Revise 2

WASTE STREAM – CONTAMINATED SOILS

1. BACKGROUND TO THE POLICIES AND MARKET CONDITIONS

Directive and other regulatory effects

- Contaminated Land Regulations 2000 (England)
- Part II of EPA '90
- PPC
- Environmental Liabilities Directive
- Water Resources Act
- Groundwater Regulations and Water Framework Directive
- Sustainable Construction Strategy

2. LIKELY FUTURE ARISINGS OF CONTAMINATED SOIL WASTE CONSIDERING THE MARKET CONDITIONS AND PRODUCERS RESPONSE TO FORTHCOMING LEGISLATION

Waste arising each year

Contaminated soils observes a strong correlation with C&D waste arisings, however the SWaT data has shown that "contaminated soils", in the waste description, was present in most categories but in large volumes in 050108, other tars, and 050603, tars from the pyrolitic treatment of coal. (Babtie)

Contaminated soils account for up to 1 million tonnes of special waste arisings per year in England and Wales, yet it is envisaged that increased treatment and recovery may lead to a reduction in the quantities of wastes soils being consigned. Conversely, the implementation of the Contaminated Land Regulations 2000 and the likely growth in redevelopment of brownfield sites may result in the redevelopment and remediation of more contaminated sites, which could be central to an increase in the quantity of contaminated soils.

These developments will also vary the arisings geographically per year, depending upon where the redevelopment projects are scheduled, thus having a strategic influence on the location of treatment processes or sites.

See **Annex I** for Table showing hazardous and liquid waste arisings for the UK by Construction and Demolition which includes the various quantities of contaminated soil from other waste streams. See also **Annex II** for table showing the analysis of treatment requirements, highlighting the assumed increase in brownfield redevelopment.

Impact of the Landfill Directive

As a result of the Landfill directive there will be limited voidspace available and it has been suggested that Local Authorities may in some areas also prohibit all contaminated soils from disposal to landfill. This could effectively place the land remediation and development industries in crisis. The industry will be generating contaminated soils when there is limited treatment technology and capacity available and there will be little or no available waste disposal route.

The remediation and waste services industries appear to be aware of the implications and are starting to make limited provisions, including acquiring some remediation technologies, mostly in overseas sister companies where the technology can be used economically as a business. Unfortunately there is no economic driver for importing such technology to the UK, nor is there an available market.

Initially it is expected that a significant majority of contaminated soils currently consigned to landfill may be stored, pending subsequent treatment technology and capacity being available, this is unsustainable. Much contaminated soil will be consigned to landfill using minimal treatment (such as stockpiling) but regulators are not keen to let this happen. It will be important to ensure that a short term contingency strategy is available to help industry cope with the wastes produced until sufficient technology and capacity are available.

Treatment of contaminated soils for simple volume reduction or for re-use on site will become important. Volume reduction will essentially concentrate contamination into smaller volumes, effectively increasing the potential hazard of the material and potentially increasing the waste classification. Treatment of an entire soil mass (by solidification into a mass or by chemical alteration of the contained contamination) to reduce the environmental hazard and allow the re-use upon the site will effectively remove the contaminated soil from the waste hierarchy.

The impact of treatment on contaminated soils on the quantities of waste produced and the resulting waste classification is largely unknown under the existing waste classification system. The impact of such treatment on the classification of such wastes using WAC is totally unknown.

It can be foreseen that although the total volume of contaminated soils consigned to landfill will significantly reduce over the following few years, the proportion of the waste consigned as hazardous may significantly increase as the contamination is concentrated into a smaller volume.

Considerations:

Producers

- Likely response to regulations
- Assess levels of in-house treatment/discharge

- Assess the quantity of contaminated soil within the C&D and other waste categories in the EWC, the proportion likely to have hazardous properties and the treatment requirements prior to landfilling
- Pre-treatment costs
- Lack of treatment technology

Waste Industry

- Investment in technology

Regulators

- Increase in controls
- Advice on separation and segregation

Local Authorities

Government

3. POSSIBILITIES FOR MINIMISATION AND REDUCTION OF CONTAMINATED SOIL- MARKET FOR HAZARDOUS WASTE

The quantity of contaminated soil requiring treatment and/or disposal appears likely to continue increasing proportionally to C&D waste. However, whereas currently the most cost effective means of site remediation is to employ a “dig and dump” strategy (plentiful voidspace, cheap landfilling costs) as the available landfill voidspace for such materials is reduced and the costs rise, alternative remedial options and treatment technologies will become more cost effective.

Obstacles to remedial treatment of contaminated soils are plentiful, but appear to fall into two general categories: cost effectiveness and regulator approval.

For small volumes of waste, the costs for treatment can be prohibitive (especially ex-situ treatment) such issues may be overcome by the use of centralised facilities, though currently there is no market or economic incentive

In-situ treatment is often not considered favourably by Regulators because it is difficult to adequately validate the process, these problems are currently largely being overcome by insurance

New technology is considered with suspicion by Regulators until it can be tried and tested, technology needs a pedigree, regulators need to find a way that will allow development and use of new technology without necessarily releasing the remedial obligations of the landowner/developer prior to satisfactory completion

Remediation proposals are generally complex and involve the input from a number of areas of expertise (including environmental risk assessment, geohydrology, chemistry, biology, toxicology, ecology, civil engineering, process engineering, etc.). As a result the resources utilised by Regulators often have insufficient knowledge or experience (whether in house or external staff) to fully address a land remediation proposal, resulting in confusion, numerous rounds of explanation and clarification and often incurring significant delay. Additional resources need to be readily available to the Local Authority to allow proposals to be quickly and adequately reviewed for approval

Minimisation and reduction of contaminated soil consigned as waste will occur as a direct result of the development of the technology in contaminated soils treatment. Whereas currently a significant proportion of the contaminated soil is consigned to landfills as waste, when the technology is available in the UK and operating a much smaller proportion (only the waste by-product of treatment processes) will be consigned to landfill. It is expected that a significant majority of contaminated soils can be treated and made suitable for re-use.

