Car Park Waste Encapsulation Remediation

Fact Sheet **May 2011**

Fact sheets are designed to provide the community with simple and easy-to-understand information on environmental science and technology. Readers requiring greater detail should contact Orica:

- by phoning our Community Feedback Line - 1800 025 138
- by writing to - Community Matters, 16-20 Beauchamp Road, Matraville 2036

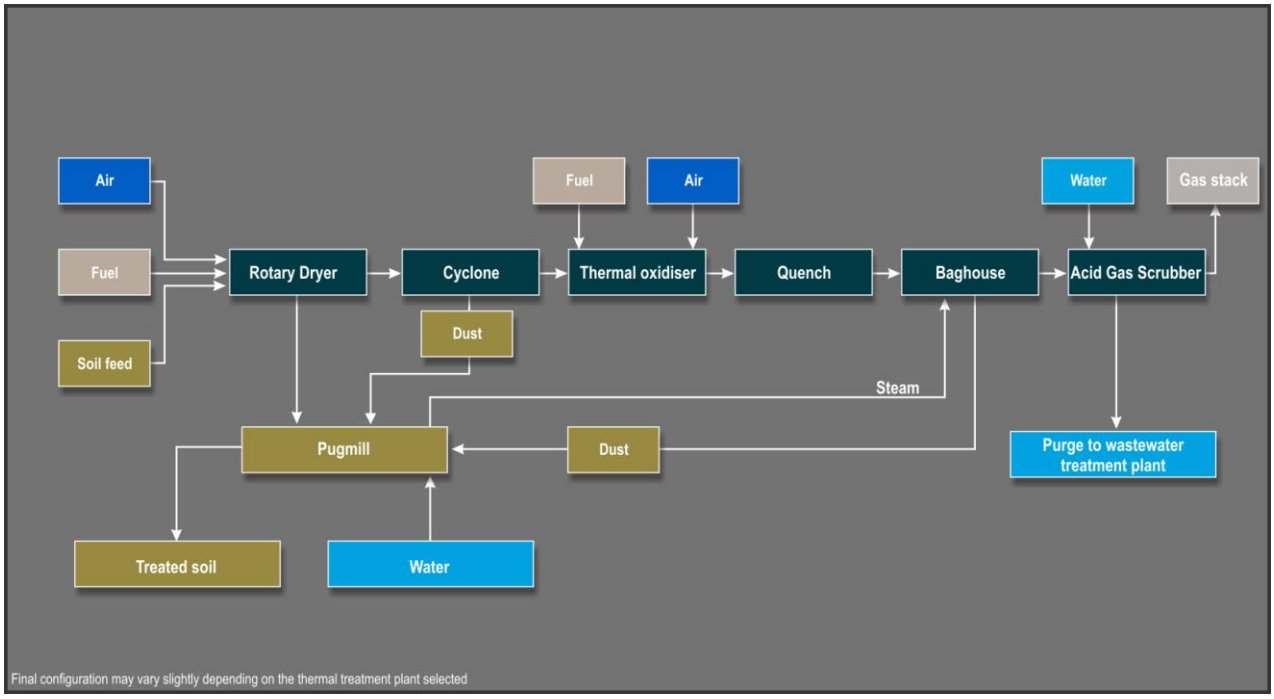
Cleanup Technology: Directly-heated Thermal Desorption (DTD)

Introduction

Orica Australia Pty Ltd is using Directly-heated Thermal Desorption (DTD) technology to treat soil contaminated with hexachlorobutadiene (HCBD), a waste by-product from the former manufacturing of chlorinated solvents by Orica (then ICI). The HCBD-contaminated soil has been encapsulated underneath a car park on Corish Circle (Car Park Waste Encapsulation, CPWE) since the 1980s, awaiting the availability of a suitable remediation technology in Australia. The use of a DTD plant to treat the waste was approved by the NSW Department of Planning.

DTD involves the desorption (separation) of contaminants from material such as soil using heat. The thermal desorption process for the remediation of wastes can be implemented using two main methods, with DTD being more widely used than ITD (indirectly-heated thermal desorption).

