

INSPECTORS REPORT

WASTE LICENCE REGISTER NUMBER 137-1

APPLICANT: Haytonvale Developments Ltd.

FACILITY: 'Ropewalk Place Development'. Facility Contained by the Following Street Frontages: No. 28 & 29 Sir John Rogerson's Quay, No. 10, 11, 12 & 13 Cardiff Lane, and Facility East of No. 10 Hanover Street East.

Recommendation: That a licence be granted subject to Conditions.

(1) Introduction

This waste licence application is for activities involving the remediation of hazardous contaminated soil and groundwater at a facility in the south Dublin Docklands to be developed for commercial and residential use.

The proposed waste licence facility straddles three street fronts - Sir John Rogerson's Quay; Cardiff Lane; Hanover Street - and lies immediately west of the current Dublin Docklands Development Authority (DDDA) licensed remediation gasworks facility (100-1). The facility setting consists of predominantly office/warehouse/small business units. Several employee intensive businesses back onto the eastern boundary of the facility. The main remediation works would be directly viewed by employees of ESAT, Arena Kitchens and An Post. The nearest residential area is Pearse Square which lies immediately south of the Hanover Street facility entrance. **A plan showing the location of the facility to which the application relates is provided in Appendix 1.**

The facility is 't' shaped with a total area of 1.1 hectares, of which only 0.56 hectares (main central concrete yard area) are considered contaminated from site investigations. The facility's contaminated land is concentrated across the middle axis of the 't' running east/west for a distance of 150m and is considerably smaller than the DDDA facility (8.9 hectares). In summary the possible contamination from past usage includes:

- | | |
|-------------------------------|---|
| - Timber Yard (1870 –1925) | <i>Timber treatment – Heavy metals, PAH¹s.</i> |
| - Paint Factory (1960s) | <i>Heavy metals, solvents, hydrocarbons, PAHs.</i> |
| - Transport Yard (to present) | <i>Hydrocarbons.</i> |

There is no history of a gasworks type development at this facility. However groundwater in the underlying gravels has been contaminated by gasworks related compounds, which have migrated in the groundwater from the adjoining DDDA facility.

Considerable demolition and site clearance is to be undertaken to the north and very east of the facility but outside the contaminated zone and prior to the soil removal remediation process. Demolition is not considered to be a waste activity since it is

¹ PAH: Polycyclic Aromatic Hydrocarbons (2 benzene ring compounds).

governed by normal site clearance practices set out in the relevant planning permission issued by Dublin Corporation (3938/99, Condition 16). The intended period of the waste licence for soil removal and remediation is 18 months. On completion of remediation it is proposed to build a seven-storey over basement development to cover the entire facility area.

The applicant has applied for Class 6 under licensed waste disposal activities, and Classes 2 and 4 under licensed waste recovery activities, in accordance with the Third and Fourth Schedules of the Waste Management Act, 1996.

Facility Visits:

DATE	PURPOSE	PERSONNEL
8 May 2000	Facility Notice Check	T. Nealon
26 October 2000	Facility Visit	M. Doak

General Information:

Quantity of Waste to be removed	Max 100,000 tonnes
EIS required	No
Number of Submissions received	1

(2) Facility Development

The remediation strategy for the facility is detailed in the following documents attached to the application:

- a). Report on Risk Assessment for Remediation Works, *Card Geotechnics UK*, March 2000;
- b). Attachment D (Facility Design) of the application;
- c). Soil Mixing, Validation and Environmental Monitoring Specification, *Carew Associates*, March 2000.

In summary the remediation strategy for the facility is:-

- Prior to commencement of any waste activities, a groundwater cut-off wall is to be installed around the contaminated area (the middle 't' axis), through the gravels and into the underlying impermeable boulder clay. The objective of the cut-off wall is to remove the potential migration pathways between the source of the contamination and its potential receptors (River Liffey, groundwater). This will be installed using slurry/bentonite wall techniques and will form part of the permanent works for the basement car park. The Specified Engineering Works requires a proposal to be made to the Agency regarding the engineering aspects of the cut-off

wall to include permittivity² and exact location since such items have yet to be confirmed pending further ground investigations.

