

6th May, 2005

Attn: Ms. Charmaine Vassallo

A. Question List

Ta' Zwejra Non-Hazardous Engineered Waste Facility

Application for an integrated pollution Prevention and Control Permit, 2004/2005

Reference is being made to the Hydrogeological Risk Assessment and the Leachate Water Balance Assessment, referred to as HRA and LWBA respectively hereunder. The Water Directorate would like some clarifications on a few issues outlined below:

HRA 17.0 Aquifer pathway (p.23)

17.1 Hydraulic Conductivity

- The Water Directorate wishes to know whether any *on-site* tests were carried out to verify the effective field porosity of the Lower Coralline Limestone.

Adopted value for effective porosity was taken from available data as reported by Martin 1970 and they corresponded to values obtained from testing the rock samples in various nearby localities. While testing the geological formation of proposed waste facility at Ghallis which is of same nature as for Zwejra, we found that effective porosity varies from 6.0 to 15.7 % and comparing with other sources we adopted 10 % to 15 % as a most realistic water filled effective porosity of lower coralline aquifer underneath the site.

HRA 20.0 Hydrogeological Risk Assessment (p.29)

Determination of Environmental Assessment Limits (EALS)

- 1st Paragraph: The HRA states that “...*the landfill will not result in discernible discharges of List I substances entering the groundwater and will not cause pollution of groundwater by list II substances*”. How were the EAL's for list I substances considered?

An EAL can be defined as a water quality standard that is provided from either local regulations, EU Directives or another relevant source like in this case UK Drinking water Standard. A description of how these were considered is provided in Section 8.0 of Addendum document submitted with Additional Information in March 2005.

- To which table 7 is the derivation of EAL ammoniacal nitrogen being referred to in the last paragraph?

Sorry for omitting the table. Provided below.

TABLE 7 :
DERIVATION OF ENVIRONMENTAL ASSESSMENTS LIMITS

DETERMINAND	UK Drinking Water Standard (mg/l)	Max. Concentrations in background groundwater (Scott Wilson Report MBH2)	Resultant EAL (mg/l)
Ammoniacal -N	0.39	<0.2	0.39
Arsenic	0.01	< 0.002	0.01
Chromium	0.05	0.011	0.05
Copper	2	0.005	2
Lead	0.01	0.05	0.01
Nickel	0.02	0.01	0.02

HRA 20.0 Hydrogeological Risk Assessment (p.30)

Numerical Modelling

- 2nd Paragraph: Outward advective leaching requires further clarification

This is a simple assumption based on standard UK methodology by predicting possibility of advective leachate flow through the lining system for the purpose of numerical modelling. The theory of advective flow as expressed in Darcy's law, says that, if you reduce the pressure, you will reduce the flow of fluid through the bottom liner. To reduce the pressure, Ta' Zwejra like the other modern landfills is equipped with a leachate collection system to prevent fluid build-up. In reality, after one year of operation and now after the wet season has passed we did not detect any free liquid at base of landfill. Waste is not yet fully saturated therefore no leachate is formed yet.

LWBA Leachate Estimation Spreadsheet

1.3 Landfill characteristics

- It is not clear how the given value of 0.05m for the mean leachate head in this table was calculated or reached.

Noted ! It should be 0.5 m (500mm). The result however remain the same since it is not an input parameter for leachate calculation.