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THIESS USES RDP ENVESSEL PASTEURISATION AT NORTH HEAD

Cover Story

THE sewage treatment plant at North Head captures 35 per cent of the sewage produced by the City of Sydney and produces approximately 40 dry solid tonnes of primary undigested sewage sludge daily. Before 1992 the sludge was incinerated, or disposed of in the ocean. More recently the sludge has been stabilised using the N-Viro process, and the product either landfilled, or beneficially used in agriculture.

In accordance with the Sydney Water Corporation objective to develop beneficial use of biosolids as a viable sludge disposal option, Sydney Water called for tenders in 1994 for a chemical stabilization process to produce grade A biosolids capable of beneficial use. Since North Head is in a residential and resort area, noise, numbers of truck movements, dust and odours were of major importance.

The RDP Envessel pasteurisation process, developed in the USA, was selected by Sydney Water as the most suitable to meet the particular processing and environmental requirements at North Head. The facility was installed under a build - operate contract by Thiess Environmental Services.

The RDP Envessel pasteurisation process is a two-step patented process which meets the requirements for stabilization grade A as described in the NSW Environmental Protection Authority Environmental Management Guidelines for the Use and Disposal of Biosolids Products, August 1995.

These guidelines require pathogen reduction, and reduced vector attraction to meet grade A standards as outlined for a range of processes. The RDP Envessel pasteurization process is based on the combination of lime and supplementary heat addition to eliminate the pathogens, and to prevent vector attraction. The RDP process qualifies as a grade A stabilization process under certain processing

Biosolids Classification NSW

Biosolids Contamination	Contaminent Grade	Stabilisation Grade
Unrestricted Use	A	A
Restricted Use 1	B	A
Restricted Use 2	C	B
Restricted Use 3	D	B
Not Suitable for Use	E	C

Initial Verification Standards NSW

Parameter	Standard
Enteric Viruses	<1 PFU per 4 grams product dry solids
Helminth Ova	<1 PFU per 4 grams product dry solids
E. Coli	<100 MPN per gram product dry solids
Faecal Coliforms	<100 MPN per gram product dry solids
Salmonella spp	Not Detected / 50 gram dry solids

conditions: pathogen reduction (the RDP process meets the grade A stabilization requirements for thermally treated biosolids by maintaining the temperature at 70°C for 30 minutes) and vector attraction (attraction reduction requirements are met under Section 6 by adding sufficient lime to raise the pH above 12.0 for two hours and then at 11.5 or higher for an additional 22 hours, to prevent pathogen regrowth).

The RDP facility was installed by Thiess Environmental Services at North Head and began operation last year.

The facility will operate on a continuous basis for the duration of the contract. The sludge cake is dewatered by Sydney Water to approximately 30 per cent dry solids, and pumped to a sludge receival hopper in the RDP facility.

The sludge cake is then augered onto a weightbelt feeder to determine processing rate, and then delivered to the Thermoblender where it is mixed with quicklime. The quicklime is delivered in sealed tankers, and is pneumatically pumped into lime storage silos. The sludge cake is preheated in the Thermoblender to precondition the cake before addition of the quicklime. The preconditioning enhances the hydration reaction that occurs during "slaking" of the quicklime, and significantly enhances the exothermic effect of the quicklime. The sludge cake-quicklime mix is then augered into the pasteurisation vessel. This is an insulated box, with a slow-moving belt conveyor floor, and electrical heating elements in the walls of the vessel. The belt speed determines that the sludge-quicklime is held at 70°C for at least 30 minutes to produce grade A biosolids. The grade A biosolids are then conveyed for storage and subsequent loading into covered trailers for transport to the beneficial use site.

The sensitivity of the Manly area required that any potential odours or dust from the process be contained and treated. Since the RDP process is fully enclosed small odour scrubbers were fitted to treat for ammonia in air drawn from the Thermoblender, pasteurization vessel and conveyors. The storage building is also fitted with scrubbers to treat air for ammonia, hydrogen sulphide, and dust.

After the RDP plant had been commissioned, samples of stabilized biosolids were analysed for pathogenic organisms as required by the NSW EPA. The RDP process was subsequently approved by the NSW EPA as a process to produce grade A biosolids by thermal treatment.

Initial verification required that the process meet certain standards (see table on previous page).

The competitive advantage of the RDP process is that the cost of lime addition is significantly reduced. The rate of quicklime addition is calculated to raise the pH of the treated biosolids to 12 for a period of 24 hours. Low-cost electrical heat is used to maintain the temperature at 70°C for 30 minutes. Total processing cost using the RDP process is less than half that of other lime stabilisation processes.