- The excavation and off-site disposal of contaminated soils and made ground within the confines of the cut-off wall to a depth of 4m. The target depth of 4m has been set by the applicant in order to clear ground for the proposed basement of new buildings. The applicant considers that the total quantity of soils and made ground in the top 4m to be excavated for removal/remediation shall not exceed 70,000 tonnes total. The applicant proposes to deal with the 70,000 tonnes of contaminated soil in the following way using the estimates:
 - a) 23,000 tonnes of hazardous waste (TPH³ concentration > 1000mg/kg) of which:
 - 4,600 tonnes (TPH > 20,000mg/kg) will be stockpiled and taken for treatment at a licensed hazardous EU facility outside the country;
 - 18,400 tonnes (TPH 1000 - 20,000mg/kg) will be treated on site with bioremediation to form a non-hazardous end product to be ultimately disposed of at a licensed landfill in Ireland. This aspect is recommended for refusal and is discussed in Section 10 of this report. It is recommended that the 18,400 tonnes be removed off-site and taken for treatment at a licensed facility within Ireland or outside the country.
 - b) 47,000 tonnes of non-hazardous waste (TPH < 1000mg/kg) to be disposed of at a licensed landfill in Ireland.

It is estimated by the applicant that 4,600 tonnes (a) of contaminated soils is to be conveyed off-site via ship which is to lie alongside the north wall of the facility at Sir John Rogerson's Quay, although this figure would be increased to 23,000 tonnes if the bioremediation aspect is to be refused. Transport by ship is provided for in *Condition 7.3*. The other 47,000 tonnes (b) of soils is to be transported off-site by road haulage.

- A detailed grid for the characterisation and determination of soil quality (*ie* whether soil is hazardous waste or not) must be agreed with the Agency prior to commencement of any waste activities *Condition 5.1.2*.
- It is proposed to remediate the remaining contamination in the gravels and groundwater below the 4m depth contour with *insitu* soil mixing and soil stabilisation techniques (by hollow stem auger) where site specific clean up target levels are breached*. The soil mix columns will mix the contaminated soils and gravels with a slurry comprised of cement, bentonite and other reagents in order to stabilise and solidify the contamination left in place. This action will stabilise the contamination within the deeper gravel soils in order to diminish the risk to human indoor inhalation (finished development residents), groundwater and the River Liffey. A source/pathway/target risk assessment has been carried out for these deeper contaminated deposits using calculated risk based screening levels (RBSL's)* in soil as mg/kg, to form site specific clean-up target levels. These target levels are set out in 'Report on Risk Assessment for Remediation Works, Card Geotechnics, March 2000', and are incorporated into the PD in *Condition*

² Permittivity: the ratio of hydraulic conductivity to the thickness of the barrier.

³ TPH: Total Petroleum Hydrocarbons

5.1.1. Where soil concentrations are over the RBSL, *insitu* soil mixing will be undertaken. However further ground investigation is considered necessary in order to position the soil mix columns *Condition 5.1.2*.

- The finished soil mix columns will be tested in accordance with the *Leaching Tests for Assessment of Contaminated Land, National Rivers Authority, 1994*, using the Dutch Target values for groundwater as the target eluate concentration, *Condition 5.1.3*.

(3) Waste Types and Quantities

Condition 1.4 and Schedule A of the proposed decision controls the quantities and types of waste to be removed from the facility. The total quantity of soils and made ground in the top 4m to be excavated and classified at the facility shall not exceed 100,000 tonnes total. The deeper programme of soil stabilisation is likely to treat up to 17,000 tonnes *in situ*, which cannot be confirmed until the detailed grid design is set.

