



SCOTGEN (DUMFRIES) LTD
DARGAVEL ENERGY FROM WASTE FACILITY
SITE STATUS REPORT – V7

Author:

Date: 08 May 2012

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 European 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 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-March 2010.

Boiler problems persisted and in 2010/2011 it was recognised that the poor performance of these units was significantly affecting plant operational efficiency and impeding progress on two main areas of environmental compliance:

- difficulty with 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.

Current Plant Re-Commissioning

A project to re-design the boilers was initiated and the proposals were accepted by SEPA on 26 July 2011 (copies of the Application by Scotgen and SEPA's determination of those proposals are available from our Public Registrars at East Kilbride). Combustion activities ceased on 14th April 2011 and did not re-commence until the new boilers were installed in early 2012. As part of the commissioning plan, the site began burning non-hazardous waste on 25 March 2012. SEPA are aware of four minor incidents which have occurred during the early stages of re-commissioning. The causes of all 4 incidents have been identified (Incident 1 - commissioning of the soot blowers lead to a loss of steam pressure resulting in short term low O₂ levels; 2 - external contractor access to a computer port lead to a software issue, temporary Comms failure, bypass stack activation and low O₂ level; 3 - failure of a boiler water level probe resulted in interlocks activating and bypass stack activations; and 4 - a kink in a steam valve control rod lead to short term O₂ level breach). All incidents were thoroughly investigated and resolved. Such issues are not unexpected during a commissioning program.

Notwithstanding the above monitoring / control / signalling issues which arose during the early phases of hot commissioning, initial results have been largely positive. Although it is too early to draw firm conclusions, the level of boiler fouling appears significantly reduced and on-line self cleaning systems appear effective. Scotgen plan to begin final commissioning of the steam turbine system in May and hope to be in a position to generate electrical energy in June 2012.

Additional Plant Design Issue

The ash handling system (to the rear of the PGCs) requires modification - ash is currently 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 by the end of Dec 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 initiated an improvement plan which is subject to ongoing review by SEPA and further in-depth audits 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 – these items will be followed up by routine inspection.

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 waste processing operations began in December 2009 until shut-down in April 2011, there were 45 noise complaints, 38 by-pass stack activations, ~200 reported emission limit breaches (mainly short term low temperature and O₂ levels), and ~100 notifications of short term exceedences – see previous Site Status Reports for details. Records for each incident are available for inspection on our Public Register. For information on Dioxin / Furan results – see section overleaf.

The only public complaints have related to noise impact. Over the commissioning period, automatic door closers have been fitted to minimise noise breakout from the main process building; broadband reversing alarms were fitted to site mobile plant; an engineering fix (to reduce low frequency tonal noise associated with the main ID fans) was installed; and steam venting is now carried out at reduced pressure through silencers with little on-going noise impact. The new boiler design should result in a significantly reduced load on the main ID fans (with a consequent reduction in noise emissions).

Since re-commissioning of the new boiler systems began, there have been 7 occasions when low O₂ levels were recorded in the SCC, 7 by-pass stack activations, one Comms failure, one breach of permitted operational hours, and one noise complaint (related to the early delivery of waste to site).

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 from both waste Lines.

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 indicated that both waste streams were 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.

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. 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 reports 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 did not commence this monitoring until December 2011.

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 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 accidental / indirect releases of process effluent.

The SUDS contains a lined basin with outlet 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 via the 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) 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 (to close the plant in April in order to facilitate upgrade of the boiler systems) 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.