The biosolids produced by the RDP Envessel pasteurization process comply with grade A stabilisation requirements, and do not require further processing. The biosolids are suitable for unrestricted use (pathogen) as determined by the USA EPA Rule 503, and the NSW EPA's Environmental Management Guidelines for the Use and Disposal of Biosolids Products produced last August.

The RDP process has other significant advantages over most other lime stabilisation processes, in that:

· It produces a class A stabilised biosolids product in a fully controlled process on site;

· There is no requirement for further stockpiling or processing;

· It produces a biosolids product with good liming equivalency, suitable for beneficial use in agriculture, horticulture and land restoration;

· It uses fewer chemicals and produces a lesser volume of biosolids to be trucked off site compared with other lime stabilisation processes;

· Comparatively lower operating costs, and

· The process is fully enclosed and can be odour-scrubbed for sensitive sites.

Stabilisation of biosolids for beneficial use has only occurred to any major extent over the past 10 years in Australia which has prompted the need for the regulatory guidelines. In the absence of concise guidelines, the USA EPA Rule 503 has been adopted in part in Australia for the pathogen reduction requirements for sewage sludge. Since Australian soils are primarily acidic however, there has been need to review the limits for contaminants. The NSW Environmental Protection Agency has subsequently embraced much of the US EPA standards in its biosolids guidelines.

These regulations address processing and monitoring methodology to determine classification grading for beneficial use. These guidelines are now being adopted by other states, and may possibly be adopted as national guidelines. If so it would be useful for an advisory group to be formed to facilitate review and update the guidelines as current technical information becomes available, particularly in relation to contaminant concentrations for "unrestricted use".

Based on the level of contaminants and the extent of pathogen reduction, the treated biosolids are given a classification grading to determine the allowable beneficial use application.

Unrestricted use requires that the biosolids meet both stabilisation grade A and contaminant grade A.

Samples of RDP treated biosolids are taken on a routine basis and analysed to determine the stabilisation and contaminant grading as described by the NSW EPA. The RDP stabilised biosolids from North Head meets the requirements for stabilisation Grade A.

In general, the contaminant grading meets the requirements for beneficial use in agriculture.

The RDP Envessel pasteurization process produces a granular product which is suitable for mechanical spreading and has a liming equivalency of approximately 44 per cent on a dry weight basis. The stabilised product has an aroma described as similar to that of wet cement.

Most of the grade A stabilised biosolids produced at North Head using the RDP process is disposed of in Sydney Water's beneficial use programme in agriculture.

In this program, the RDP stabilised biosolids are used in agricultural cropping programs as a liming material, with five tonnes of RDP product having the same liming value as one tonne of lime.

Under the requirements of the NSW EPA, agricultural sites for application of all except biosolids classified "unrestricted use" must be licensed by the EPA. Licensing

of these sites requires that soil samples be taken to establish background contaminant levels in the soil, and to determine application rates. The biosolids are then transported to the site, stored in an approved stockpile site, and applied, and surface incorporated in accordance with NSW EPA methodology. At present, the guidelines make no distinction between the various types of biosolids, i.e. compost, dewatered cake, and lime stabilised product.

Surface incorporation was required for control of pathogens from field applied dewatered cake, and to prevent surface runoff, particularly from large volume applications as would occur with compost and dewatered cake.

With lime-stabilised product grade A pathogen reduction has been achieved during the verified treatment process, and so incorporation to control pathogens is not a valid argument for soil incorporation.

Furthermore application rates are usually less than 10 tonnes of stabilised product per hectare, which would represent less than three tonnes of sludge solids, giving considerably lower contaminant and nutrient loading rates compared with dewatered cake.

The guidelines for beneficial use should therefore consider the characteristics of the various biosolids products (compost, dewatered cake, limed product), and the specific practical requirements of the various market sectors. Lime applications in cereal cropping systems are required at specific times corresponding with harvest, first rains after harvest, soil moisture profile, and stubble cover.

The time window for lime application is very narrow, and the requirement for surface incorporation of biosolids within 36 hours will restrict the practicality of use of lime amended biosolids in cereal cropping systems.

Provided that the lime stabilised biosolids is grade A stabilized, and applied on land with suitable ground cover, it would seem reasonable that guidelines for limed product should be different to dewatered cake and compost.

Trials are under consideration with several regional offices of the NSW EPA to consider surface application of grade A stabilised limed biosolids onto grazing and cropping agricultural lands.

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