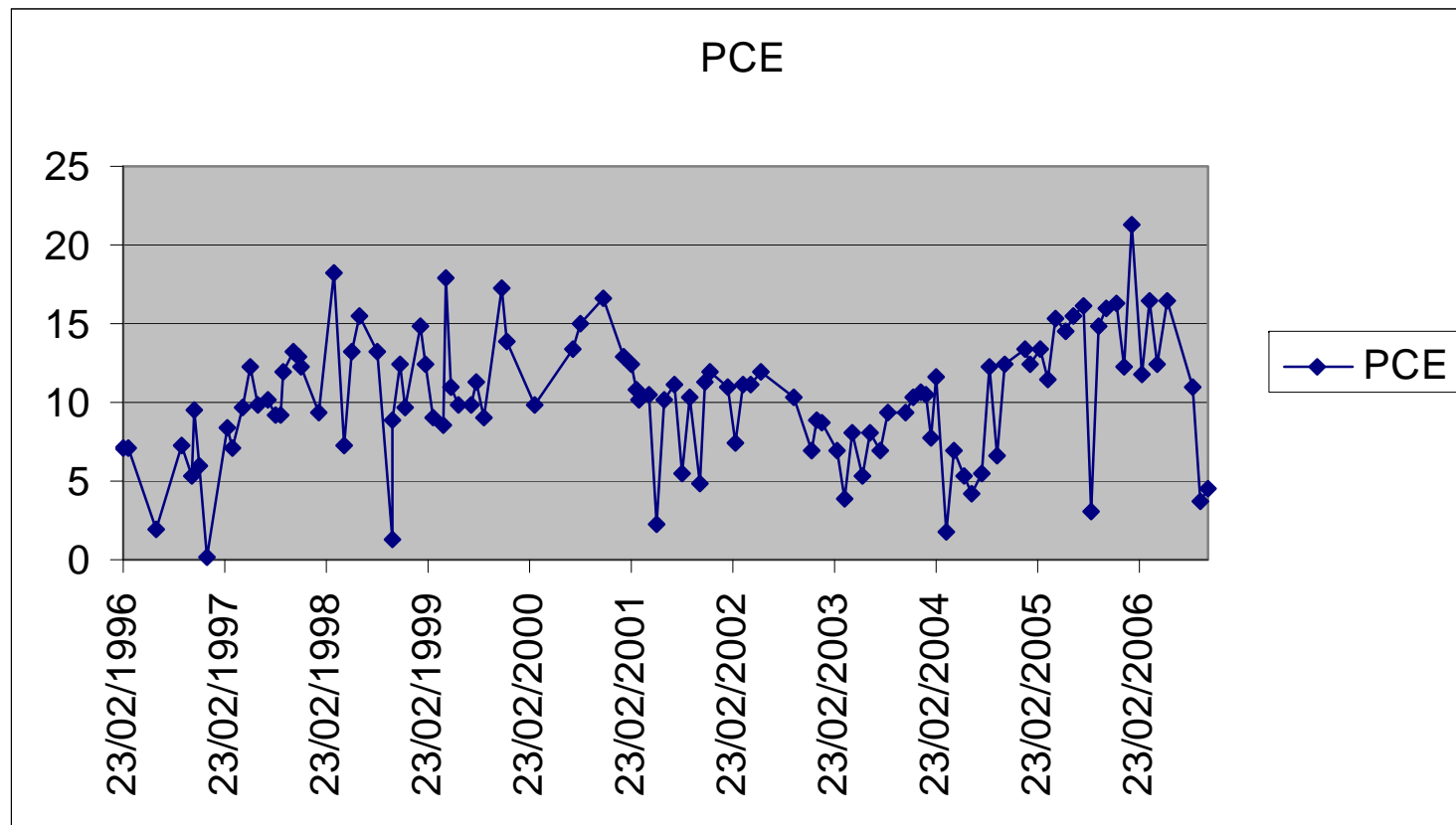
Offsite Borehole in Harwell Plume