Considerations:

Producers and Waste Industry

- Possible increase in R&D in pre-treatment
- Changes to waste management practices
- Development of new materials

Waste Industry

- Potential impact on waste minimisation

Government and Regulators

- Support for Envirowise
- WRAP – Increase the market for hazardous waste
- Encourage R&D spend

4. ASSESSMENT OF THE FUTURE TREATMENT AND DISPOSAL CAPACITY FOR CONTAMINATED SOIL

Assess the influences that have been outlined in 1, 2, and 3 and the subsequent influence on the requirements for merchant facilities. This would involve the type of facilities and the capacity in which they should exist.

Calculate the effect that increases in off-site treatment costs for contaminated soil wastes would have on the market for in-situ remediation techniques.

Alternative Treatment routes for Contaminated soil waste:

- Stabilisation/Solidification processes
    - (ESA) has the potential to treat up to 525,000 tonnes of contaminated soil depending on the type and degree of contamination present. This practice usually goes to landfill in Europe
- Direct Landfill
- Bioremediation
    - In France soil biotreatment and washing are also carried out on site. 23,000 tonnes of hydrocarbon contaminated soil are biotreated each year at a cost of approximately £40 per tonne.
- Thermal desorption
- Vitrification
- Thermal Degradation
- Aerobic Treatment
- Based Catalysed Dechlorination (BCD)
    - The BCD process involves the addition of sodium bicarbonate, or an alkaline polyethylene glycol (APEAG) reagent to the contaminated soil, which is then heated to 330 degrees Centigrade in a reactor to partially decompose and volatilise the contaminants, which then require separate treatment. Although the technology has not yet been used in the UK it is used in the US to remediate soils.

"*The price charged for contaminated soil disposal rarely reflects whole-life costs of disposal, but rather the state of the market, and the need for the waste management companies to maintain volume and turnover at landfills to meet business targets. One larger operator recently raised prices by £2-3 per tonne, and lost substantial volumes of waste business as a consequence*"
Entec (industry source)

The cost of treatment will have a profound affect on the redevelopment of brownfield sites and ultimately the environment, as it will not be naïve to assume that if the cost of treatment is too high then redevelopment will be hindered. Alternatively, different designs will leave more of the material in situ to reduce overall disposal costs.

Considerations:

Producers

Waste Industry

Regulators

Government

6. KEY DECISIONS TO BE MADE BY:

- **Producers**
- **Waste Industry**
- **Regulators**
- **Government**
  - Central
  - Local

Annex I

Table. Hazardous and liquid waste arisings for the UK by Construction and Demolition showing the amount banned hazardous waste properties and the amount of liquid waste

	Total Average Waste (SWaT)	Total to landfill (SWaT)	Total: Banned hazardous properties (SWaT)	Total: Liquid (SWaT)	Non special liquid (UK)	Other factors - landfill	Other factors - haz - properties	Other factors liquid	Amount requiring diversion from landfill: liquid	Additional amount to divert due to banned properties	Additional amount requiring treatment prior to landfill
Total on current HWL	114017	109627	193	68	0	6068	-58	4	72	135	115488
Extra haz. wastes on integrated list	701799	695699	8009	558	0	322564	660	30	588	8668	1009007
Wastes on neither list	261714	250981	4951	873	3446	13677	-38	46	4364	4913	0
Total	1077530	1056307	13153	1499	3446	342309	564	79	5024	13717	1124495

2550te contaminated soil from 010000, 198,400te from 050000 +300 te banned hazards; 2158 from 200000; 23500 from 190000; 50,000 +500 banned properties from 130000 and 9660 from 100000
922 tonnes is liquid with banned hazardous properties, duplication removed
Asbestos fibre waste, 170601, could be considered as already treated by wetting and bagging. This would be 109,434 tonnes treated waste showing no banned or liquid properties
Asbestos cement waste is shown in the third row of the table, and is currently classed as a non-hazardous waste. This is expected to change, but the disposal option is expected to be to non-hazardous landfill without any need for further treatment. Total amount involved is around 200,000 Te
56041 tonnes special waste added, including 79 tonnes liquid, plus 646 tonnes non-special liquid waste, from Scotland and Northern Ireland

Annex II Babtie report analysis of treatment requirements

Table 7.2 (cont.) Treatment for special solid wastes			Amount of waste requiring diversion (te/year)	Waste min	In house reuse	Merchant recycling	Simple phase separation	Complex phase sep. e.g. centrif + settle	High cost physical	Intense oxidation pretreatment	Compost	Aerobic	Anaerobic	Biological + pretreatment	Combustion	Other thermal; e.g. pyrolysis/ gasification	Plasma/ vitrification	Neutralisation	Chemical treatment	Solidification	Remediation	Do nothing	Total	Cost of change (£/ annum)		Additional cost/tonne (£/ t)	
EWC	Waste type																							low	high	low	high
17	Construction and demolition waste (including road construction)	Total on current HWL	115,623																			100%	100%	0	0	0.0	0.0
		Additional wastes on proposed integrated list	1,017,675	30%												10%			10%	50%		100%	-1,526,513	35,109,791	-1.5	34.5
		Wastes on neither list	263,740	5%																15%	80%	100%	-461,545	1,384,635	-1.8	5.3
				Assumed no requirement to treat 115,600 te asbestos fibre and 200,000 te asbestos cement; assumed major changes in production of contaminated soil with redesign of brownfield developments																								