

Appendix X:
Infrared Fire System

AUTOMATED REMOTE FIRE SUPPRESSION SYSTEM

Benedict Recycling has recently designed and installed an automated remote fire suppression system at its Unanderra and Newcastle sites in response to fires that broke out in the mixed light waste stockpiles held at the sites. It was suspected that smouldering wastes were inadvertently accepted in front lift truckloads and during the night, slowly ignited. Besides this installation, a greater scrutiny protocol for ash/hot residues has been instituted.

The Unanderra site was first to be fitted with the system which integrates thermal imaging technology with fire suppression equipment, CCTV and third-party remote monitoring. Together, the thermal imaging cameras and software are capable of pin-pointing hot spots and initiating an automated fire-fighting response.

EQUIPMENT

Thermal Imaging Cameras

A series of four (4) thermal imaging cameras have been installed above the mixed light waste stockpile. These cameras measure and track temperature differences and stream infrared images with embedded temperature readings, identifying 'hot spots' within the area monitored (see Figure 1 below for typical example). These cameras have the ability to "look" some 6 metres into the mass of the stockpile.



Figure 1: Infrared Image Capture

Fire Suppression

The thermal imaging cameras are integrated with fire suppression equipment dedicated to the mixed light waste stockpile. A 100mm ring main with 50mm branch lines supplies six (6) water cannons positioned on either side of the light waste stockpile as shown below in Figure 2.

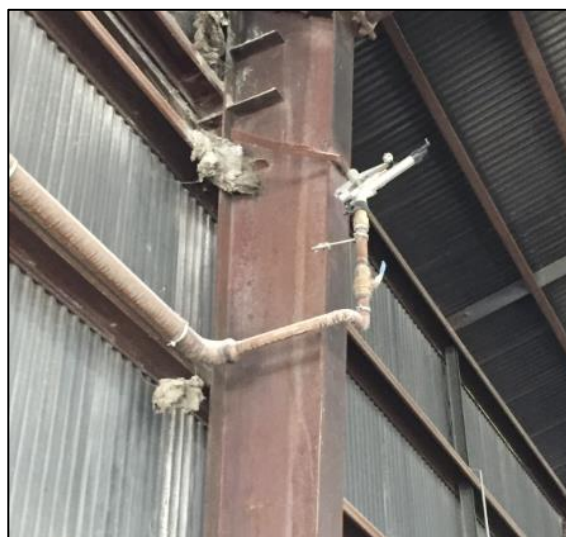


Figure 2: Water Cannon

Each water cannon has a capacity to deliver water at a rate of 160 litres per minute and when activated, all six (6) cannons operate simultaneously, covering the light waste stockpile area which is approximately forty (40) metres long and twenty-five (25) metres wide. The schematic in Figure 3 below shows the approximate location of both thermal imaging cameras and the water cannons in relation to the light waste stockpile.



Figure 3: Light Waste Fire Suppression Schematic

Figure 4 below shows the relative location of the thermal imaging cameras and water cannons within the shed on site.

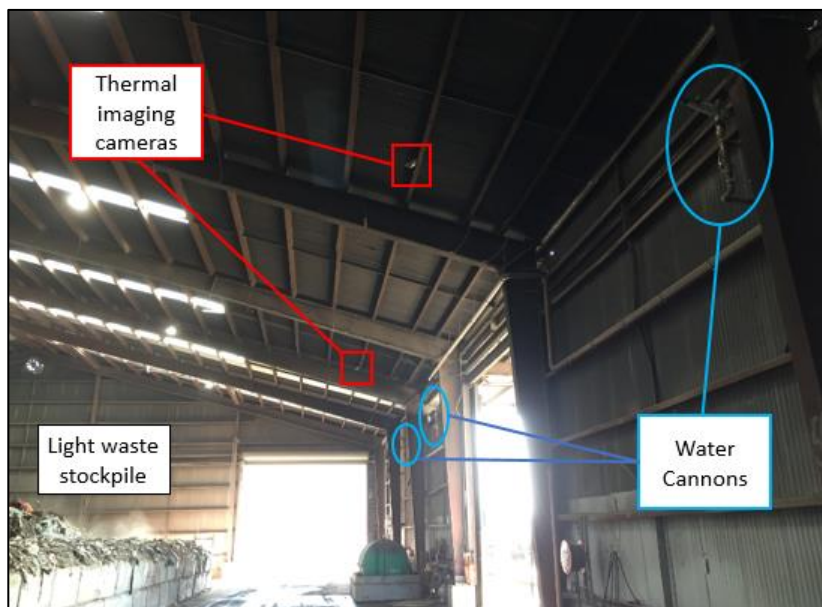


Figure 4: Location of Equipment

OPERATION

During normal operating hours, the thermal imaging cameras operate continuously and can be monitored together with the general security cameras from the site office and remotely via the internet. In the event that a hot spot (or smouldering fire) is identified during normal operating hours when the site is manned, the water cannons can be manually activated via a remote manual control panel (see

Figure 4 below). It is not left on “automatic” during normal business hours as the heat signature from a vehicle or machinery will activate the water cannons.



Figure 4: Water Cannon Manual Control Panel

Outside normal operating hours (when the site is not manned) activation of the water cannons is automatically triggered when the programmed temperature limit (currently set at 68 degrees Celsius) is detected by the thermal imaging cameras. The site alarm system is triggered by the temperature exceedance detected by any camera and a solenoid is activated which initiates the fire suppression water cannons. Simultaneously, an alarm notification is sent to the third-party remote monitoring control room, who notifies the Site Supervisor, and where observation of the stockpile area is made via CCTV security cameras as well as a determination made as to whether the Fire Brigade should be called. In addition, a strobe light and siren are activated locally within the shed.

Even after activation of the fire suppression system, the thermal imaging cameras continue to measure and track temperature readings. The run time of the fire suppression system is programmable (currently set at 30 seconds duration) and will cycle repeatedly until such time as the temperature readings fall below the programmed temperature limit. Figures 5 and 6 below show the water cannons in operation.



Figure 5: Water Cannons Operational



Figure 6: Water Cannons Operational

ADVANTAGES

The system is intended for use primarily outside of normal operating hours, when the site is unmanned, however it has the benefit of instantaneous drenching of the waste stockpile if required during normal business hours. Having the thermal imaging technology and fire suppression equipment integrated with the CCTV and third-party remote monitoring, effectively provides 'around the clock' visibility.

A thermal monitoring system such as this, is capable of detecting rising temperatures before any fire has the chance to establish and spread. Additionally, continuous remote monitoring of temperatures in waste stockpiles can assist in preventing fires by detecting even modestly rising temperatures ('hot spots') before they have the opportunity to ignite.

With a programmable temperature limit, the system is able to cater for seasonal variations in ambient temperature, that is, in the colder winter months it is possible to set the temperature limit lower than usual, enabling earlier detection of any rising temperatures within the stockpile.

Remote live 'streaming' of the thermal imaging cameras is accessible to key operational personnel using mobile/tablet/desktop computer, enabling essentially 24 hours/7 days monitoring ability.

Benedict Recycling intends to deploy this system in all of its planned 4 new facilities as well as at Chipping Norton.