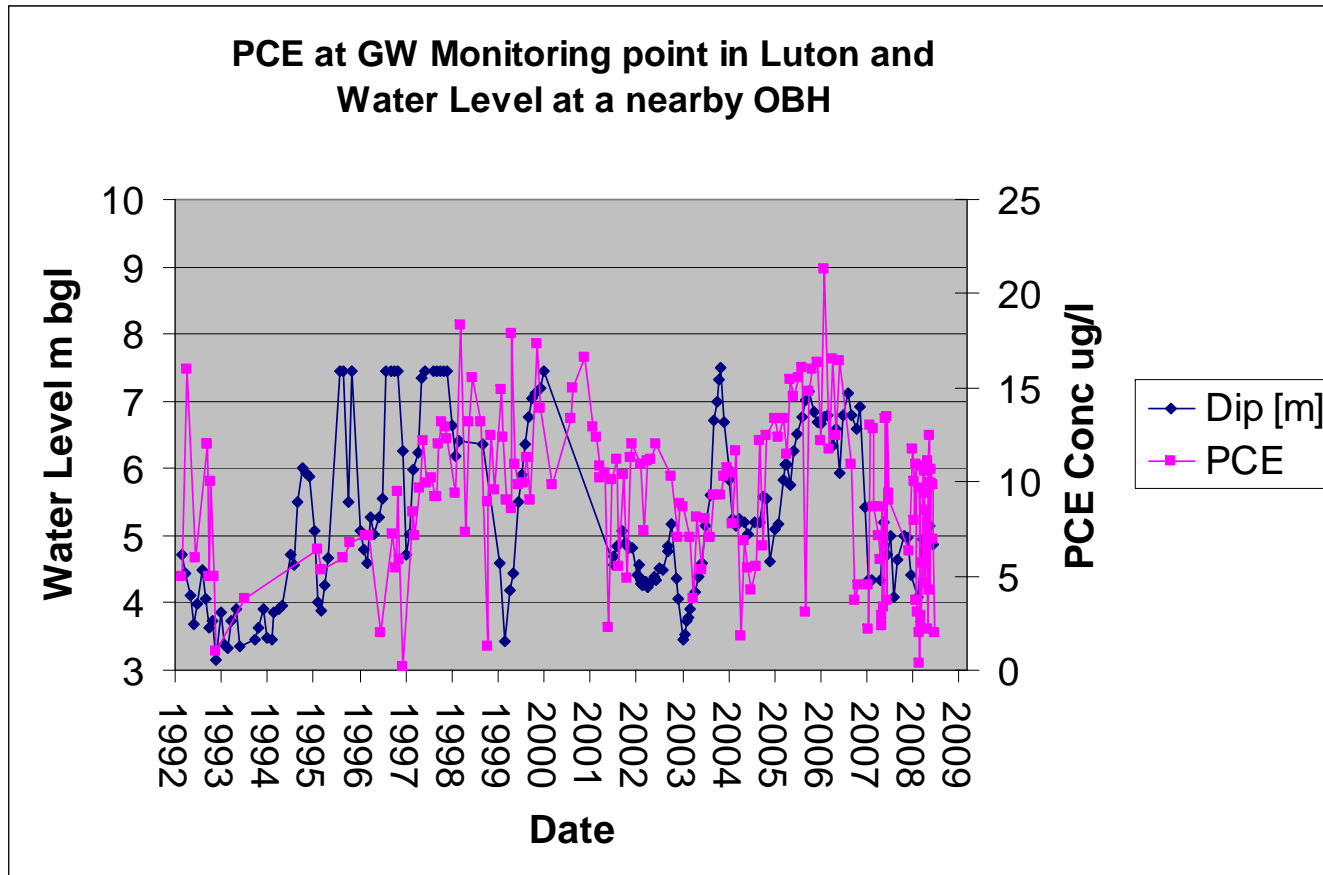
Water level and contaminant concentration