The application shows that the total quantity of contaminated groundwater to be treated during soil excavation and treatment is approximately 5000m³.

(4) Emissions to Soil & Groundwater

A detailed ground investigation was undertaken by the applicant during October 1999, which included trial pitting and borehole drilling. A total of fourteen boreholes were drilled at the facility, three being completed as permanent monitoring wells in the underlying limestone bedrock.

Soils

In general the facility is underlain by made ground (comprising clay, ash, clinker, concrete, brick and mortar with occasional pieces of timber, tarmac and steel) to depths of approximately 3.5m below ground level across the facility. The made ground is underlain by river gravels (measured permeability 4.8×10^{-2} m/s - 5×10^{-6} m/s) to depths of between 3m and 8m which are in turn underlain by stiff boulder clay (low permeability 10^{-9} m/s - 10^{-10} m/s) of depth range 7.5m to 12.5m, at which limestone bedrock lies.

Laboratory results of the soil/made ground samples in the top 4m indicate localised contamination with elevated levels of arsenic (8-120 mg/kg), mercury (0.2-22 mg/kg), copper (11-330 mg/kg), zinc (46-860 mg/kg), total petroleum hydrocarbons (TPH) (23-40,000 mg/kg), poly-aromatic hydrocarbons (1-14,206 mg/kg), benzene (0.5-24 mg/kg) and toluene (0.05-107mg/kg). It is understood that this area has been used for the maintenance of lorries. 29% of the soil samples tested exceeded the Dutch Intervention levels. However these soils will be removed from facility to make way for construction of the basement and therefore will not pose a risk to the occupiers of the facility, or surrounding environment, on completion of the development.

Laboratory results of the underlying gravel samples below 4m indicates less organic contamination than for the made ground and an absence of metal contamination.

However results in groundwater are often a better indication of contamination since gravel soil samples are not normally taken for contaminated land studies due to the fact that there is normally no matrix and the clasts cannot absorb contamination.

Groundwater

Groundwater is present in two aquifers - the gravels and the underlying Calp limestone bedrock (poor aquifer). The water table in the gravels is between 3m and 4m below existing ground level and groundwater flow is to the northwest, towards the River Liffey. The groundwater in the limestone is confined below the impermeable boulder clay. The shallow groundwater does not appear to be significantly influenced by tidal changes.

Laboratory results of groundwater in the gravels indicate that contamination by lighter hydrocarbons is widespread across the centre of the facility with concentrations of benzene, ethyl benzene, toluene, and xylene above the Dutch Intervention levels. In addition there is phenol and PAH contamination, where the individual PAH contaminants are common to gasworks type compounds. Laboratory results of groundwater in the underlying limestone aquifer (Boreholes RC1 – RC3) show that groundwater in the vicinity of borehole RC2 is seriously contaminated by the following List I substances: BTEX (26mg/l), Gasoline Range Organics (31mg/l), and Mineral Oil (3.4mg/l); with each parameter showing concentrations in excess of Dutch Intervention values. RC2 lies to the middle of the facility. The other two limestone boreholes only show trace contamination.

It appears that the gravel aquifer at the Haytonvale facility has been impacted by both off-facility contamination from the adjoining gasworks to the east and by on-facility hydrocarbon sources (spillages/leaking underground storage tanks (LUSTs)) in the overlying made ground. The underlying limestone aquifer has been impacted locally at RC2 (depth 17.0m) mainly by hydrocarbon contamination. The reason for this elevated yet localised hydrocarbon contamination in the rock at RC2 appears to be due to poor borehole construction rather than natural migration, given that the stiff impermeable boulder clay (4.25m thick) was found to be free from contamination and should have created a barrier to downward migration of the contaminants. The PD requires that the limestone unit at RC2 should be pumped free from contamination and decommissioned (to the UK Environment Agency publication 'Decommissioning Redundant Boreholes and Wells') within six months of date of grant of licence *Condition 3.11.3*. Furthermore, off-site bedrock groundwater quality should be reviewed quarterly in order to determine if RC2 is having a negative impact on the underlying aquifer *Schedule D 4*.

