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Julia Frost
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Chester Road
Buckley
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Ref. Environmental Permit EPR/BK6483IU/V003

Date: 15/12/2009

Dear Julia,

With reference to permit improvement condition 9.24, I attach a report on the Resin Coated Sand (RCS) ST9 furnace and ST11 incinerator operating temperatures, along with the key environmental control parameters for each process.

If you have any queries, please do not hesitate to contact me.

Yours sincerely,

John Malpas
Section Manager
Facilities and Environment

Enc: Report on the RCS ST9 Furnace and ST11 Incinerator Operating Temperatures

OK FOR PUBLIC RECORD	INITIALS	DATE
	W	21/12/09
COPIED TO PUBLIC RECORD	MR	24/12/09

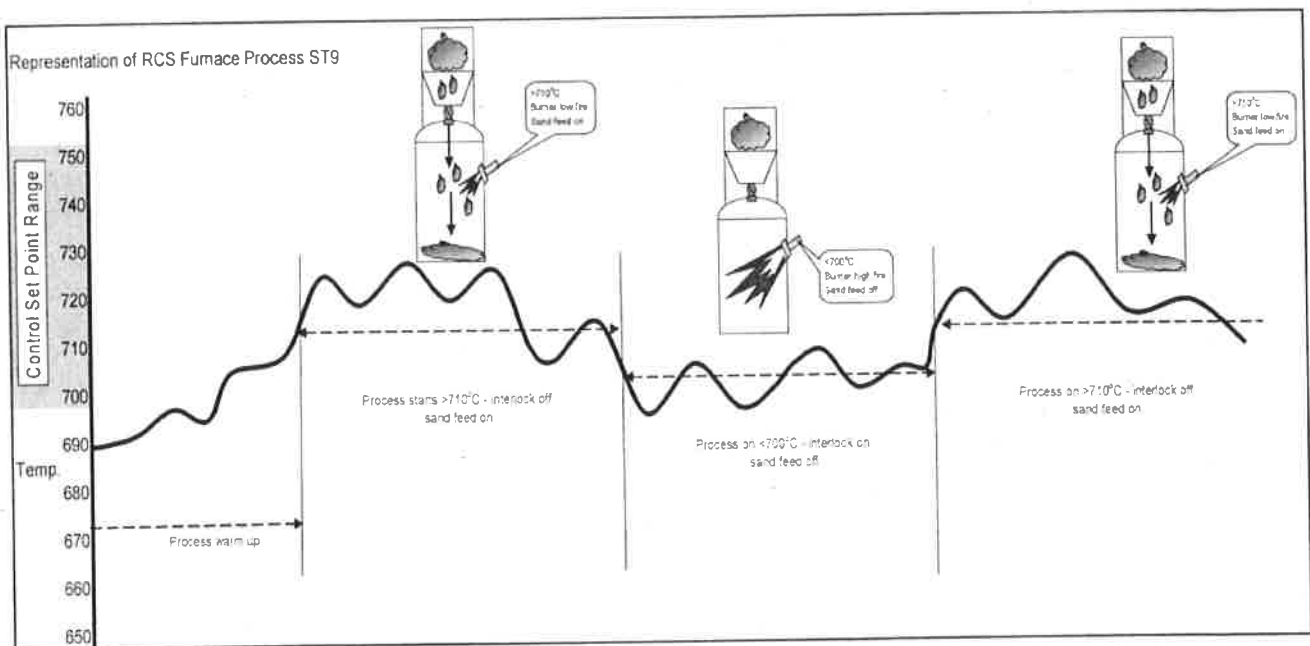
Report on the RCS ST9 Furnace and ST11 Incinerator Operating Temperatures

RCS Furnace ST9 – Removal of spent resin coating on sand

The furnace is a batch process with a capacity of 1 ton of spent sand per hour. The spent sand is heated to oxidize the VOC fume in the combustion chamber, which has a control set point range of 700 – 750°C (actual 710°C). The sand is hopper-fed into the furnace at ambient temperature. This has a cooling effect on the furnace and therefore, the burner will increase its firing rate to compensate. As the temperature approaches 710°C, the burner reduces fire, to reduce temperature overshoot. Further, sand addition will result in the furnace cooling again and the burner firing rate increasing. The furnace temperature is regulated by the burner modulating the effect of cold sand addition.