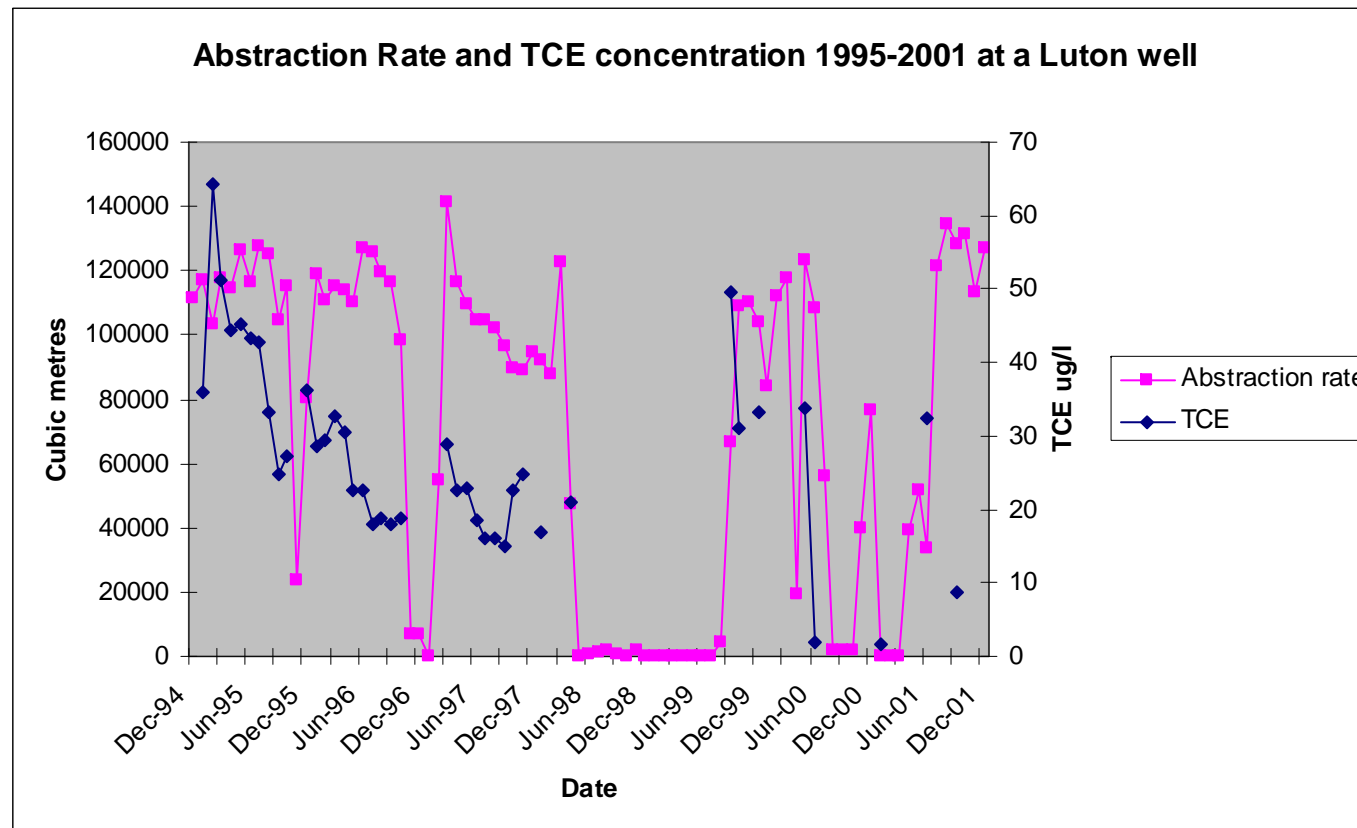
WFD Rising trend in Luton



Water Levels and PCE Concentration



Impact of abstraction on TCE contaminant levels



Degradation

Solvent / daughter	Average 1993-2012
	ug/l
Carbon Tetrachloride	3.8
Chloroform	54.8
Dichloromethane	<0.5
111 TCA	76.1
1,1 Dichloroethane	0.58
1,2 Dichloroethane	0.85
1,1 Dichloroethene	6.41
Tetrachloroethene	2.9
Trichloroethene	29.8
cis 1,2 Dichloroethene	0.34
trans 1,2 Dichloroethene	<0.1
1,1 Dichloroethene	6.41
Vinyl chloride	<1

Drinking Water Protected Area test

Statistically significant trend in data	Mean concentration below Threshold Value	Mean concentration above Threshold Value
Down	GOOD (not at risk)	GOOD (at risk)
No trend	GOOD (not at risk)	GOOD (at risk)
Up	GOOD (<u>at risk</u> where predicted concentration in 2012 > 75% of TV, otherwise <u>not at risk</u>)	POOR (at risk)

