



SCOTGEN (DUMFRIES) LTD
DARGAVEL ENERGY FROM WASTE FACILITY
SITE STATUS REPORT – V6

Author:

Date: 16 September 2011

Jim McIntyre
Specialist I
Ops Technical Support Unit

Site Details

Site Operator: **Scotgen (Dumfries) Ltd.**

National Grid Ref: **NY 0141 7730**

Address: **Dargavel Stores, Dumfries, DG1 3PG**

Telephone: **01387 240066**

Licenses: **PPC/A/1022412 (plus CAR/R/101129 sewage & CAR/L/1033239 abstraction)**

Background Information

This Installation is designed as a continuous batch incinerator with energy recovery; it is regulated by means of a PPC Permit to meet the standards required by the Waste Incineration Directive. The site accepts hazardous and non-hazardous waste, which is thermally treated in one of two identical waste lines. Each Line consists of 4 Primary Gasification Chambers (PGCs), which generate synthesis gas that is combusted in a Secondary Combustion Chamber (SCC). The hot gas exiting the SCC passes through a boiler pack to produce steam which will ultimately drive a turbine to produce electricity.

A link to the PPC Permit and a comprehensive assessment of the original Application "the Determination Document" can be found via the Public Participation Directive section of our website: http://www.sepa.org.uk/air/process_industry_regulation/pollution_prevention_control/public_participation_directive/ppd_consultations/closed/a1022412_14may09.aspx

The Permit Application, all emission monitoring, commissioning, quarterly, annual and incident reports relating to this site are available electronically from SEPA's Registrars at East Kilbride.

Commissioning History

The plant was Permitted in May 2009 and commenced cold (July), then hot (September) commissioning later that year. The first waste (clean wood) was burned in October 2009 and commissioning then progressed to municipal waste in December 2009. Problems then occurred with the boiler superheater tubes (attributed to fouling, high temperature and corrosion), resulting in the combustion activities being taken off-line to facilitate interim boiler modifications. Commissioning re-started on 11th March 2010, with waste again being thermally treated from 29th March 2010. The plant was therefore not operational during January, February and most of March 2010.

In 2010/2011 it was recognised that the poor performance of the boilers was significantly affecting operational efficiency and impeding progress on two main areas of environmental compliance:

- control over the combustion air flows was leading to temperature and oxygen excursions which in turn led to short term emission limit breaches, bypass stack activations and incident notifications; and
- a long-term fix to the boiler issues was needed before superheated steam could be generated and the steam turbine connected to the system.

Therefore, a project to re-design the boilers was initiated and an Application to Vary the PPC Permit to accommodate this change was submitted to SEPA on 19 May 2011 (the Application request was determined and a Variation Notice issued on 26 July 2011). Combustion activities ceased on 14th April 2011 and will not re-commence until the new units are installed (the boilers are not expected to hot fire until late December 2011 / early January 2012). Scotgen estimate that export of electrical power to the grid will take place ~ March 2012.

Additional Plant design issue:

- the ash handling system (to the rear of the PGCs) regularly blocks due to fused material forming in the Primary Chambers. Initial modifications to the ash conveying system did not resolve the problems and the system does not function as designed (ash is now removed by bucket loader from the front of the chamber). In the short term, interim upgrades to the dust suppression systems were proposed and accepted on 18 July 2011. In the medium term, detailed design proposals for a new ash conveying system are expected in 2012.

Control of Site Operations

A detailed assessment of the site control, monitoring and interlock systems can be found in the above link to the PPC Permit and the Permit Determination Decision Document. The PPC Permit requires routine monitoring of incoming waste, emissions to air, emissions to water and analysis of the ash residue. There are also daily visual, noise and odour assessments carried out by on-site staff and by SEPA Officers during inspection.

In order to assess the effectiveness of site control; SEPA's Technical Support Unit undertook an in-depth review of the Dargavel Facility in September 2010. The audit highlighted several areas of improvement required to staff training and management control of site operations. The Operator has initiated an improvement plan which is subject to ongoing review by SEPA and a further in-depth audit of the Site Environmental Management System (EMS), staff training packages and site operational procedures took place in August 2011 (prior to recommencement of gasification activities).

The August 2011 Audit noted a significant improvement in staff training (with job descriptions specified, comprehensive training in required work practices being delivered and necessary documentation available and up-to-date). There has also been a distinct improvement in the planning element of the EMS with many new operating procedures introduced and previously identified gaps in existing procedures amended as required. SEPA have recommended some additional tasks, to further refine the EMS, operating procedures and develop summary work instructions.