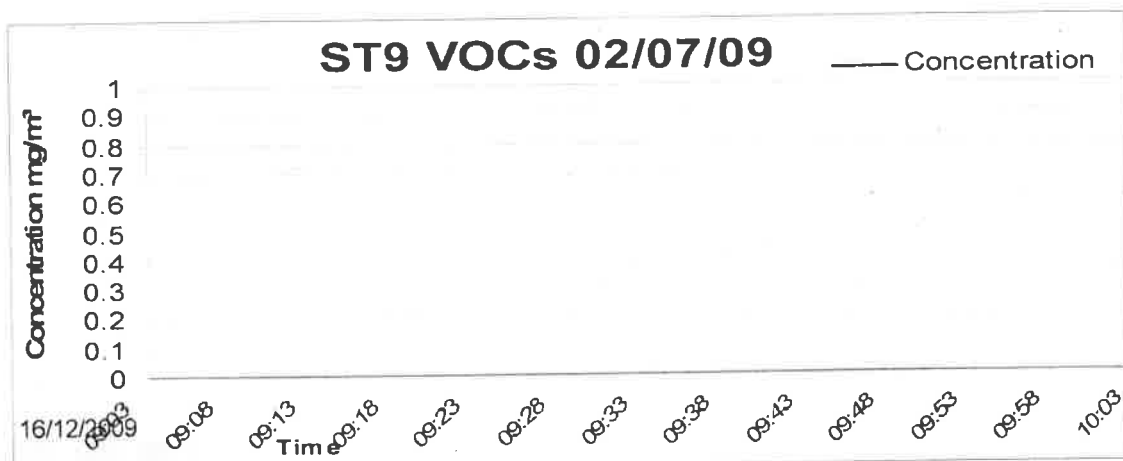
The sand feed hopper has an interlock, which only allows sand addition when the temperature is above the 710°C set point. There is also a process interlock on the furnace to prevent sand feed during temperatures below the 700°C control point.

Below is a representation of the RCS furnace process temperature profile:

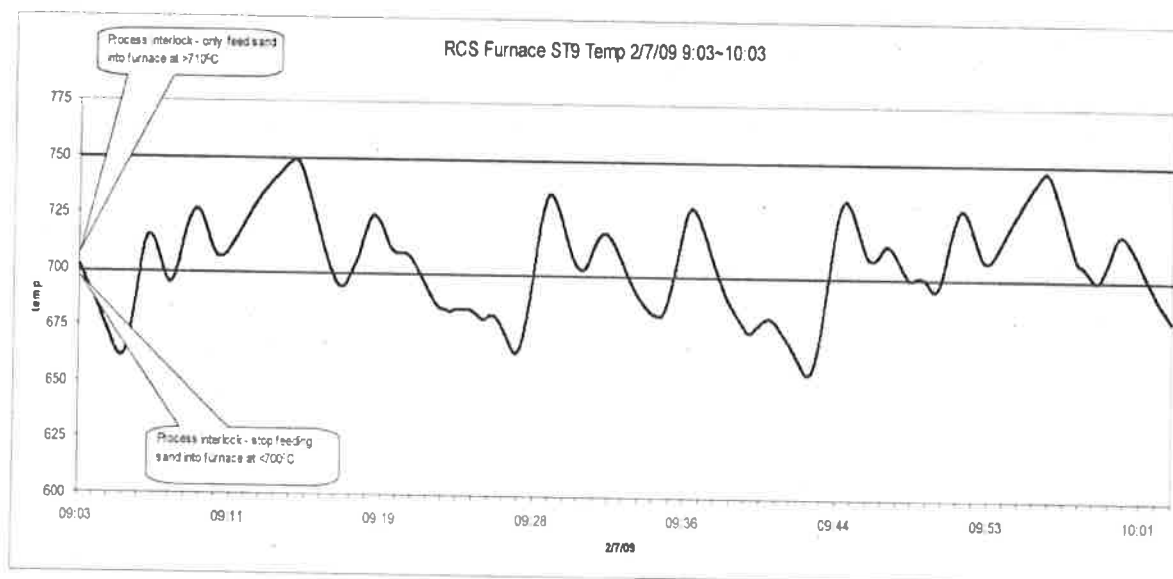


Although the actual furnace operating temperature will fall below the minimum control set point range (700°C), the process interlocks control the sand addition to ensure VOC abatement capacity is retained at all times.

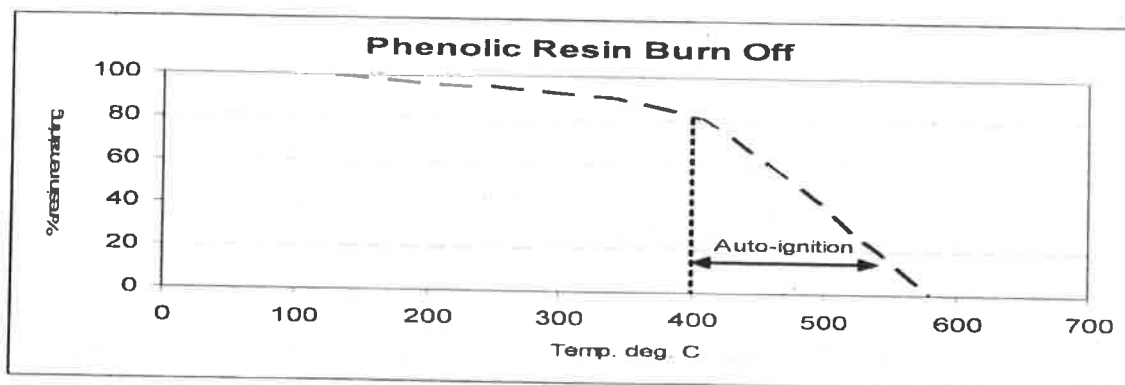
Routine MCERTS emissions testing on 2nd July 2009, 09:03 hours – 10:03 hours, reported no VOC's detected during a 1 hour batch emissions test:



During the same 1 hour batch, the RCS furnace operating temperature chart recorder shows the following trace, with deviation outside the 700°C – 750°C control set point range.



This data supports the information submitted in the ZR RCS permit application for variation Nov 2006, which shows phenolic resin burn-off, and auto-ignition temperature of 400 – 600 deg. C.



Summary of RCS furnace ST9 emissions monitoring 02/07/09:

Period	Batch monitoring period	Process	VOC mg/m3	Avg Recorded Temp. °C	Max Recorded Temp. °C	Min Recorded Temp. °C
09:03 – 10:03	1 hour	1 ton spent sand	None detected <LOD 0.4	704.3	749.1	655.7