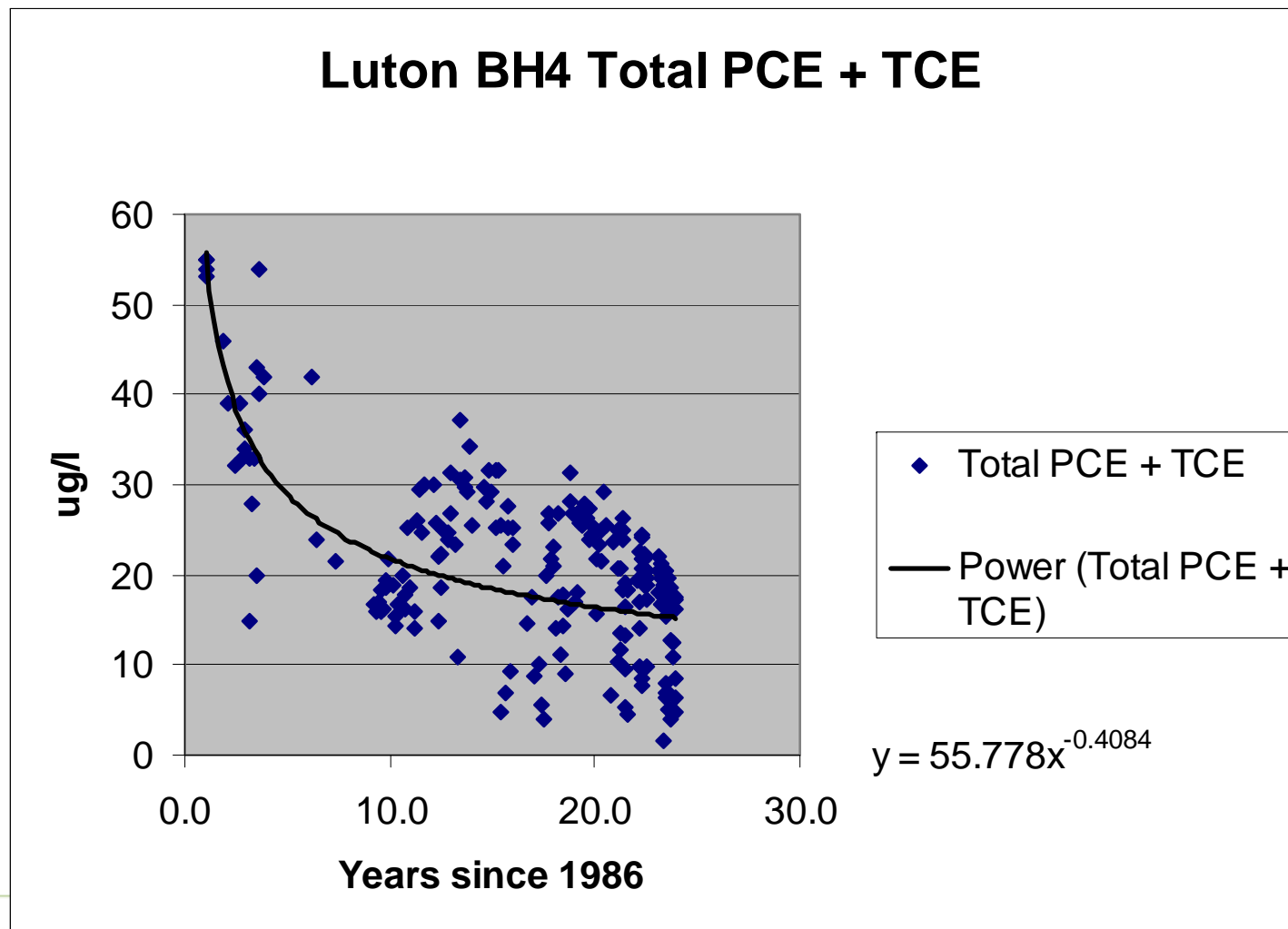
General Chemical Assessment test

Groundwater Chemical Status	Confidence	Example criteria
Good	High	Groundwater body (GWB) not at risk (6 or more monitoring points). No pressures acting on groundwater body.
	Low	GWB not at risk (<6 monitoring points). No pressures acting on groundwater body.
		GWB at risk (<6 monitoring points). Groundwater pollutant concentrations below threshold value or within baseline range at all monitoring points.
		GWB at risk (6 or more monitoring points). <33% of monitoring points exceed threshold and percentage area of pressure impact is <50% (groundwater vulnerability and presence of low permeability drift are taken into account). GWB average concentrations below threshold value.
Poor	Low	GWB at risk (<6 monitoring points). Groundwater pollutant concentrations above threshold value at all monitoring points.
		GWB at risk (6 or more monitoring points). ≥33% of monitoring points exceed threshold value.
		GWB at risk (6 or more monitoring points). <33% monitoring points exceed threshold value but percentage area of pressure impact ≥50% of the GWB (groundwater vulnerability and presence of low permeability drift are taken into account).
	High	GWB at risk (6 or more monitoring points). ≥50% of monitoring points exceed threshold value and percentage area of pressure impact ≥50%.

