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FC/12/9059/L01
10 May 2012

Dr Brian Sheridan
Odour Ireland
Unit 32 de Granville Court
Dublin Road
Trim
Co. Meath

Dear Brian,

RE: PROPOSED DRY FERMENTATION ANAEROBIC DIGESTION PLANT

Introduction

We understand the EPA has issued a request to your client in connection with the above facility.

EPA Request

"Clarify what controls are proposed in the biological treatment facility and the CHP plant to mitigate against fire and explosion risks and whether the relevant regulatory body has approved these controls measures in accordance with relevant standards / legalization".

Brief Description of Facility and Associated Hazards

The facility is a dry fermentation anaerobic digestion facility which is comprised of a number of sealed concrete tunnels of dimensions 30 m long x 7 m wide x 5 m high.

There is one access door for each tunnel to allow loading and unloading of material. Once each unit is loaded, it is pressurized to seal the door and leachate is recirculated over the material over a period of 35 days, with subsequent generation of biogas by methanogenation.

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Gas leaves each vessel via a pressure relief valve, which is set at 25 mbar approximately, which classifies the system as low pressure. Each line is fitted with a flame arrestor and each line feeds to a common manifold, which in turn runs to the CHP engine room and through another flame arrestor, through a Heat Exchanger, through a Catalytic iron filter to remove H_2S. The gas is then heated back up to 30 deg C and then slightly pressurized and fed to the CHP engine at about 90 mbar, where it is burned to generate electricity and hot water.

There is no bulk biogas storage in place at the facility.

Biogas is only stored is in the headspace of each concrete tunnel. There may be up to 30 tunnels in the facility, 15 on either side of a corridor.

Hazards

The principal hazard associated with the biogas system is fire and explosion resulting from a gas leak with subsequent flash fire (FF) and vapour cloud explosion (VCE). Both of these events are more likely to occur when a bulk storage container ruptures and releases biogas to atmosphere, so the proposed facility is inherently lower risk than many anaerobic digestion facilities as it does not have a bulk storage component.

The most likely hazard is therefore gas leak from a leaking flange or valve, or line rupture due to external force such as collision with a vehicle (the system is low pressure so line rupture due to high pressure is unlikely).

Controls in Place to Minimise Hazards

"*The Safety, Health and Welfare at Work (General Application) Regulations 2007; Part 8: Explosive Atmospheres at Places of Work* states that an employer shall:

"where an explosive atmosphere is or is likely to be present at or may, from time to time, arise in a workplace, make a suitable and appropriate assessment of the risk arising from such explosive atmosphere to the employees concerned having regard to all the circumstances."

An explosive atmosphere is defined as:

"An explosive atmosphere means a mixture with air, under atmospheric conditions, of flammable substances in the form of gases, vapours, mists or dusts in which, after ignition has occurred, combustion spreads to the entire unburned mixture. An explosive atmosphere does not always result in an explosion, but if it caught fire, the flames would quickly travel through it. If this happens in a confined space (e.g. in plant or equipment) the rapid speed of the flames or rise in pressure could also cause an explosion."

While the risk of an explosive atmosphere occurring at the proposed facility is low, nevertheless the possibility that such an atmosphere could exist in an accident situation, cannot be discounted.

The facility will therefore be designed and operated in compliance with the 2007 Regulations noted above.

A risk assessment will be conducted at the design stage of the proposed design and building layout and the techniques of HAZID (Hazard Identification) and HAZOP (Hazard and Operability Study) will be applied to the proposed design to designate the facility under the Zoning criteria specified by the 2007 Regulations, as follows:

Zone 0:
A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.

Zone 1:
A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.

Zone 2:
A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

Equipment to be used in the facility, including all potential sources of ignition such as electrical junction boxes, pump motors, fan motors, switches and light fittings will comply with these requirements:

- in zone 0 equipment marked category 1 by the manufacturer,
- in zone 1 equipment marked category 1 or 2 by the manufacturer,
- in zone 2 equipment marked category 1, 2 or 3 by the manufacturer.

The equipment will also comply with the provisions of:

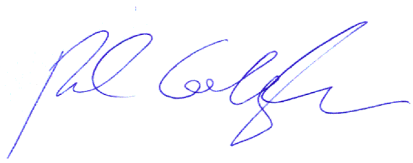
- European Communities (Equipment and Guide to the Safety, Health and Welfare at Work (General Application) Protective Systems Intended for Use in Potentially Explosive Atmospheres) Regulations (S.I. No. 83 of 1999);
- Regulation 172(g) of S.I. No. 83 of 1999 which transposed Directive 94/9/EC8 and places duties on the manufacturers and suppliers of equipment that is intended for use in explosive atmospheres
- to design and manufacture such equipment in accordance with the essential health and safety requirements of Directive 94/9/EC and to affix the CE marking;
- Institute of Petroleum's Model Code of Safe Practice (Part 15)11

  and the

- ETCI Guide to the Selection of Electrical Apparatus for Use in Potentially Explosive Atmospheres.

The preparation of an EPD (Explosion Protection Document) under the above regulations will be undertaken prior to the commencement of the facility, which will detail all of the above, and will be submitted for the approval of the Health and Safety Authority prior to commencement of operations at the facility.

Yours sincerely,



DR FERGAL CALLAGHAN BSc (Chem) PhD (Chem Eng) MRSC AMIChemE MCIWM
Director
AWN Consulting

Encl Attachment A: F Callaghan Summary of Experience

ATTACHMENT A

Dr Fergal Callaghan
Summary of Professional Experience

Dr Fergal Callaghan is a Chemical Engineer with 22 years experience of preparing EPD (Explosion Protection Documents), Quantitative Risk Assessments, HAZID and HAZOP Studies, MAPP and SMS Documents, and consequence analysis and risk assessment modelling of Major Accident Hazard Scenarios across a wide range of the process industries. He has a BSc in Industrial Chemistry from the University of Limerick and a PhD in Chemical Engineering from the University of Birmingham.

He has recently completed a quantitative risk assessment and explosion risk assessment for a major anaerobic digestion plant (Dublin City WWTP) including quantitative risk assessment of fire and explosion risks.

He has a strong working relationship developed over many years with HSA (Health and Safety Authority), the body responsible for QRA in the process industries in the Republic of Ireland and other public authorities, including Fire Service, Environmental Health and Safety Officers and Local Authority Engineers;

He is a Technical Adviser to Clare Fire Brigade for a major bulk fuel storage and unloading terminal and has acted as Technical Expert and Inspector to An Bord Pleanala for a major accident hazard site public enquiry;

He is a Visiting Lecturer in Process and Safety Engineering at Queens University Belfast and a Visiting Lecturer at Trinity College Dublin for the Post-graduate Environmental Engineering Diploma. He has also recently been invited by Engineers Ireland to lecture on Seveso II and Seveso III and Process Safety and Fire and Explosion Modelling as part of their CPD programme.