Report Parameters:

Case ID	= "4297247"		
Include Related Cases	= "Y"	Include Investigation Tracking	= "Y"

Master Case 4297247

Company ID	4277540	**Company Name**	Scotgen (Dumfries) Limited
Site ID	4277541	**Site Name**	Lockerbie Road/Scotgen (Dumfries) LTD
Date Created	29/08/2012	**Status**	Closed-InvestComp
Category	RIDDOR	**Assigned To**	MacDonald,Callum
Type	DangerOccur	**Provider Group**	FOD SANE Ops 1 Group 3
Detail	Other		
Problem Summary	R/D 19/9 Scotgen (Dumfries) LTD DO on 6.8.12 External Pipe burst		
Problem Description	External pipe burst - cause under investigation		
Master Case Detail			

Incident Details

CC ID No.	74ABE75EB5	**Date Received/Reported**	07/08/2012
Notifier Name	Lloyd Brotherton	**Date of Incident**	06/08/2012
First Name		**Time of Incident**	1:40 PM
Last Name		**Reportable?**	Y
Sex		**Mandatory Investigation**	Yes
Age		**Formal Enquiry**	
IP Status		**Coroner's Verdict**	
Occupation			

Master Case Notes

Note Summary		**Date Note Added**	24/09/2012 01:36:29 PM
Specialist advice note			
Note Details		**Attachments**	

12/9/12 JV with Callum MacDonald HM Inspector, met with [redacted] and [redacted]. Purpose of the visit was to investigate a reported DO concerning pipe failure on Boiler no. 1.

The company described the event as known to them, this comprised a burst pipe on a section of pipe they have identified as the outlet section from the first evaporative section of the boiler. They believe the incident occurred because temperature trip switch TS3377 did not to function when subsequently tested. At the time of the incident the steam produced in the first evaporative section was greater than the design temperature for the pipework, the temperature switch should detect this and activate a bypass on the stack to discharge excess heat..

The two identical boilers are new being supplied and commissioned March / April 2012, they replace the original boilers from 2007; the Boiler manufacturer is Greens Power Ltd, Wakefield. The boilers are controlled by PLC with a SCADA system overlaying this.

In other documentation (SEPA) reference was made to employees dealing with an recirculation pump alarm at the time of the incident. I was informed two recirculation pumps A and B are fitted per boiler, A is in continuous use, B is a standby. A flow sensor will activate an alarm if low flow is detected in the recirculation circuit, this alarm had occurred immediately prior to the incident. The company informed me that when this occurs they will try to reset pump A, if within a short time <1 minute that fails they believe that the PLC should bring the standby pump B on line. If that fails then a decision appears to be taken whether to open the bypass on the stack. They have a time limit set by SEPA licence conditions which the bypass can be open, If I understood correctly this is 4 hours. If an incident is likely to last longer than that they would need to shut down the boiler.

I was informed that as well as the low flow alarm sounding at the time of the incident, pump A had been previously removed from the site for repair and they were using pump B. No replacement for A had been installed. They were not clear how or if the PLC recognises this situation. Even If the PLC assumes it has activated the standby pump, with it not being present the low flow alarm should activate. With the information available this might have happened but the company did not distinguish that there were in effect 2 alarms one after the other relating to low flow pump A followed by low flow pump B.

I was informed the company understand the low flow sensor and high temperature sensor to

scotgen_update.htm
Boiler_1_Certs_for_HSE.pdf
scan00806.pdf
Scotgen_InformationRequest140113.doc
ScotgenInformationRequest_GHA261112.doc
ScotgenInformationRequest_Greens261112.doc

be independent.

I have requested company to supply further details as they did not have all the information to hand and are awaiting some from third parties. Boiler 1 remains off line however boiler 2 is operational, I have recommended they discuss with the Boiler manufacturer the function of the PLC, alarms etc. and amend any local instructions as necessary.

I also took the opportunity to look at the written scheme of work they have had produced by Allianz for thorough examination of the boilers. They were unclear on the identification numbers used for the different items of equipment and I recommended they clarify this.

14/9/12 - copies of certification for boiler received - satisfactory

17/9/12 - copy of documentation for temperature switch received. This appears to be the order and declaration of conformity from the switch manufacturer. It suggests that there should be a final test certificate showing compliance with set point and mid-range temperatures. This isn't included and I have requested them to provide a copy.