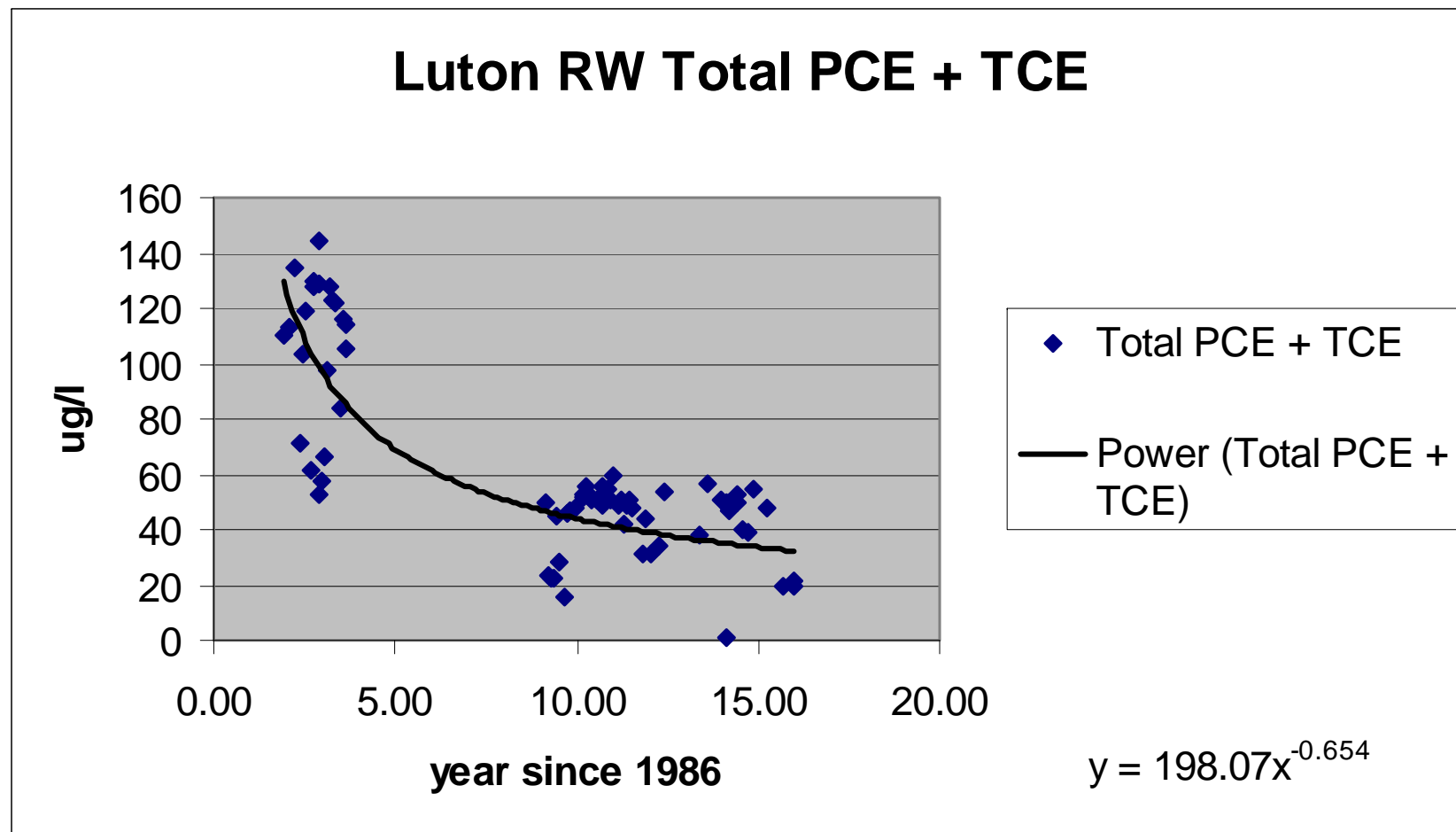
Questions

- ➔ What type of decline equation might be expected from dilution and dispersion of the pollutant alone in a dual porosity aquifer?
- ➔ How would you remove the effects of changing water levels and abstraction rates to obtained baseline declining plots to check the mathematical solutions for these graphs?
- ➔ Should the equations generated be based on the worst case scenarios (e.g a & b below) as peaks and frequency of contaminant peaks often trigger the need for water treatment?
 - ➔ a) drought and minimal abstraction or average conditions
 - ➔ b) effects of climate change
- ➔ If these curves predict breaches of threshold concentrations beyond 2027 what remedial measures might be appropriate?