The applicant proposes to construct a groundwater cut-off wall around the centre axis of the 't' *Condition 3.11.1*, remediate the arising groundwater and recharging rainwater, *Condition 3.8.1*, and discharge the effluent to sewer, *Condition 6.5*. Monitoring of groundwater levels and quality (downgradient of RC2) outside the facility is required by *Condition 8.8* and, in the event of any impact being measured, remediation must be undertaken in accordance with, *Condition 9.4.3*.

(5) Emissions to Air

No specific dust, noise or odour monitoring proposals were submitted by the applicant, apart from general statements contained in the application.

Odours

The main types of odours expected at the Haytonvale facility will be dominantly hydrocarbon/mineral oil related since contaminated soil excavation and removal is only to occur in the shallow ground (to the 4m depth contour) which has been impacted by past use as a transport yard. Any gasworks type odours will be confined to the gravel units and groundwater. The total volumes of soils excavated, remediated/stabilised or stockpiled (total 87,000 tonnes) at Haytonvale will be far less than at the adjacent DDDA licensed (100-1) gasworks facility (in excess of 200,000 tonnes).

Fugitive hydrocarbon emissions and associated oil type odours may result on soil excavation and movement to a screening process for loading onto ship via conveyor. The type and concentration of odours emanating from these works and threshold for human 'smell' cannot yet be properly quantified. It will be therefore necessary to carry out an odour assessment during the first two weeks of soil excavation as a 'commissioning process' to identify the key odour contaminants and arrive at baseline odour figures particularly in an area where traffic volumes are high *Condition 8.6*. The generation of gasworks type odours are considered not to be a significant issue at this facility since the soil mixing technique is *insitu* and only one column will be mixed at a time. There will be no excavation or removal of gravel soils.

Furthermore, in the light of Agency experience enforcing the adjoining DDDA licence (100-1), and the issues raised in the one submission (Appendix 2), I recommend that the following conditions be established in order to minimise and control odours and to prevent any further nuisance to the community.

- The licensee shall carry out weekly odour monitoring at four points outside the facility (*Condition 8.6.2*) for malodorous and organic compounds associated with hydrocarbon and gasworks facilities is to be carried out as per *Schedule D 7*, and general odours are to be assessed quarterly using olfactometric techniques.
- The licensee shall establish and maintain a Stakeholders Group composed of representatives of the local community. The licensee shall convene monthly meetings in order to update the Stakeholders on works, progress, Agency correspondence, and nuisance/emissions aspects arising. *Condition 2.4.2*
- Experienced supervisors at key work faces and other key potential odour source areas (soil mixing columns) must be employed to ensure that highly odorous materials are handled in a way that minimises odour generation, and that odour suppression equipment is utilised effectively in such areas. *Condition 2.1.3*.
- The maximum height of any contaminated soil stockpiles are to be limited to below the level of the boundary fence. Covering stockpiles with tarpaulins or impermeable geotextile should be carried out. *Condition 7.8.2*. The covering of highly odorous

surfaces at the work face and at stockpiles should be carried out progressively, at a minimum at the end of each working day. *Condition 7.8.1.*

- *Condition 7.3* details several aspects which must be followed when the transfer of soil to ships via conveyor occurs in order to minimise odours and dust.

Dust

Monitoring requirements and emission limit values are set in order to control any fugitive dust emissions from activities on facility. The three dust monitoring locations will be as set out in drawing No 99/78-03 of the application.