Use of DTD technology in remediation began in the USA in the late 1980s. It has been used for multiple remediation projects worldwide, including two large and complex projects in the Sydney suburb of Rhodes. The DTD plant is configured according to the “Best Available Techniques” of the Stockholm Convention on Persistent Organic Pollutants, to which Australia is a signatory.



Car Park Waste Encapsulation Remediation

How does the process work?

Soil handling and pre-treatment

The contaminated soil is being excavated within a sealed building constructed over the CPWE (Excavation Soil Building, ESB) to prevent dust being released into the atmosphere. Some soil sampling occurs in the ESB to test for the expected contaminants. Covered trucks transport the excavated soil on an internal Botany Industrial Park road to the Feed Soil Building (FSB) where it is screened to break down clumps and remove debris. The soil is stockpiled and tested further to confirm its contaminant concentrations before being fed by a conveyor into the adjacent DTD plant for treatment. To control emissions of dust and odour, the Excavation and Feed Soil Buildings are each fitted with an emission control system (ECS).

Figure 1: The Feed Soil Building

Directly-heated thermal desorption

In the rotary dryer of the DTD plant, contaminants are desorbed from the soil by direct heating – in contrast to indirect heating of the dryer surface, as in the ITD process. And since DTD exposes the soil directly to flame and combustion gas, the potential to generate unwanted combustion by-products is increased. Consequently, any by-products and the contaminants themselves must be destroyed later, within the thermal oxidiser.

During the DTD process, the soil is heated to a temperature typically between 350°C and 450°C using natural gas as fuel. The heating process separates organic compounds and low boiling point metals such as mercury from the soil as vapour. The DTD plant has the capacity to treat between 20 and 35 tonnes of soil per hour, depending on the soil matrix.

Cyclone and soil cooler

Car Park Waste Encapsulation Remediation

The gas stream from the thermal desorption process passes to what is known as a cyclone to remove large dust particles. The hot soil is transported to a soil cooler (pug mill), which uses treated water from the process. The processed soil exits the DTD plant on a conveyor and is stockpiled. Later, it is tested to confirm that contaminants have been removed to an appropriate level.

Thermal oxidiser

The gas stream is then transported from the cyclone to the thermal oxidiser. Heating the vapour to around 1000°C converts it by combustion into an off-gas that is comprised mainly of nitrogen oxides, carbon dioxide, water and hydrogen chloride (hydrochloric acid) i.e. combustion thermally destroys the volatilised organic compound contaminants. The thermal oxidiser would be similar to that used in the Groundwater Treatment Plant at Botany, although not as large.

Figure 2: The DTD Plant

Evaporative cooler and baghouse

The hot gas stream from the thermal oxidiser is then transferred to an evaporative cooler, where water is injected to rapidly cool the treated off-gas. This is an important step designed to minimise the formation of dioxins in the off-gas, and to protect the baghouse, which is downstream of the evaporative cooler. The cooled off-gas then passes through the baghouse, where fine dust particles are removed. The dust from the baghouse would then be transferred to the soil cooler (pug mill).

Quench and scrubber

Car Park Waste Encapsulation Remediation

From the baghouse, the gas stream travels to the quench and scrubber, where it is rapidly cooled with water. Hydrochloric acid produced during the combustion of the chlorinated contaminants is also removed with water. The acid in the water is neutralised and the water can then be recycled through the process or used to moisturise the treated soil. No further treatment of the water stream is required.

Emissions stack

The treated gas stream is emitted from the scrubber to the atmosphere through a stack attached to the scrubber unit. Some emission parameters can be monitored continuously whilst tests for others must be undertaken after sampling. The emissions monitoring criteria applied to the results are set by the NSW Department of Environment, Climate Change and Water (DECCW). The visible emission from the stack is steam.

Project Schedule

Soil treatment is scheduled to commence in July 2011, with commissioning tests and Proof of Performance Trials prior to this. The project is expected to be completed by the end of 2011.

Project schedule for the CPWE remediation is:

Site Establishment:	July 2010
DTD Plant Commissioning and Testing:	April-July 2011
DTD Plant Operation Commencement:	Planned for end July 2011
Operation of DTD Plant:	7-8 months (approximately)
Operating Times:	24 hrs/day, with shutdowns for maintenance