Reported Incidents

The PPC Permit requires that the cause of each Emission Limit Value (ELV) breach or "malfunction of equipment which had the potential to cause pollution" is reported to SEPA as an "incident" together with details of the emission concentrations, the immediate actions taken by the Operator to bring the system back into compliance and the system adjustments carried out to minimise the risk of a repetition under similar process conditions.

Since operations re-started in March 2010 (data correct to site closure on 14 April 2011) there have been 45 recorded noise complaints, 38 by-pass stack activations, 1 plant comms failure, 4 failures of the Continuous Emission Monitoring System and 284 notifications of short term ELV breaches: 19 VOC / 51 CO / 84 low temp at Secondary Combustion Chamber exit / 106 low O₂ / 6 NO₂ / 8 SO₂ / 3 HCl / 7 dust. For information on Dioxin / Furan results – see section below. Most of these breaches last a few minutes until the process control systems react to bring emissions back within range - in general daily and annual average ELVs are met. Such breaches are not unexpected during commissioning and development of the technology as the Operator adjusts the system. Records for each incident are available for inspection on our Public Register.

The only public complaints have related to noise impact. In most cases, the source of the noise has been identified: automatic door closers have been fitted to minimise noise breakout from the main process building; broadband reversing alarms have been fitted to site mobile plant; an engineering fix (to reduce low frequency tonal noise associated with the main ID fans) was installed towards the end of August 2010; and steam venting is now carried out at a significantly reduced pressure with little on-going noise impact. Complaints of general broadband noise from the ID fans and cooling towers persist – however, the site is now closed and the new boiler design should result in a significantly reduced load on the main ID fans (with a consequent reduction in noise emissions). Future issues will include the design of sound attenuation for the proposed steam turbine unit and associated pipework.

Discharges to Air

The air quality modelling studies (carried out as part of the original PPC Application) and monthly ambient air quality monitoring for NO_x and SO_x, at 4 locations around the site, are available on the Public Register at our East Kilbride Office. Monthly, quarterly and annual summary monitoring reports of emissions from process vents (as detailed in Table 6.1 of the PPC Permit) are also available.

Dioxins and Furans

Annexes 1 & 3 of Schedule 6 of the PPC Permit specify the dioxin ELVs for this Installation and how they are to be monitored and calculated. Section 4.2.3 and the Table on page 90 of the Permit Determination Document provide details of guideline values and how these were assessed by SEPA.

Stack sampling for dioxins and furans was carried out during commissioning (August 2010) by the Operator and found to be compliant. From November 2010 onwards the Operator entered the “operational” phase which requires monthly sampling.

SEPA contracted UKAS accredited consultants to undertake compliance monitoring for all Waste Incineration Directive (WID) pollutants in October 2010 – the results showed ELV breaches for mercury (reported as 1.95mgm^{-3} compared to an ELV of 0.05mgm^{-3}) and dioxins/furans (reported as 0.12ngm^{-3} compared to an ELV of 0.1ngm^{-3}). The final report was forwarded to SEPA in January 2011. SEPA investigated the process records and plant conditions at the time of sampling and could find no process fault to explain the results. Several other issues were raised with the monitoring contractor’s mass emission results and stack measurements for the October report and it was noted that the emission results for mercury and dioxins were not in keeping with the other sets of sampling (carried out in August, November and December 2010). SEPA therefore arranged for the stack emissions to be re-tested by a third independent contractor – those results confirmed compliant emissions levels similar to the Operator’s previous reports.

Results for Q4 (November and December) 2010 and Q1 (January, February and March) 2011 have been received and placed on the Public register - both waste streams were noted to be in compliance with Permit ELVs.

However, on 15 July 2011, SEPA were notified that the monitoring carried out on 05 April 2011 (prior to cessation of combustion activities) had noted a breach for dioxins/furans (reported as 0.13ngm^{-3} compared to an ELV of 0.1ngm^{-3}). The breach occurred during abnormal operating conditions on one waste stream (a significant water leak within the boiler). SEPA considered this a serious matter and, following an investigation by our Technical Support Unit, a warning letter was issued to Scotgen. Several features have been incorporated into the design of the new boilers which should reduce the risk of further breaches. Ultimately, the adequacy of the control and abatement systems will have to be demonstrated prior to recommencement of gasification activity on any halogen containing wastes.