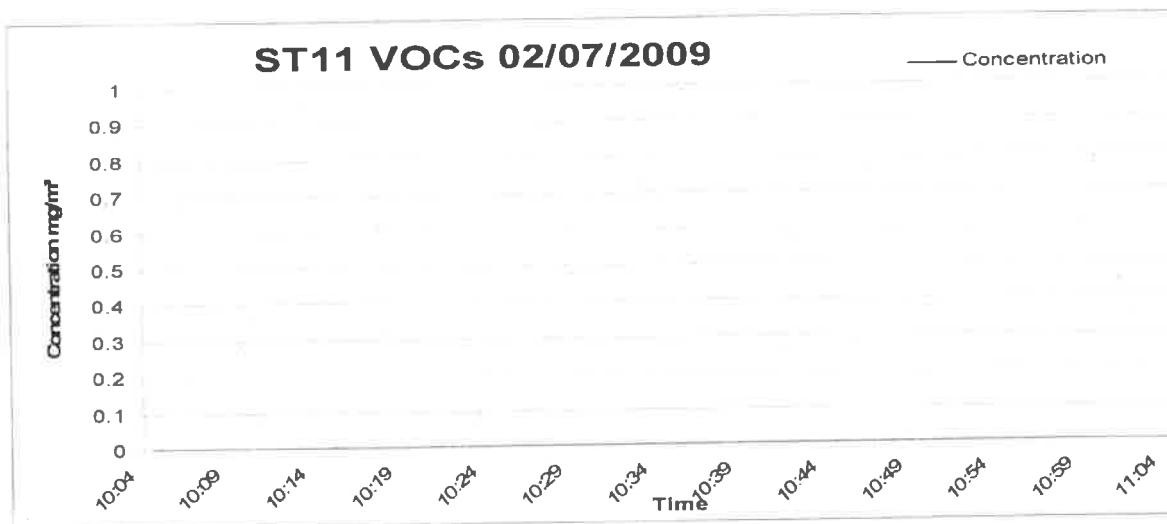
Therefore, the key environmental control parameters for the RCS furnace ST9 process are:

Parameter	Temp	Comments
Burner Control Set Point Range	700 – 750°C	Process idle time excluded
Process Operational Range	640 – 750°C	
Sand Feed On Interlock	>710°C	
Sand Feed Off Interlock	<700°C	

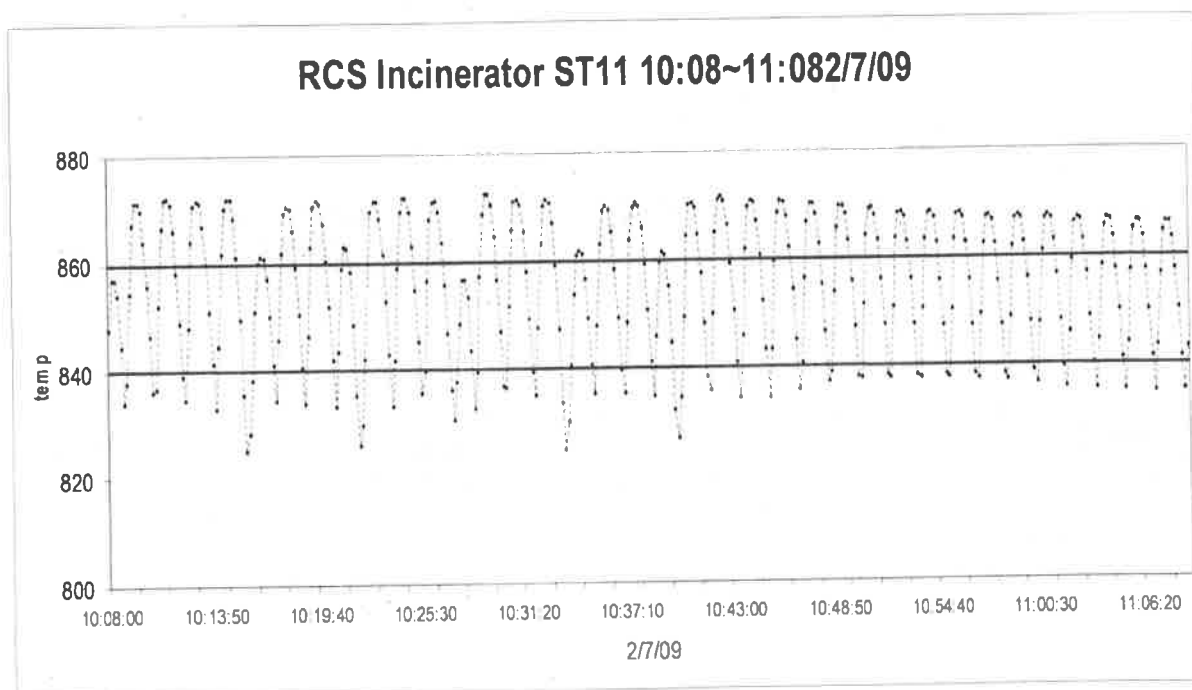
RCS Incinerator ST11 – Coating of reclaimed moulding sand with phenolic resin