Noise

The existing ambient noise levels are relatively high, up to 71dBA at surrounding streets due to traffic. Therefore, although the noise from the construction work will be relatively high, caused by pile boring during the construction of the groundwater cut-off wall, general mechanical digging/excavation, and installation of soil mixing columns, the impact is not considered to be high. The potential impact from the piling is also lessened by the method of piling proposed which does not result in any impulsive noise being generated. Remediation activities on the facility are restricted in duration and are expected to be completed within eighteen months. Noise monitoring at the facility is required by Schedule D3 of the proposed decision. Three noise monitoring locations must be set in the vicinity of the east side (ESAT and An Post) and the south side (gardens of Pearse Square).

(6) Emissions to Surface Waters/Sewer

A Section 52 consent has been obtained from Dublin Corporation for the discharge of the treated groundwater and wastewater to sewer. *Condition 6.5* provides for the requirements of that notice.

(7) Other Significant Environmental Impacts of the Development

None

(8) Waste Management, Air Quality and Water Quality Plans

The Dublin Waste Management Plan, 1998, makes reference to contaminated soils and states that soil from large-scale sites is unlikely to be treated in facilities in the region due to the volume of the material and the nature of the contamination, such as gasworks and heavy metals.

(9) Submission

One submission was received relating to the application on 22 March 2001 from a community based group called 'Docklands Opposes Contamination Ltd.' c/o Eileen

Dunne, 8 Pearse Square, Dublin 2. Appendix 2 details the submission and my response to it.

I have had regard to this submission in making my recommendation to the Board.

(10) Reasons for the Recommendation

I recommend the grant of a licence that will allow activities involving the remediation of hazardous contaminated soil and ground water present at the Haytonvale Developments facility for Classes 2 and 4 under licensed waste recovery activities, in accordance with the Third and Fourth Schedules of the Waste Management Act, 1996 for the following reasons:

1. I am satisfied that emissions from the soil removal and soil mixing activities will not result in the contravention of any relevant standard, including any standard for an environmental medium, or any relevant emission limit value, prescribed under any other enactment.
2. I am satisfied that the activity concerned, carried out in accordance with such conditions as may be attached to the licence, will not cause environmental pollution particularly with regard to the stabilisation of the contamination within the deeper gravel soils in order to diminish the risk to human indoor inhalation (finished development residents), groundwater and the River Liffey. Furthermore the installation of the groundwater cut-off wall around the contaminated area (the middle 't' axis) will negate environmental pollution of the River Liffey.
3. I am satisfied that the best available techniques will be used to prevent or eliminate groundwater and air emissions from the activity due to the use of soil mixing columns and the installation of a groundwater cut-off wall around the contaminated area (the middle 't' axis). Furthermore contaminated soils and gravels below the 4m contour will not have to be disposed off site, they will remain stabilised on site.

I recommend that Class 6, Third Schedule (on site bioremediation to form a non-hazardous end product) be refused for the following reasons:

- i. I am not satisfied that emissions from the bioremediation activities will not result in the contravention of any relevant standard, including any standard for an environmental medium, or any relevant emission limit value, prescribed under any other enactment due to the risk of contaminated effluent leakage to groundwater or the possibility of vapour/hydrocarbon emissions being produced during soil turning and processing at soil surface.
- ii. I am not satisfied that the best available techniques will be used to prevent or eliminate or, where that is not practicable, to limit, abate or reduce an emission from the activity concerned due to the following:
 - uncertainties which persist as to the viability of the bioremediation system in successfully reducing the concentration of mineral oil in the contaminated soils from 20,000mg/kg to below 1,000mg/kg within a

period of three months, given the fact that much of the mineral oil contamination in the top 4m is of heavy phase type and not volatile.

- the practicalities of ensuring that the treated soils are reduced to concentrations of under 1000mg/kg mineral oil in order that they can be disposed off-site to non-hazardous landfill. Such a bioremediation process is unlikely to reduce soil mineral oil concentrations to this figure.