Luton

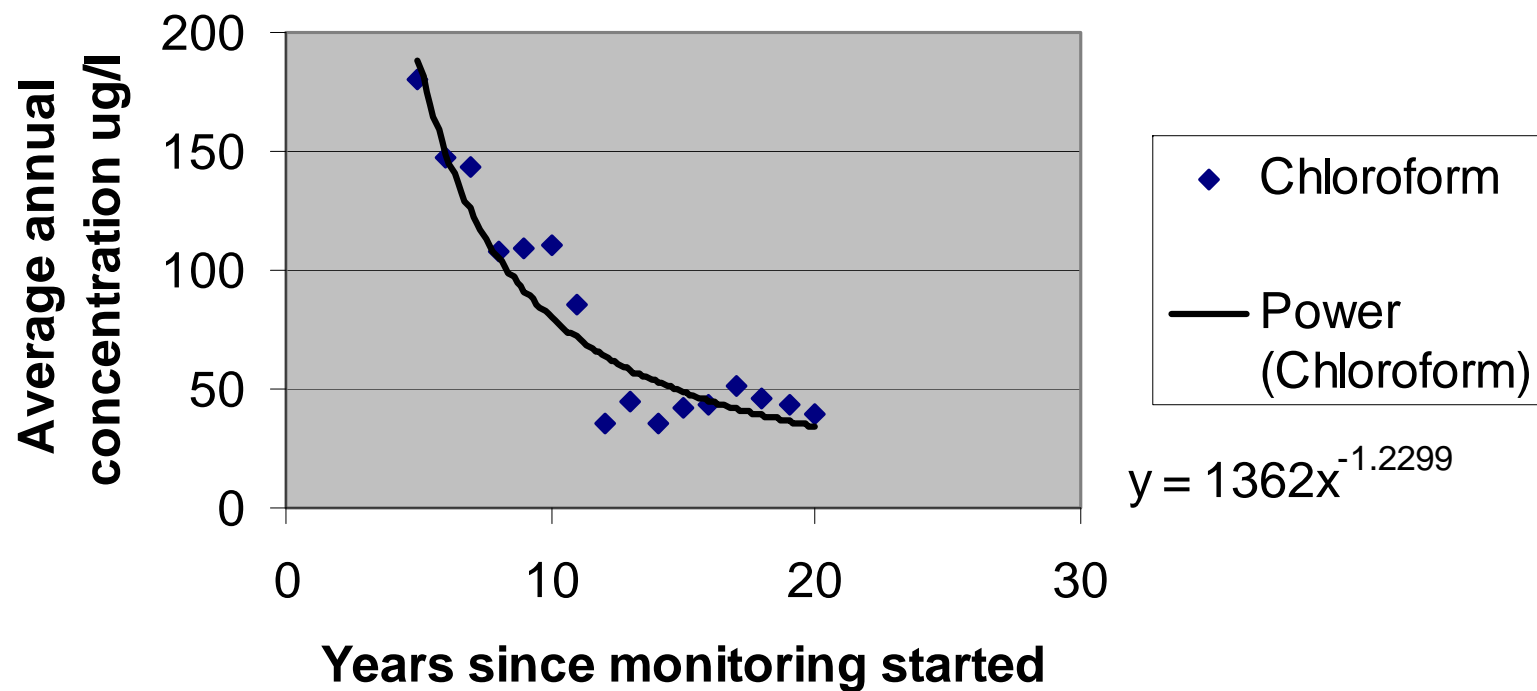


Luton



Harwell

Declining chloroform at HWS15



- ➔ Longstaff S, Aldous, P.J., Clark L, Flavin R.J., & Partington J. (1992)
- ➔ Contamination of the Chalk Aquifer by Chlorinated Solvents: A Case Study of the Luton and Dunstable Area. J.IWEM No 6 pt 5 Oct 1992 pp 541-550.