The sand coating process has a capacity of 1 ton per hour, consisting of 10x 6 minute 100 kg cycles. The reclaimed sand is first heated before being fed into the mixer for coating with new phenolic resin. During coating, VOC is driven off which is abated in the coating incinerator ST11. To assist the coating process, a damper closes the fume extraction duct when the resin is dosed into the mixer. This stops the fine powder being drawn straight into the abatement process. Once the resin is mixed, the damper opens prior to the hexamine liquid dosing, to expel any VOC fume for abatement. Therefore, the incinerator, which is trying to hold the set point temperature (850°C) doesn't receive the cooler VOC fume constantly, but instead cyclically. This cyclical pattern causes furnace operating temperature variation.

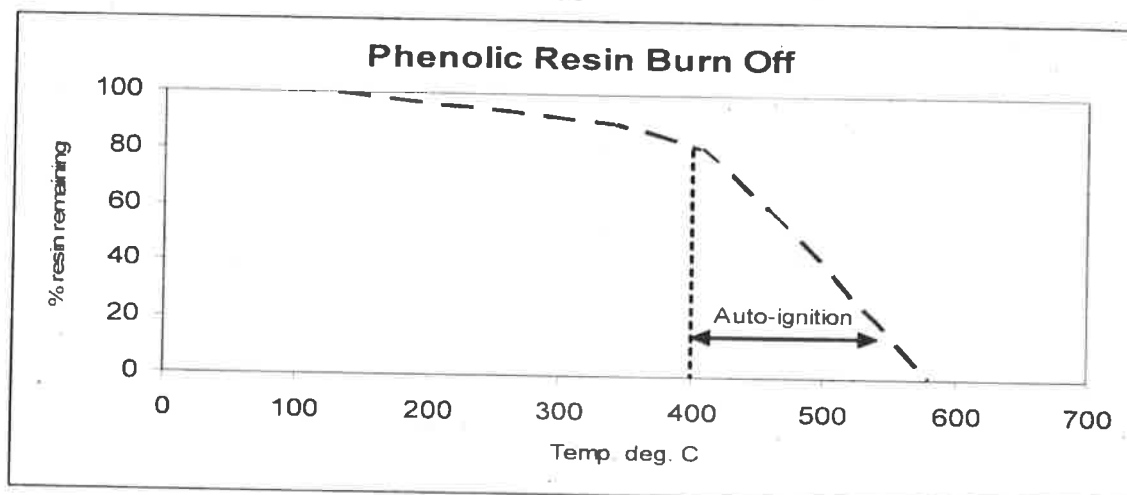
Routine MCERTS emissions testing on 2nd July 2009, 10:08 hours – 11:08 hours, reported no VOC's detected during a 1 hour batch emissions test:



During the same 1 hour batch, the RCS coating incinerator operating temperature chart recorder shows the following trace, with deviation outside the 840°C - 860°C control set point range.



The data supports the information submitted in the ZR RCS permit application for variation Nov 2006, which shows phenolic resin burn-off, and auto-ignition temperature at 400 – 600 deg. C.



To improve the burner control and reduce temperature deviation, the gas supply damper motor PLC control setting has been changed from "Extend Motor Life" to "Controllability". This increases the response rate of the damper by reducing motor lag. This change has provided a small reduction in set point temperature deviation, although the operating temperature still drifts outside the control set point range.

Summary of RCS incinerator ST11 emissions monitoring 02/07/09:

Period	Batch monitoring period	Process	VOC mg/m3	Avg Recorded Temp. °C	Max Recorded Temp. °C	Min Recorded Temp. °C
10:08 – 11:08	1 hour	1 ton coated sand	None detected <LOD 0.4	855.1	872.4	824.6

Therefore, the key environmental control parameters for the RCS incinerator ST11 process are:

Parameter	Temp	Comments
Burner Control Set Point Range	840 – 860°C	Process idle time excluded
Process Operational Range	810 – 880°C	