18/9/12 - e mail clarifying plant and serial numbers used on written scheme of examination - satisfactory

14/11/12 meeting with boiler manufacturer Greens Power ltd at their office in Wakefield to discuss failure of pipework at outlet of evaporator 1 on stream 1 at Scotgen Dumfries, JV with Jim Corbridge HMPI SG (mech eng north). Met with [redacted] (all Greens Power Ltd) and [redacted] Later met with [redacted]
Both Boilers were manufactured to BS EN 12952, operating pressure is 40 Bar @ 250 oc. Max gasification temperature specified by Scotgen was 1100 oc, max design temp is 1200oc and actual is understood to have been 850oc or less. Each was specified as a closed system (the site stated they had no drainage available) and use 2 circulation pumps in parallel, 1 duty and 1 standby,
Incident was initiated by overheating of header & pipework leading to rupture of pipework at 90 deg bend. The cause is either a failure of circulation pump or air not vented, Both could lead to boiler tubes not containing sufficient water internally and rise in temperature of pipework outside design specification.
Because of waste being burnt and used as fuel, input heat cannot be 'switched off' therefore

in above situation bypass to stack should open (within 10sec quoted), which diverts heat away from the boiler. This should have happened automatically on receipt of low flow signal from circulation pump or high temperature signal from temp switch at outlet of evaporator 1. Natural circulation of water i.e. pump failure is within capability of the boiler but bypass must be open. Greens recommendations following incident were to

- replace header,
- internal examination of top 2 rows of tubes as per Test House report,
- Replace failed pipework.
- Leave vent partially cracked on start up

They have

- replaced the header
- on instruction from Scotgen removed top 4 rows of boiler tubes,

and understand

- the pipework has been replaced by a n other (possibly Alston).
- Temperature switch has been replaced with a temperature sensor / switch with display.
- Vent is left open permanently.

We were informed that removing the top 4 rows of tubes has not affected the design temp and pressure of the boiler but reduced the steam generation available subsequently for the turbine, latter isn't and hasn't worked so this isn't currently an issue. Agreement between Greens and Scotgen that Gasification temp now reduced from 1100 to 850 oc, they understand Scotgen have never been able to achieve in excess of 850 oc. Bypass flap should operate at this temperature but Greens do not know if the parameter has been changed.

Greens are to clarify Test House Report comments concerning material hardness test results but their initial reaction is that it is satisfactory.

Greens claim commissioning of the boilers has not been completed due to original site operator going into liquidation part way through process. Greens did issue some declaration of conformities for the boiler but not a handover certificate. They are to verify the status of these certificates and whether one is for final installation. They recognise the commissioning may have been subsequently completed by others.

Greens have written to Scotgen expressing some concerns with the boiler due to commissioning not been completed and advising in their opinion it shouldn't be operating.

CDM coordinator has done likewise. Their most serious concern in H&S terms appears to be with the water level particularly during soot cleaning where they understand an employee is responsible for monitoring and maintaining the water level manually. Feed water control valve should operate to maintain water level and mitigate for any losses in system, the soot clearing is a deliberate loss but others could occur when no one is monitoring resulting in low water level, overheating etc.

Greens and CDM coordinator to be requested to provide copies of written corresponadnce with Scotgen with aim of discussing current situation with Scotgen.

13/12/12 attended meeting with Callum where we met with [redacted] and [redacted] both SEPA [redacted] They gave a background to the site and its operations, It appears that SEPA are pushing Scotgen to get the whole plant up and running, indicating a deadline of the second half of 2013. They explained the licence conditions for the plant including reporting conditions when discharges from the stack occur due to the bypass being open. They understand that this can't be at the expense of H&S and that HSE's current involvement was concerned with the boiler not the whole plant. We discussed with them the most likely cause of failure and what actions have subsequently been taken by the site and boiler manufacturer. It wasd explained HSE needed further information from Scotgen ijn light of comments made by the boiler manufacturer and this was in the process of being obtained which would be used to inform further action.

Note Summary **Date Note Added** 17/01/2013 12:32:34 PM

Contact Detail

Note Details **Attachments**

12/09/12. JV Peter Dodd (Mech Spec) to Scotgen site, Dumfries. Met with [redacted]

14/09/12. Email received from [redacted] supplying boiler certification and update.

17/09/12. Email received from [redacted] detailing beta switch certification.

18/09/12. Email received from [redacted] detailing written scheme referencing.

03/10/12. Email received from [redacted] supplying incident reports.

26/11/12. Request for information sent to boiler manufacturers (Greens) and CDM Agent (GHA) (attached). Replies received and given to Peter Dodd.

13/12/12. Meeting in Glasgow HSE Office with Peter Dodd and SEPA ([redacted]

14/01/13. Request for further information sent to Scotgen (attached).

25/01/13. Inititial response received from Scotgen (attached).