Signed: _____

Dated : _____

Mr Malcolm Doak

APPENDIX I

MAPS

APPENDIX 2

SUBMISSION RECEIVED

One submission was received relating to the application on 22 March 2001 from a community based group called 'Docklands Opposes Contamination Ltd.' (DOC) c/o Eileen Dunne, 8 Pearse Square, Dublin 2, signed by Mr Richard Greene.

DOC state that remediation of gasworks sites is new to Ireland. Problems were experienced by the local community and DOC in the vicinity of the DDDA facility (Waste Licence 100-1) since July 2000 whereby environmental nuisances were above an acceptable level. Furthermore and in the light of these problems experienced, DOC wishes the Agency to consider Grounds 1 to 4:

1. Emissions
2. Exposure of Environment
3. Monitoring
4. Consultation

Ground 1: Emissions

Gasworks related odours produced as a result of excavation of soils at 100-1 DDDA, Sir John Rogerson's Quay (SJRQ) have been a constant serious nuisance to the community and raise health concerns. DOC acknowledge that the Agency enforced better odour control measures in the last year at 100-1, and expect such measures to be adopted in this PD for Haytonvale (137-1). Sealed tents or domes are effective in containing odours as is the practise of planting trees or forming berms at the boundary. Dust emissions on demolition and on open soil expanses/stockpiles were a nuisance at 100-1.

Comment

It is considered that the emission of gasworks type odours will not be a significant issue at 137-1 since any gasworks related contamination lies in the groundwater within the deeper gravels at a depth contour of 4m below ground level. The gravel aquifer will not be exposed during soil removal of the shallower soils which are mainly contaminated by hydrocarbons. The gasworks type contamination is to be remediated by soil mixing with an individual auger rig which will mix bentonite/cement compounds into the soil, forming cement columns. The emplacement of cement columns will be singular at a rate of approximately two columns per day. The Ropewalk facility does not contain any gaswork related tank bases *etc.* and so tenting will not be necessary. The facility is much smaller in size than the neighbouring DDDA facility. Large open expanses of soil will not therefore be an issue at Ropewalk.

The PD specifies several new Conditions 7.2 and 7.7 in order to better manage odours and odour nuisance for a contaminated land facility and limits dimensions and specifies stockpile covering in Condition 7.7.2. Furthermore it will be necessary to carry out an odour assessment during the first two weeks of soil excavation as a 'commissioning

process' to identify the key odour contaminants and arrive at baseline odour figures particularly in an area where traffic volumes are high *Condition 8.6*. Weekly odour monitoring at four points outside the facility (*Condition 8.6.2*) for malodorous and organic compounds associated with hydrocarbon and gasworks facilities is to be carried out as per *Schedule D 7*.

Ground 2: Exposure of Environment

DOC considers human health issues should be considered by the Agency particularly with regard to gaseous volatile emissions and are not satisfied with the use of Occupational Exposure Limits (OEL) as indicators of human exposure. They state that the applicant's use of ICRCCL and Dutch Standards is dated and would wish the Agency to draft new human exposure standards with the help of the US EPA and NAOSH (their abbr).

Comment

OELs and ambient air quality directives (*eg* EU 2000/69) were considered in producing this PD. The Inspector in this case reviewed the data presented with Dutch Standards and not the ICRCCL standards which are dated. The Dutch Standards were completely revised in 1999 and are published in 'Risk Analysis', Vol 19, No. 6 1999 (F Swartjes).

Ground 3: Monitoring

DOC objects to licensee self-regulation in general and wish the Agency to be present at the facility continuously. DOC raises particular concerns about sampling at 100-1.

Comment

All licensed facilities are subject to unannounced inspections and strict reporting structure and enforcement, and are subject to full Agency audits. Unannounced sampling is undertaken by the Agency. The sampling issues at 100-1 are outside this PD scope.

Ground 4: Consultation

DOC suggests that a condition of licence entails consultation with the public.

Comment

This has been done as per Conditions 2.4.1 and 2.4.2