Environmental Monitoring

The PPC Permit required sampling of soils (for metals, dioxins and furans) at 4 locations around the site prior to commencement of waste burning operations. These samples were taken at the start of commissioning in October 2009, in December 2009 and again in June 2010.

The “operational” phase monitoring requirements of the Permit commenced on 01 November 2010 and require two rounds of soil sampling per year (at each of the 4 agreed locations) for the first two years of operation; thereafter one set of samples per year. Sampling of soil in November and December 2010 was not possible due to the frozen ground conditions. Three rounds of sampling were therefore arranged for 2011. So far in 2011, samples have been taken in February and July. All results so far have been less than half the Scottish rural average and there is no upward trend evident. However, this assessment is limited by the relatively few samples collected and the fact that the Dumfries EFW Plant has only ever operated to ~30% installed capacity.

Air sampling: in addition to ambient NO_x and SO_x monitoring (see annual report available on the Public Register), spot samples of “metals in air” are to be taken at 4 locations in the vicinity of the site during the first years of operation. Due to a delay in obtaining a suitable power supply to the sampling points – Scotgen have yet to commence monitoring of “metals in air” and are in on-going discussions with SEPA to progress this non-compliance.

Discharges to Land

There are no disposals to land at this Installation. All ash residues are sampled and analysed prior to disposal. Recycling routes for the non-hazardous "Bottom Ash" are being sought (e.g. cement product manufacture). However, at present all non-hazardous ash is taken off-site and disposed of at a local landfill (Auchenlosh) in Dumfries and Galloway. "Fly Ash" and boiler residues are taken off-site for disposal at suitable hazardous waste landfill sites (Avondale near Falkirk, or one of Augean's three sites in England).

Discharges to the Water Environment

Process effluent - there are no direct discharges of process effluent to sewer at this Installation. Process effluent (arising from water cooling tower discharges, boiler blow down and cleaning of plant) is removed by vacuum tanker to the main sewer at Locharmoss (under a Trade Effluent Discharge Consent from Scottish Water) which is then treated at Troqueer Waste Water Treatment Plant.

Surface water - this site has an impermeable surface to prevent emissions to groundwater. There are no routes for direct discharge to groundwater from the PPC activities on-site. The site is served by a contained drainage system (in the areas where hazardous chemicals may be unloaded or stored) and a Sustainable Urban Drainage System (SUDS) which takes surface water run-off. The SUDS provides an additional measure of containment / treatment for any indirect releases of process effluent.

The SUDS contains a lined basin with outlet (rather than a pond) designed to allow surface water to gradually pass through the retention system. The sizing of the SUDS was detailed in Appendix 4 of the original Application and SEPA's assessment of it can be found on the previously supplied link to our PPC Permit and Determination Document.

The PPC Permit requires weekly (pH, suspended solids, conductivity, temperature and hydrocarbons) and monthly (Biological Oxygen Demand) monitoring of the SUDS system by the Operator; reporting of results on a quarterly basis and an annual inspection of the systems which protect groundwater. To date, there have been no issues with discharges to the water environment from this Installation.

SEPA Regulatory Activity

This site is regulated by a Lead Officer (Specialist) from our Technical Support Unit with assistance from other Specialists (Process Engineers) and Officers from the Local Dumfries & Galloway Team as necessary. At present the Lead Officer's workload is largely taken up with regulating this site. Other SEPA staff provide advice on scientific, policy, access to information and legal matters as they arise. The Lead Officer reports to SEPA through the Technical Support Unit Manager who is SEPA's Sector Lead for the Thermal Treatment of Wastes in Scotland.

SEPA closely monitors the operation of the plant, receives commissioning reports and monitoring data submissions, carries out inspections and, where necessary, writes formally to the Operator on specific issues. Two formal warning letters have been issued to Scotgen; the first (related to waste handling issues) was issued on 27 April 2010; and the second (related to the dioxin ELV breach that occurred on 05 April 2011) was issued on 31 August 2011. On 23 February 2011 SEPA formally advised the Operator that a remedial plan was required by 25 March 2011 to demonstrate that the process could be operated without further breaches of the PPC Permit – the plan was received and placed on the Public Register.

In addition to incident reports (as they occur) and commissioning reports, SEPA also receive quarterly, 6-monthly and annual environmental monitoring reports (on emissions to air, water, land and ash residue). All reports are available on our Public Register. SEPA inspect against compliance with the conditions of the PPC Permit and carry out routine waste audits during most site inspections. SEPA receive copies of waste consignment notes for all wastes entering the facility and also carry out forward audits at the final off-site disposal locations for the site bottom ash residues.