01/03/13. Letter sent to Scotgen (attached)

04/03/13. Email received from [redacted] clarfiying that the temperature into the boiler should not exceed 850 - (Letter of 1st March had said gasification chamber rather than boiler). Updated letter (rev1) attached.

ScotgenEmail140912.htm
Scotgen_Boiler_1_Certs_for_HSE.pdf
ScotgenEmail_170912.htm
Scotgen_Temp_Switch_Doc.pdf
ScotgenEmail180912.htm
ScotgenEmail_031012.htm
Green_s_Report.pdf
Green_s_report_2.pdf
Green_s_visit_report.docx
Scotgen_Incident_Report_1.pdf
Answers_Qu_3
5
8___9_for_HSE.docx
...<moreattachments>

Note Summary
Investigation Detail

Date Note Added 11/04/2013 02:28:02 PM

Note Details

Attachments

Names (and agencies) of other investigators: [redacted]
Scottish Environment Protection Agency (SEPA) was consulted and kept informed of our investigation

Role of duty holder: Employer in terms of HSWA Sections 2 and 3

Other interested agencies: SEPA as above

Background / incident/details/consequences
Scotgen is a waste gasification facility. Within their building near Dumfries there are two waste streams, comprising of one boiler on each. On 6th August 2012 there was a pipe burst on the outlet section from the first evaporative section of the boiler on stream one. On examination of the pipe, post incident by Greens Power Ltd (Boiler Manufacturer), there was evidence of overheating of the pipework but the tests conducted were not conclusive in showing that the overheating directly caused the burst. Assistance was requested from Specialist Mechanical Inspector, Peter Dodd. See attached note.

One member of staff received a minor injury during the incident which was not required to be reported to HSE under the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations. There were no other immediate health and safety outcomes from the burst itself at the time due to the location of the particular part of the plant and the normal absence of any staff from that area. The wider implications of a burst in steam plant were the main reason for investigating the incident.

When the burst occurred, the system was quenched and the existing heat in the boiler was removed via the bypass stack. When the temperature reaches and exceeds a pre-determined level, a temperature switch should recognise this and activate the bypass stack to remove excess heat.

Immediate/underlying causes
It is understood that in this incident, the temperature switch did not function and therefore the excess heat was not removed. The temperature switches on both streams were replaced and ongoing testing and maintenance of these switches now exists. The company have been

advised that temperature switches that are safety critical must be maintained accordingly. There is no evidence to suggest that there are other temperature switches within the plant with a similar default. The metallurgy of the failed pipework was examined post incident and an appropriate replacement was fitted. This was organised through the original boiler manufacturer.

Enforcement Action /Duty holder Action
During the investigation, concerns were raised in writing in relation to how the company were treating the water in the boiler, access to competent persons for health and safety matters and management of the written scheme of examination in accordance with the Pressure Systems Safety Regulations. Details of these concerns and the response from Scotgen is attached, and it is considered that the responses are satisfactory. Also discussed with the company was how to manage the operation of the duty and standby water circulation pumps.

Scotgen have also been made aware of HSE Guidance Document INDG436, Safe Management of Industrial Steam and Hot Water Boilers.

Conclusions
No further action is proposed

Investigation Tracking Data

Planned Review Date	25/05/2013	**Employee Rep Contacted**	N
Review Completed Date	11/04/2013	**EMM1 Completed**	N
Contact with Bereaved / IP / Complainant	N	**AIMS Used**	N

Review Notes

22/10/2012, DO is to be investigated with mechanical specialist input to ascertain appropriate design and operating conditions for safe operation of plant. Jim Young
31/3/2012. Investigation has lead to a significant number of queries about the design and operational parameters of the pressures systems side of this plant. SEPA have an interest and a meeting took place 13/12/2012 to share information. Investigation continues. Jim Young
25/3/2013 Concerns have been raised with operator and satisfactory responses received. . Case to be written up and closed. Jim Young

Service Orders Related to Master Case 4297247

SO ID	SVC4248012	**Provider Group**	SG Mechanical - North
Date Created	29/08/2012	**Assigned To**	Dodd,Peter
Start Date	29/08/2012	**Service Type**	Assessment
Status	Complete	**Service**	Specialist Assistance

Note Summary

Date Note Added 30/08/2012 14:22:00

Specialist assistance request to investigate boiler incident

Note Description

Attachments

Reported pipe failure associated with a boiler received, mention of a temperature switch failing and company reviewing boiler venting. There are no details of the safety components fitted or whether they have functioned or not. The plant derive fuel gas from waste. Minor injury to one employee and damage to plant and building.